

FEBRUARY

25 CENTS

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD. TRADE MARK, GREAT BRITAIN, NO. 40430

REG. U.S. PAT. OFF.



SEE PAGE 186

Copyrighted material



STOP THIEF STOP
GET AWAY FROM ME
TAKE YOUR HANDS OFF ME
LOOK OUT THIEF LOOK OUT

This Queer Little Automatic Device Protects My Car From Thieves

ELECTRICALLY!

I have hit on something truly amazing. Since the first discoveries of radio, I know there has been nothing so startling and uncanny. My little secret device guards every part of your automobile from spare tire to headlights and steering wheel. In your garage or on the street it is on the job 24 hours a day. Never sleeps, rests or gets tired. Already approved by insurance companies and motor associations. Now offered on 5-day test.

Puzzles Everyone!

THIS little, automatic "electric-watchman" invention is called "Devil-Dog." It is not only a new kind of device, it is an *entirely new idea!* Absolutely unique and utterly different than anything anyone ever saw before. So startling that it grips the imagination of everyone from the millionaire Rolls-Royce owner to the fellow who drives a second-hand Ford. Until he knows the secret every motorist will swear that you have someone hiding in your car. He just simply can't *believe* there can be such a device as this queer "electrical-watchman."

INSTALLED IN 10 MINUTES — COSTS NOTHING TO OPERATE

Every man who owns a car can afford Devil-Dog. Actually, no man who owns a car can afford to be without this inexpensive protection. Last year over 116,000 automobiles were stolen in this country. Millions of dollars' worth of spare parts were pilfered by sneak thieves. Now Devil-Dog can be installed by anyone in ten minutes or less. There

is absolutely no cost for operation. No extra batteries to buy. It will last as long as the car. And you hide the secret switch button anywhere you want to around your car. It's nothing but common sense for a man to grab Devil-Dog the very first time he sees it demonstrated. No wonder distributors already are cleaning up young fortunes!

5-DAY FREE TEST

I invite readers of this magazine to send for the special 5-day test offer now being made on Devil-Dog. Test it. Show your friends. If your present income is less than about \$50 a week, profit opportunities as my spare-time or full-time representative may surprise you. My one condition is, I want men to help me *quick!* Write me today!

**AUTOMATIC
 DEVIL DOG**

**NORTHWEST ELECTRIC CORP.
 Dept. B-10, Pukwana, So. Dak.**



RECORD EARNINGS — \$138 IN A DAY!

Every Devil-Dog sale brings you a real profit. No penny-ante little business! That's another reason Devil-Dog is a *real big money maker!* C. Oliver, Illinois representative, reports, "Made \$138 in a day. This is the easiest way to make money quick I ever heard of. My next order will be for 1,000." That's the top record so far. Who will beat it first?

POLICE BUY FOR ARMORED CAR

Richard Jacques, Canada, just started, writes, "Here's our order for 24 Devil-Dogs. I have sold one to the police for their armored car. Am also getting letters from the Chief of Police and the Detective Department. Tomorrow we demonstrate to the motor league."

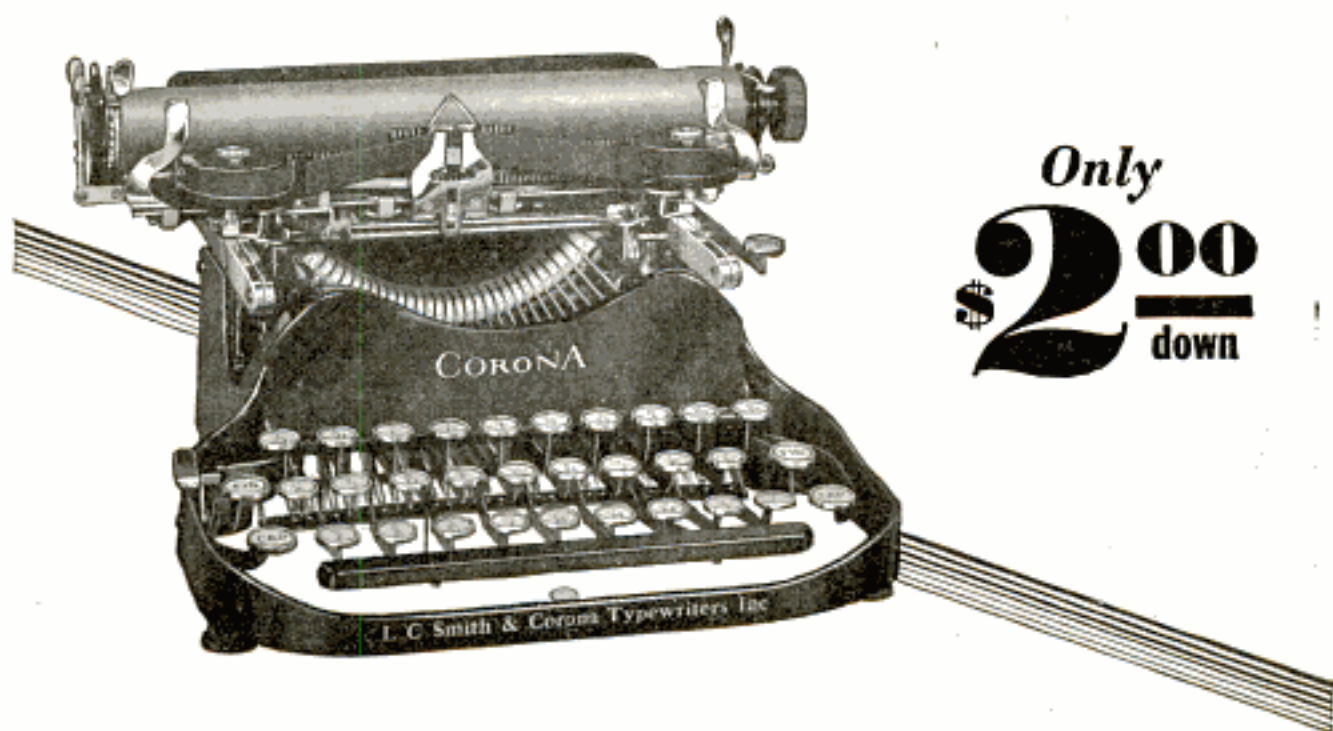
Northwest Electric Corp., Dept. B-10,
 Pukwana, So. Dak.

Rush territory details and your 5-day test offer without obligation.

Name.....

Address.....

Town..... State.....



BRAND NEW CORONA GENUINE Model #3

*Lowest Price — Easiest Terms
Ever Offered*

HERE'S your chance to own that *brand new* Genuine Model 3 Corona you've wanted — on the easiest terms ever offered — at **LOWEST PRICE** ever offered. Complete in every detail; back spacer, etc. *Manufacturer's Guarantee*. Recognized the world over as the finest, strongest, sturdiest portable built.

Yours for **10 DAYS TRIAL**

Try this wonderful portable typewriter — the same machine that has satisfied 500,000 users. Experience the joy this personal writing portable typewriter can give you! Use it ten days free! See how easy it is to run and the splendidly typed letters it turns out. Ideal for the office desk, home, traveling. Small, compact, light, convenient. Don't send out letters, manuscripts, reports, bills in poor handwriting when you can have this Corona at such a low price on such easy terms. Remember these are *brand new* machines right out of the Corona factory.

Carrying Case Included If You Act Now!

Leatheroid carrying case, oiler, instructions, free on this offer. Send no money — just the coupon. Without delay or red tape we will send you the Corona. Try it 10

days. If you decide to keep it, send us only \$2.00 — then \$3.00 a month until our special price of \$39.90 is paid. Now is the time to buy. Mail coupon today!



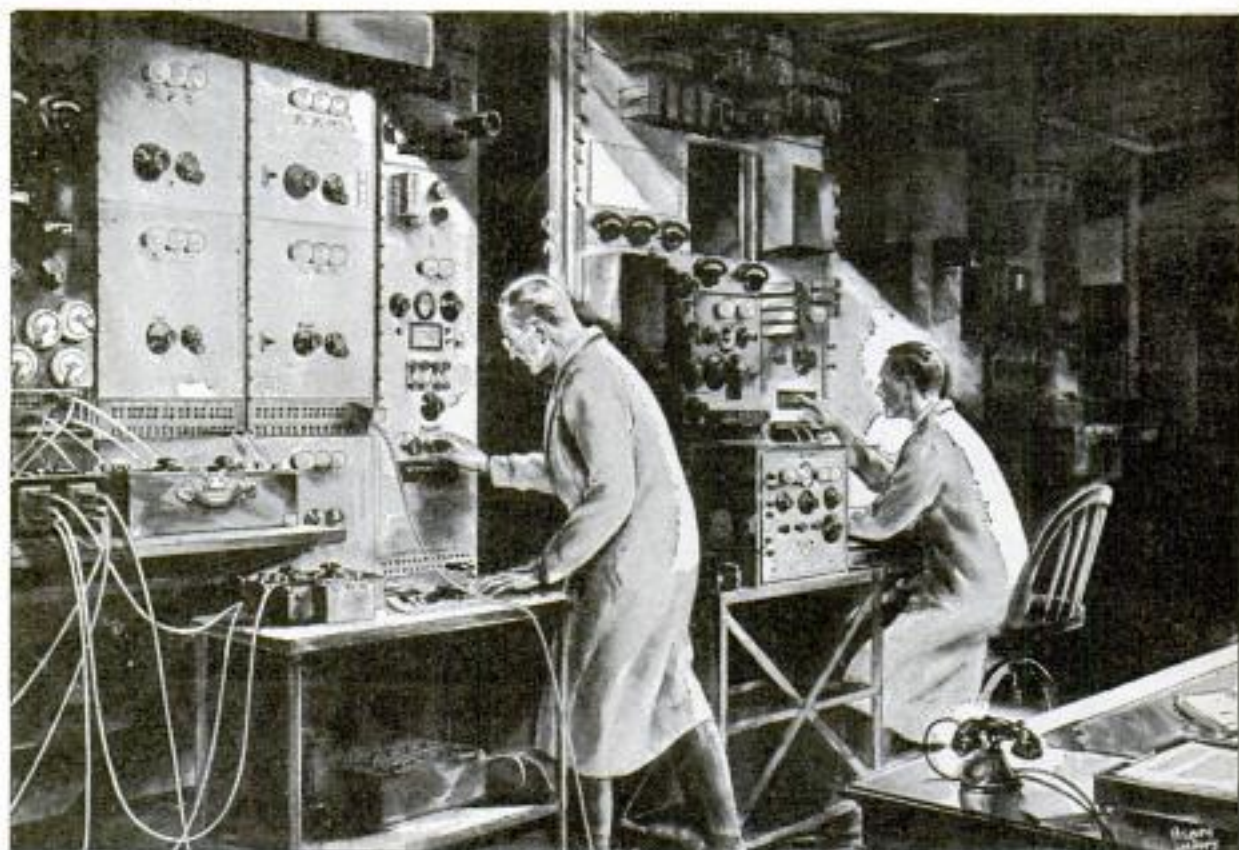
Save Money—Use this Coupon

Smith Typewriter Sales Corp., (Corona Division)
469 E. Ohio St., Chicago, Ill. Dept. 32
Ship me the Corona, P. O. B. Chicago. On arrival I'll deposit \$2 with express agent. If I keep the machine, I'll send you \$3 a month until the \$37.90 balance of \$39.90 price is paid; the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent, and get my money back. You are to give your standard guarantee.

Name _____

Address _____

Employed by _____



THE STEADY SCIENTIFIC PROGRESS OF THE BELL LABORATORIES SHOWS IN THE EVER-INCREASING QUALITY AND SCOPE OF YOUR TELEPHONE SERVICE

To clear all barriers for the human voice

An Advertisement of the American Telephone and Telegraph Company

BELL TELEPHONE LABORATORIES, Incorporated, is the scene of a progressive conquest of natural forces that aims to let you speak clearly, quickly and cheaply to any one, anywhere in the land and even to distant countries. More than 5000 scientists and assistants are busy there and elsewhere in the Bell System studying the problems of sound transmission. Its work is the growing foundation of the telephone art; and it has, besides, helped to make possible the radio, sound pictures and special apparatus for the medical profession.

Among its achievements are the underground cables which make city telephone service possible, better and faster long distance service, service to ships at sea, and to millions of telephones beyond the seas. The steady

scientific progress of the Bell Laboratories shows in the ever-increasing quality and scope of your telephone service. Its new developments in every type of equipment clarify and speed up your telephone talks and give you more and better service at low rates. Every advance it makes is available throughout the Bell System.

The Bell System is an American institution owned by more than 500,000 stockholders. It places before you the benefits of its technical achievements and the coordinated efforts of more than 400,000 trained workers. It accepts its responsibility to further the development and welfare of the nation by furnishing the public the best of telephone service at the least cost consistent with financial safety.



Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

London: Hachette & Cie.,
3 La Belle Sauvage, Ludgate Hill, W. C. 2

Paris: Hachette & Cie.,
111 Rue Reaumur

Melbourne: Gordon & Gotch
509-513 Little Collins St.

ISSUED MONTHLY

SUBSCRIPTION:

SINGLE COPY, 25 CENTS

In United States and its possessions, Canada, Cuba, Mexico, and all countries in the Pan-American Postal Union, per year, postpaid } \$2.50

To all other countries in the Postal Union 3.00

All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.

Entered as Second Class Matter Sept. 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.

Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

Copyright, 1931, by Popular Mechanics Co.

Copyright in Australia. Copyright in France

Vol. 55

Contents for February, 1931

No. 2

Special Features

The Electrical Lever	202
New Conquests for Ancient Metal (copper)	210
A Floating Power Plant	217
Round the Horn in a Windjammer	226
Sound Tricks in the Talkies	236
Thrills of the Spring Log Drive	242
Keeping Pace with the Gangsters	250
Battleships under the Sea	266
Uncle Sam Enters Atlantic Race	275
With the Arctic Air Mail	281
A Cold Wave Factory	291
Air Mail—plane carries mail in wing	290
Airplanes	
cool engine valves with "freezing" tube	293
dragline helps pilot land in fog	220
forty-passenger plane used on European airways	225
four-second plane take-off	248
landing gear folds in wings	209
landing gear repaired in air	207
plane that flies backward called safest craft	249
Airships	
fore-and-aft mooring mast for	265
more durable cover for navy airship	265
Archaeology—seven-foot tortoise shell discovered in India	298
Archery—roadside ranges via with miniature golf	284
Automobiles—old chain-driven steam car	224
Automobiles, Accessories	
electric heater in auto engine	274
loud speaker replaces horn	285
motor oil freed of water	206
windshield freed of snow with alcohol wiper	248
Automobiles, Design—forecast of the future trend in	221
Automobiles, Engine—electric car detects knock in motor	271
Automobiles, Fuel—deadly gas eliminated by fuel-saving appliance	202
Automobiles, Repairing—one-man brake tester	257
Automobiles, Tires	
automatic tire pump operated from driver's seat	285
concrete road on flywheel tests	295
Automobiles, Truck—body stays level on an uneven surface	265
Aviation <i>wings across Atlantic 186</i>	
artificial blizzard help to protect planes	234
students are taught to fly seated on ground	283
"windmill" plane promises vertical flight	256
Basketball—on roller skates	220
Bees—window in bottom of hive	280
Birds	
boy's bird-egg collection has high value	219
electric wires kill in increasing numbers	279
Boats and Boating	
boat serves as dance pavilion	193
folding boat for outboard motor	271
non-sinkable steel boat	215
tilting drive for outboard	241
Bridge—triangular, has extra strength and stability	216
Calking—with pressure gun	279
Camera—attached to tripod by self-locking disks	289
Cash Register—has combination lock	293
Caterpillar—big as a whale when viewed by camera	214
Clothesline—fasteners for, are easily adjusted	193
Concrete—dynamite is replaced by air to raise	280
Crime—invisible crisscross light safeguards whole room	247
Door—that is opened by electric eye	199
Eggs	
separator sorts yolks and whites	255
white-leghorn hen breaks egg-laying record	289
Electric Fitting—light socket easily applied to insulated wires	241
Eyes—bicycle wheel is exerciser for muscles	207
Fan—giant, cools powerful motors	264
Fish and Fishing	
commercial fish not found in Hudson Bay region	222
fish attracted by whistle are caught in hands	209

[Continued on Page 4]

Brake tester 291
Burner crankcase
oil 222

Agar, wood mouthpiece
247

Car, Electric 271

Copyrighted material

2uel Sav. de l'eleme 207
Hydro electric plant 24
water Power plant 241
 [Contents—Continued]
Heater, constant hot water 283

Caricabs. Moving cards for 185 by Japanese machine 296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400

Fish Bowl—inverted, is held in upright container	200
Flags—special flag for air-mail	200
Flour Mill—portable, comes to farmer on truck	279
Flowers—why the orchid costs more	218
Fountain—shaped like dragon illuminated at night	220
Games—baseball game with top	235
Gas Fighting—school trains gas fighters for mine rescue	263
Golf	
score card on putter and pencil on shaft	256
windmill is moving hazard for small course	254
Grinding—air-powered tool used like fountain pen	214
Guns, Ordnance—field-gun practice indoors	223
Heating and Ventilating	
burner consumes waste crank-case oil	222
pipes concealed in plaster heat building	272
radio tubes act as furnace for broadcast station	198
Heat Waves—penetrate body according to length	200
Household Devices	286
House Plans—plan No. 6-F-8	352
Ice Cream—slot machine dispenses	262
Ice Skates—rubber guard protects runners	199
Illumination—giant tower made brilliant by floodlights	283
Insects	
fly in "reverse gear"	262
trap with glass sides skids into oil	270
Lighting—shop windows are lighted by passer-by	255
Mica—light under inspection belt shows flaws in	272
Mines and Mining—windmill raises sand to run water wheel	215
Motor—tiny air-cooled gasoline	223
Motorcycle—used as trailer has auxiliary wheels	293
Nuts—inspector raises quality of importations	294
Ocean—map of bottom of Atlantic	288
Oil Wells—sawdust and sand restore production	256
Paints and Painting—electric paint mixer	255
Photography—plates for drying pictures coated with chromium	248
Power Plant—midget water, lights farm homes	241
Price Card—card-a-minute writer	249
Projector—electrically operated, fits in pocket	274
Pump—artificial waterfall produced by an altered-gravity	206
Punishment—electric shock proves effect of	208
Radio	
helpful hints and kinks from the radio lab	302
tested tips for the experimenter	296
Radio, Aerial	
spreaders for zeppelin-type	302
wired pole aids stringing of	302
Radio, Apparatus	
dynamotor operates from battery	298
handy universal trouble finder	304
this condenser repairs itself	302
Radio, Batteries	
air-cell battery has constant voltage	264
increasing tungar-charger rates	297
Radio, Construction—correct connections for home-made coils	268
Radio, Loud Speaker	
a compact speaker for your car	305
connecting phones or remote speakers	304
Radio, Receivers	
building portable S-W transmitter	299
combined with movie projector and phonograph	288
Radio, Television	
black and white pictures	304
home television in kit form	297
rheostat controls motor	297
Radio, Tubes	
effect of one bad tube	297
mounting 860-tubes	298
Railroads—locomotive run by a horse once won prize	209
Reflector—casts light rays without shadows	264
Religion—giant figures are part of religious ceremony	273
Respiration—frame to induce breathing	257
Sander—flexible, finishes irregular work	289
Sanitarium—craftsmanship taught in, aids cure	294
Saws and Sawing—carbide-tipped saws for longer life	241
Shingles—aluminum-plated	216
Ships and Shipping	
breaches buoy saves crew of grounded ship	295
fog-signal system for ships	225
guide maps on ocean liners direct passengers	285
Showcards—stencil set for	295
Ski Jump—quarter mile long may bring new records	222
Smokers' Accessories—wood mouthpiece for cigar	247
Swimming—safety belt used by diver for leaps into sand	224
Telephone	
lucky phone number sold to Japanese patrons	223
radio switch on	200

Toys—xylophone toy plays metal records	290
Tractor—jungle trip through Africa made with	201
Transmission—variable-speed chain drive replaces gears	199
Trees—tractor used to trim with extension saw	262
Typewriter—case also serves as an overnight bag	235
Voice—artificial for mutes	216
Walls—of laminated glass	193
Water Heater	
constant hot-water supply from small kettle	283
water tank stays hot for indefinite period	249
Wood	
better way to finish	223
treated, resists heat longer than steel	284

Tube, lead-glass 287

AMATEUR MECHANICS

Automobiles—latest tricks of the automobile thief	330
Automobiles, Accessories	
emergency luggage carrier	322
installing extra horn on Ford cars	313
ventilating closed cars	310
Airplanes, Driving—salt keeps windshield clear of sleet	331
Boats and Boating	
easy method of making model propellers	312
"Roamer" a speedy outboard cruiser	314
Bobbed—pipe makes rigid frame for	334
Camera—with pinhole cap takes large photos	323
Doll House—has running water	324
Magazine Rack—attached to closet door	332
Mop—spinning, disentangles strands	331
Musical Instruments—door harp is pleasant novelty for the home	311
Photography	
focusing cloth white on one side is cool	332
photo of watch with objects keeps record of exposure	322
tips for the amateur photographer	312
Pongun—barrel made from elder stalk	334
Poultry—doorknob rids poultry house of snake	333
Razor Blade—tumbler for honing	321
Rubbers—old magazine holds while cleaning	331
Saws and Sawing—sawing joints on home woodwork—ing outfits	310
Shaft—steel square for marking	309
Ski Jump—how to build a successful and safe	333
Smokers' Accessories—"holster" for pipes	332
Toys	
plywood monkeys prove amusing	322
"ring-my-nose" provides indoor amusement	313
Trouser Holder—utilizes waste space of closet	321
Wall Plaques—artistic, of hammered brass	307
Water Colors—sponge in wide-neck bottle to hold	334
Windows—automatic lock holds open	312

SHOP NOTES

Advertising—linoleum scraps for signs	350
Automobile, Driving—tin-can lid used as reflector	348
Automobiles, Repairing	
hole in housing permits cleaning the starter-drive gear	343
tool for pulling grease retainers from axles	339
Bent Iron—for the home craftsman	344
Camera—attachment for graflex enables focusing without opening it	351
Chopping—diagonal cuts prevent flying chips	350
Drafting	
C-clamps provide convenient holders for drawing board	343
large blotter prevents paper from buckling	336
Emery Cloth—held on file with clamps	337
Furnace—coils can be cleaned without removing them	342
Level—mirror on, for correct sighting	349
Log Cabin—built in attic	340
Photography—redeveloping dark sepia prints	338
Planing—block prevents splitting when end planing	338
Poultry—new remedy for lice	343
Reference Table—swinging	337
Sanding Belt—cutter for interlocking ends	339
Saws and Sawing	
how to sharpen handsaw blades	335
how to straighten a buckled handsaw	348
making power-hacksaw blades last longer	350
oblique saw-cuts for making molding	349
Scriber—pencil on surface gauge marks wood	350
Tractor—protector for the radiator	338
Vellum Paper—rubbing with magnesia makes erasures possible	351
Washers and Nuts—handy method for storing	338

Spine, machine for treatment 192

P.
Gare
Gla
Go?

Make it out of PRESDWOOD

*this grainless
all-wood board
will serve you well*

FURNITURE

OUTDOOR SIGNS

KITCHEN CABINETS

TRUNKS - TOYS

INCUBATORS

RADIO CABINETS

TRUCK BODIES

AND 80 OTHER USES

VERSATILE Presdwood! Every day new uses are found for it. Note the articles listed on this page — a few of the countless products manufacturers make better with Presdwood. In your business, like as not, there's a place where Presdwood can serve you well.

Presdwood comes in big, broad boards up to 12 feet in length; or cut to order. It's easy to work with, whether you use punch, drill or saw. Will not split, splinter, crack, chip or warp, and its resistance to moisture is a valuable asset.

In construction projects, Presdwood makes ideal concrete forms, better concrete. In home building or remodeling, it panels rooms, converts waste space into cheerful quarters, serves endless purposes.

Send for free Presdwood booklet. Lists 80 uses and best ways to apply finishes. Also ask your architect, contractor or lumber dealer about Presdwood.

Masonite

STRUCTURAL INSULATION • INSULATING LATH
PRESDWOOD • QUARTSBOARD

"Made in Mississippi"

© M.C. 1951

This One



YTYX-DFN-BQT7

City..... State.....
 If interested in Masonite Insulation, check here

You Can't Stop It, But— You Can Make It Carry You to Success!

"It is estimated—that in the last ten years over 2,000,000 workers have been displaced from older industry due to labor-saving devices."
President
Herbert Hoover

Louisville Vice-President Now
President of Own Firm

Illinois Chain Store Manager
Moves Up to Auditor

New York Purchasing Agent
Establishes Public Accounting
Firm

Buffalo Railway Mail Clerk
Now Assistant Treasurer

Toledo R. R. Tracing Clerk
Climbs to Auditor

Knoxville Dry Goods Clerk
Promoted to Assistant
Credit Manager

Vancouver Girl Bookkeeper
Becomes Officer of Company

Elmira Shipping Clerk Wins to
General Managership

Boston Traffic Clerk Steps Up
to Traffic Manager

New York Order Clerk Rises
to General Manager

Seattle Stenographer Made
Superintendent

Vancouver Radio Plant
Worker Sells Radios
Successfully

Alabama Railroad Shop
Laborer a Successful
Lawyer

Canadian Salesman Heads
Successful Insurance
Company

Pattern Maker Wins Place as
Superintendent

Names gladly given on request

THIS "Machine Age"—are you fighting it in fear and desperation?

If so, quit the losing fight—and make these machines carry you to larger success.

It's simple and easy.

For this mechanization of office and factory—this wave of marvelous machines that is affecting payrolls and eliminating thousands from jobs which machines can do better—falls short in one vital item.

No machine has brains—no machine can replace man in positions that require *thinking*. In fact, the coming of machines puts a premium on men who think—increases the demand and rewards for individuals who can direct and dominate these devices.

No bookkeeping machine, for example, can analyze accounts and tell how to cut costs or increase profits. No machine can correct unbalanced turnover, or show how to control inventories. Yet in this machine and merger age, with its increased production facilities and its new crop of problems and complications, accounting control by the expert accountant is more needed—and better rewarded than ever.

No machine can route a shipment quicker or cheaper—only a mind trained in the practical and technical phases of Traffic Management can determine how best to ship that car. No machine can file a claim for overcharge, or advise on methods of packing, or do any of the many, many money-making and money-saving things necessary in the efficient transportation of an ever-growing volume of goods.

No machine can walk into a man's office and sell him an idea or a bill of goods. Only a knowledge of the laws and principles of Modern Salesmanship can ever sell merchandise in quantity and at a profit—in face of the new competition of today.

No machine can determine whether or how to expand or retrench, neither can it work out and apply the policies needed to preserve and increase dividends. Only a human being, knowing the laws and rules of Business Management, can do that or make the other decisions necessary in this day of bigger business, sharper competition and centralized control.

Don't worry about machines cutting you out of a job. Take advantage of the opportunity they have created. Prepare yourself to master the machine—to occupy one of the many executive positions which the machine has occasioned or made more powerful.

Any question about whether or how you can do it?

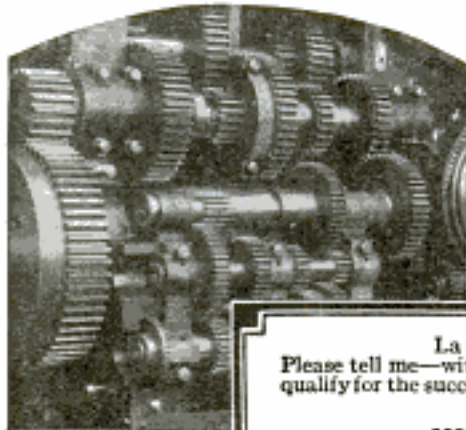
Then glance over these fifteen tabloid stories at the left of this page—fifteen out of many thousands whose stories we could cite—fifteen who through LaSalle training got out of minor jobs and into the management class or moved yet higher in the executive group. These fifteen—and most of the thousands who have made similar records through LaSalle training—were like you—men and women of no greater native ability. But they exercised vision and initiative—they got above the competition of the machine and into the preferred class of men trained to think clearly and act correctly and decisively. The rewards—of larger prestige and responsibility and income—followed surely and quickly.

You have the same opportunity—but only if you increase your thinking power to match the increased demands of the age.

And in this the new LaSalle homestudy training can be of immeasurable value.

Ask us to show you how and why—to give you the information that for thousands of LaSalle-trained men has shown how to make this "new competition" of the machine and the merger carry them to larger success.

Will you continue fighting the machine—or take advantage of it? Decide by marking and mailing this coupon—*now*.



La SALLE EXTENSION UNIVERSITY, Dept. 264-R, Chicago, Ill.
Please tell me—without any obligation on my part—how, through the new La Salle training, I can qualify for the success that this machine age offers to the prepared man. I am particularly interested in

Here indicate the field of business in which you are interested

Name.....
Address.....

LaSALLE EXTENSION UNIVERSITY

In this FREE BOOK

a World-Famous Flier shows
how YOU can get into

AVIATION



HERE is the book that tells you straight from the shoulder what Aviation offers YOU. You've been wondering how to break into the field—wanting all the facts, all the information. Here it is! A story more exciting, more thrilling, more inspiring than fiction—yet a man-to-man message of FACTS from cover to cover. Walter Hinton—hero of history-making flights—gives you the brass tacks of Aviation Today. He shows you exactly where your opportunities lie—exactly what to do to make the most of them—exactly how to fit yourself for them. Here is a book for men with too much backbone to stay chained to a small-pay job—too much adventure in their blood for a humdrum grind—too much good sound business sense in their heads to let this opportunity of a lifetime outgrow them!

The Richest, Fastest Growing Industry the World Has Ever Known

You haven't heard anything about this being a "bad year" for Aviation! Men like Ford, DuPont—millionaires—are investing fortunes in the field. Cities everywhere are building more airports; 24-hour shifts are racing construction on new plane and equipment plants. Air lines, air service of every kind is doubling and redoubling itself almost while you watch! There's no doubt about there being BIG PAY plus a real future for YOU in Aviation. Your one sure move is to get the right training—quick!

You Must Be 18 or Over

To take an active part in Aviation you must be at least 18 years of age. If you are under 18, please do not ask for Lieut. Hinton's Book because it will not interest YOU.

Aviation Is Ready, Hinton Is Ready—Now It's Up to YOU

Right at home in spare-time Hinton will teach you all the essential facts about plane construction, rigging, repairs, motors, instruments, theory of flight, navigation, commercial Aviation. Whether you plan to fly, or to cash-in on one of the more than forty Big-Pay ground jobs, you must have this ground-work to land the job you want at the pay you expect. Learn just where you stand and what first steps to take. This Free Book tells how. Clip the coupon and send it TODAY. Hinton will rush your book by return mail.



40

Jobs on the Ground
for Each One in
the Air

Fliers are in demand—certainly! But for every man in the air, trained men are needed in over 40 highly-paid jobs on the ground. Hinton's training gives you your ground-work to earn real money as one of these:

Engineers, Designers and Draughtsmen, Pilots, Engine and Plane Mechanics, Riggers, Electricians, Welders, Instrument Makers, Wood and Metal Workers, Plane and Motor Inspectors, Airport Operators, Radio Experts, Assemblymen, Aerial Surveyors and Photographers, Aerial Transport Managers, Salesmen.

Walter Hinton

Trail-blazer, pioneer, explorer, author, instructor, AVIATOR. The first man to pilot a plane across the Atlantic—the famous NC-4—and first to fly from North to South America. The man who was a crack flying instructor for the Navy during the War; who today is training far-sighted men for Aviation. Hinton is ready to back YOU up to the limit. His Book is yours FREE for the coupon below.

Rush Back to Washington!

Walter Hinton, Pres.,
Aviation Institute of U. S. A.,
1115 Conn. Ave., Washington, D. C.

301-W

Dear Lieut. Hinton: Send me your FREE Book telling how I can train under you right at home for Aviation.

Name.....

Street.....

Age.....
(must be over 18)

City..... State.....

Aviation Institute of U. S. A.

Walter Hinton, President

1115 Connecticut Ave., Washington, D. C.



Answer This Ad!

If You Want Quick Success and Big Pay In AUTOS



Morrision Did!

When Morrision of Parkersburg, West Virginia, wrote for my auto book he was working in a steel mill for low pay. In six short months he doubled his earnings and got into business for himself—even before he finished his "Job-Way" Training. You can have the same book that started Morrision on the road to success. Clip the coupon—and mail it today.

Earn Up to \$100 a Week

Get YOUR share of the \$7,000,000,000 spent every year on auto upkeep. **Just think of it**—more than 25,000,000 autos in the U. S. No wonder there are so many big pay jobs! Get into this fascinating game, now. Don't put it off another day. Get the facts. Mail coupon for big, FREE auto book. Learn of the countless opportunities in the World's Biggest Business where real jobs and big pay come quick. See how \$50—\$75—\$100 a week is possible for you now. Learn how "Job-Way" Training has brought big money—promotion—shops of their own to scores of men. Find out about my Employment Department—how it helps you get a good job in the auto business.

3 WORKING OUTFITS
also included **FREE** of extra charge if you act quick!

Learn at Home in Spare Time



"Job-Way" Training is the short cut to Auto Success. No need to quit your present job—no need to leave home—just use your spare time to prepare for a brilliant future—a real job paying up to \$100 a week. All you need is common schooling. I don't care if you never touched an auto before, I can train you at home. You should be able to make extra money quick—a few weeks after starting. Men from all walks of life who worked

long, hard hours for low pay are becoming garage owners, foremen and superintendents. If you like autos—if you're between 15 and 55—get the facts now. "Job-Way" Training covers everything about autos—Mechanical and Electrical Work, Starting, Lighting, Ignition, Welding, Vulcanizing, etc.—Everything you need to get in line for a big money job as an Electrical and Mechanical Auto Expert.

It's the trained man who gets the good jobs and "Job-Way" Training is COMPLETE, yet so simple, so easy that you get it quick.

Send Coupon for FREE Auto Book

Get my FREE Auto Book. Learn how "Job-Way" Training has brought success to hundreds. See what it can do for you. Find out how my Employment Department helps you get a good job—about the three big outfits you get. Read my money-back agreement, my aviation course offer and many other features.

B. W. Cooke, Directing Engineer
Motor Institute of America
Motor Institute Bldg. Dept. 4162
EVANSTON, ILLINOIS
(Chicago's Largest Suburb)

B. W. Cooke, Directing Engineer,
MOTOR INSTITUTE OF AMERICA,
Motor Institute Bldg., Dept. 4162, Evanston, Ill.

Send me your free auto book. I want to succeed in the auto business. Tell me about "Job-Way" Training—about your Employment Department and your 3 testing and repair outfits offer. No obligation on my part whatever.

Name.....
Address.....
Town..... State.....
Age..... Occupation.....

Do It NOW!

Don't delay another day. Clip the coupon before you turn this page. Take the first step to a big-pay auto job. Now.

TO THE CLASS OF '29

IF YOU started a career after finishing high school, you've had time to realize a few things by now. Do you ever wonder why you are not getting ahead faster and earning more money? Do you speculate on what the future holds for you?

Look about you — those who are making progress and getting the increases in pay are the *trained* men! This is an age of specialists. Deprived of college degrees by circumstances, many ambitious men today use high-school education as a beneficial background in acquiring the *specialized training* they need most. So can you!

International Correspondence Schools can do for you what it has done for them. All over the world high-school graduates are acquiring the practical knowledge they need from this 40-year-old institution. "Based on personal experience," says Jos. E. Driscoll of Roanoke, Va., "my advice to every young man and woman who cannot attend college is to take an I. C. S. course on the line of work they wish



to follow." Marking the coupon below may be far more important to your earning power than the day you received that high-school diploma.

Challenge us to help you!

INTERNATIONAL CORRESPONDENCE SCHOOLS

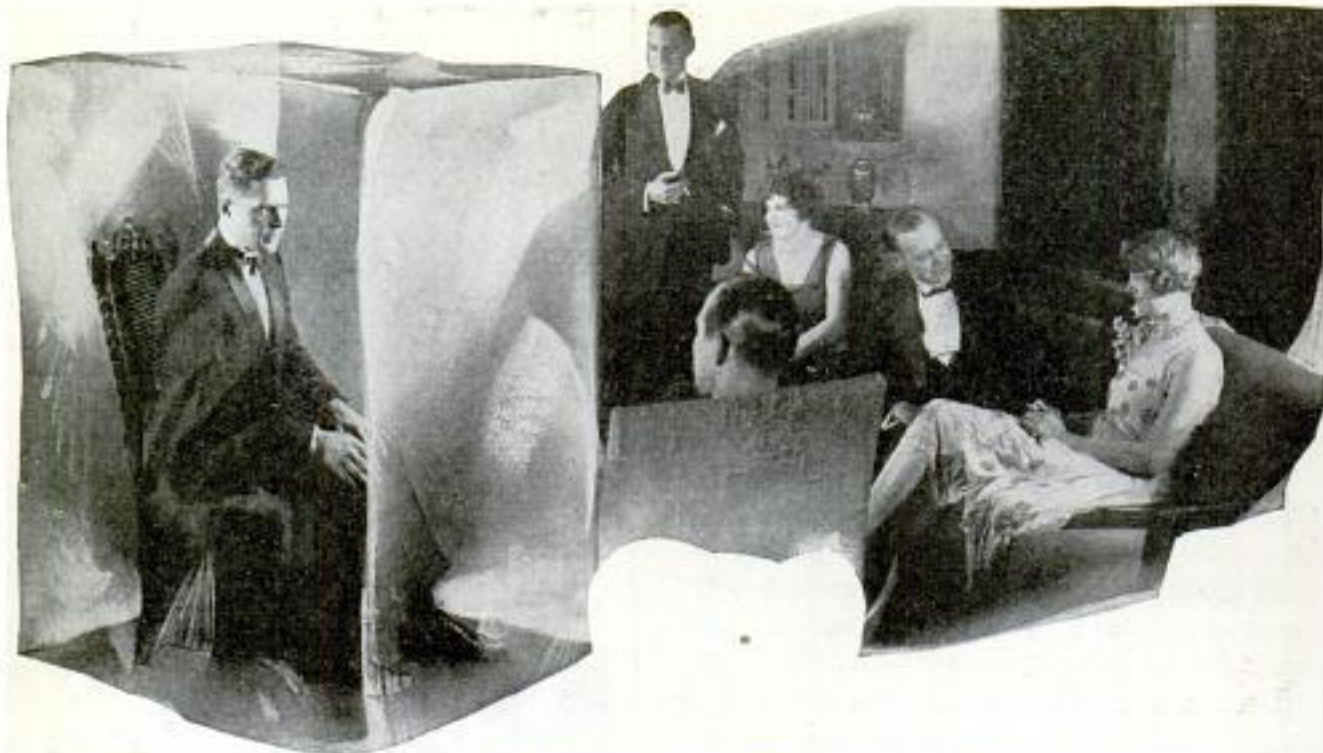
INTERNATIONAL CORRESPONDENCE SCHOOLS, "The Universal University," Box 5526-G, Scranton, Penna.
Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Automobile Mechano | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Machinist | <input type="checkbox"/> Sheet Metal Worker | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Steam Engineer | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Steam Electric Engineer | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Pipefitter <input type="checkbox"/> Tinsmith | <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> Gas Engines | <input type="checkbox"/> R. R. Locomotives | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> R. R. Section Foreman | <input type="checkbox"/> Marine Engineer |
| BUSINESS TRAINING COURSES | | | |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Stenography and Typing | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> Complete Commercial | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Personnel Management | <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Civil Service | <input type="checkbox"/> Illustrating |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> Mail Carrier | <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Business Correspondence | <input type="checkbox"/> Railway Mail Clerk | <input type="checkbox"/> Lumber Dealer |

Name.....Age.....Address.....

City.....State.....Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada



I Turned To Ice When I Tried To Talk

-But Now I Can Sway An Audience of Thousands!

I HAD always been painfully bashful. When trying to carry on even the most commonplace conversation my voice would sound unnatural and my hands and knees would tremble. Often I would listen to an argument among a group and become so keenly interested that I would want to voice my own opinion—yet timidity would keep me silent. I never had the courage to stand up for what I knew to be my rights—I was always afraid of "what people would say," of ridicule. Since my childhood I had had a secret desire to appear in public—to be active in politics—but my shyness was so great that I turned to ice when I tried to talk—in even the smallest gathering!

My inability to talk was also affecting my business success. I dreaded going in and asking for a raise—I was afraid of any situation that meant using my voice—having to express myself. I didn't know how to present the ideas which I was sure the firm could use. I was just a plodder—a truck horse, capable of doing a lot of heavy work but of no use where brilliant performance was required. Often I would see men who were not half so thorough nor so hard working as I, promoted to positions where they made a brilliant showing—not through hard work, but through their ability to talk cleverly and convincingly—to give the appearance of being efficient and skillful.

What 20 Minutes a Day Will Show You

How to talk before your club or lodge
 How to propose and respond to toasts
 How to address board meetings
 How to tell entertaining stories
 How to make a political speech
 How to make after-dinner speeches
 How to converse interestingly
 How to write letters
 How to sell more goods
 How to train your memory
 How to enlarge your vocabulary
 How to develop self-confidence
 How to acquire a winning personality
 How to strengthen your will-power and ambition
 How to become a clear, accurate thinker
 How to develop your power of concentration
 How to become master of any situation

In Twenty Minutes a Day

And then suddenly I discovered a new easy method which made me a forceful speaker almost over night. I learned how to dominate one man or an audience of thousands—how to say just the right words at the right time, how to win and hold the attention of those around me, how to express my thoughts simply and clearly, yet in a pleasing, interesting and amusing way. In just a few months I was able to make campaign speeches for a

local candidate—I who a short time before had turned to ice when I tried to carry on an ordinary conversation!

Soon I had won salary increases, promotion, popularity, power. Today I always have a ready flow of speech at my command. I am able to rise to any occasion, to meet any emergency with just the right words, to approach all types of people with ease and fearlessness. And I accomplished all this by developing the natural power of speech possessed by everyone, but cultivated by so few—by simply spending 20 minutes a day in my own home on this most fascinating subject.

Send for This Amazing Book

This new method of training is fully described in a very interesting and informative booklet which is now being sent to everyone mailing the coupon below. This book is called, *How To Work Wonders With Words*. In it you are shown how to conquer stage fright, self-consciousness, timidity, bashfulness and fear—those things that keep you silent while men of lesser ability get what they want by the sheer power of convincing speech. Not only men who have made millions, but thousands have sent for this book—and are unstinting in their praise of it. You are told how to bring out and develop your priceless "hidden knack"—the natural gift

within you—which will win for you advancement in position and salary, popularity, social standing, power and real success. You can obtain your copy absolutely free by sending the coupon.

Now Sent
FREE



NORTH AMERICAN INSTITUTE
 3601 Michigan Ave., Dept. 1352
 CHICAGO, ILLINOIS

North American Institute,
 3601 Michigan Ave., Dept. 1352, Chicago, Illinois.

Please send me FREE and without obligation my copy of your inspiring booklet, *How To Work Wonders With Words*, and full information regarding your Course in Effective Speaking.

Name.....
 Address.....
 City.....State.....



500,000 VOLTS

"Artificial lightning" being developed in COYNE School. Spark of 500,000 volts is shown jumping 30 inches. This gigantic Tesla coil is the same as that used by Steinmetz, absolutely harmless, because of high frequency.

LEARN ELECTRICITY Without Books or Lessons in 12 Weeks

By Actual Work - In the GREAT SHOPS of COYNE



Anyone who can see and understand the English language can learn Electricity in 90 days. I teach you with the most complete outlay of electrical apparatus ever assembled—30-foot control board—2-story transmitting stations—skeleton houses, huge motors of all kinds—dynamo—sub-stations—automobiles—

switchboards. In one department we generate enough electricity to supply a small city!

No Books—No Lessons—No Classes

ENTER ANYTIME. Experts teach you without books or classes. They guide you every step of the way with individual attention. You do the actual work on real full-size machinery in full operation. Take motors for instance. Instead of learning from books and charts—you actually build motors. You can't help but know all about them. Anyone can learn this fascinating way.

No Experience Necessary

That's how my methods make men learn electricity in 12 wonderful weeks. You don't need experience—Coyne training starts from the very beginning. You don't need advanced education—you learn by doing. Age is no handicap—Coyne students range from 16 to 40.

Triple Your Earning Power

I don't need to tell you about the opportunities in Electricity. They are too many and too amazing to mention. Ordinary jobs run from \$50—\$75—\$150 a week. And Coyne training leads to the biggest positions.

COYNE ELECTRICAL SCHOOL

H. C. LEWIS, President — ESTABLISHED 1899
500 S. Paulina St., Dept. 21-72, Chicago

Many Coyne men are making up to \$600 a month. Demand for Coyne men often exceeds the supply. Our Employment Department helps secure positions.

EARN WHILE YOU LEARN

We help many students to secure part-time jobs to earn a good part of living expenses while learning, so if you should be a little short of money don't let that stop you. We'll gladly help you get a good part-time job. Also, we are now including Special Courses in Radio, Aviation and Auto Electricity without extra charge.

All Details Sent Free

This school is 30 years old—Coyne training is tested—proven beyond all doubt—endorsed by electrical industry. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs—facts—jobs—salaries—opportunities. See what Coyne training can do for you in just 90 days! This does not obligate you. So act at once. Just mail coupon.

Get this Free Book



H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL, Dept. 21-72
500 S. Paulina St., Chicago, Ill.

Dear Mr. Lewis:
Without obligation send me your big free catalog and all details of your Free Employment Service, Radio, Aviation and Automotive Electrical Courses you are including and how many "earn while learning."

Name

Address

City.....State.....

MODERN ART PAYS BIG MONEY

The amazing demand for art work of all kinds is creating hundreds of big-pay opportunities every year. Trained artists are needed. This is the Age of Color . . . of Design . . . of Art in everything. Manufacturers, decorators, publishers . . . all are seeking men and women with art training.

Through the Federal School of Illustrating many who drudged at small pay have found fascinating careers . . . larger incomes. Many Federal students are now earning from \$2500 to \$6000 a year . . . others even more.

You can learn at home . . . in your spare time . . . the Federal way. Earn while you learn . . . most of our students do. The Federal Course is for practical artists who **MUST** make good. It aims at dollars and cents profit for every student.

More than fifty famous artists . . . masters of modern art . . . contribute exclusive lessons and drawings to the Federal Course. They tell you how they create new . . . striking . . . clever . . . art work. They give you their technical tricks in illustrating, cartooning, lettering, designing, etc.

Test Your Talent Free

Send for our Free Vocational Test Chart. It's simple to fill out. Our artists judge it for you and give you a definite guide to your probable talent and earning power in art. We will also send you, without charge, "A Road To Bigger Things," giving names of the famous Federal instructors . . . showing where the big money in art is . . . what others are making. Get this Book and the Test Chart. Write now.



THE FEDERAL SCHOOL of ILLUSTRATING

2131 FEDERAL SCHOOLS BUILDING

MINNEAPOLIS, MINNESOTA

Federal School of Illustrating

2131 Federal Schools Building, Minneapolis, Minnesota

Please send me free book, "A Road To Bigger Things," and Standard Art Test.

Name _____

Age _____ Occupation _____

Address _____



We have placed machinists, carpenters, masons, plumbers, railroad men, office clerks, farmers and even laborers in fine Drafting Jobs under this plan. Mail coupon for details of our remarkable offer.



Men Who Work With Their Hands Make the Best DRAFTSMEN



—and we'll back them with this EMPLOYMENT CONTRACT

We are looking for more ambitious young fellows with factory, building-trade or any other kind of mechanical experience to prepare for and help place in well-paid Drafting positions. Such men, we find, are unusually successful as Draftsmen, because they know how things are done, and that's a priceless asset to the man who makes the blueprint plans. Get in touch with me and I'll tell you how you can cash in on your entire past mechanical experience.

Drafting Is Logically Your Next Move!

Of course you realize the biggest handicap to mechanical work is that you're limited in earning capacity to the output of your two hands, as long as you live. Even the skilled mechanic earning \$50 to \$60 a week has reached his limit. He can never earn more and when he gets old he will earn less. So I don't blame any man for wanting to get away from this futureless outlook. For wanting to get into something where he can use his head as well as his hands—where he will be paid for what he knows, instead of only for what he does. . . . You know enough about blueprints to understand that PLANS govern every move in factory and construction job. The Draftsman who makes them is several jumps ahead of the workman who follows them. And so I want you to know that DRAFTING is a logical, natural PROMOTION from mechanical and building work—better-paid, more interesting—just the kind of work you'd enjoy doing.

Get Our NO-RISK PLAN

The way to a fine Drafting job for you—is easier than you think. It takes no "artistic talent" or advanced education. Thousands of men no smarter than you, with no more education or ability, have learned it quickly and you can, too. With the co-operation of some of the biggest employers and engineers in the U. S., we have worked out a plan to prepare you for Drafting work in your spare time at home—then to help you get a fine position when you're only half way through the course. Mail the coupon and we'll be glad to tell you all about this lifetime chance.

THE AMERICAN SCHOOL
Dept. D-247, Drexel Ave. and 58th St., Chicago, Illinois



36-Page Drafting Book—FREE

Tells how easy Drafting is to learn—how interesting the work is—what remarkable opportunities are open for Draftsmen right now. Mail coupon for a copy—without cost or obligation.

AMERICAN SCHOOL, Dept. D-247, Drexel Ave. & 58th St., Chicago, Ill.

Please tell me, without cost or obligation, about your training and employment service in line marked X below.

DRAFTING

- | | |
|---|--|
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Civil Engineering |
| <input type="checkbox"/> Building | <input type="checkbox"/> Auto Engineering |
| <input type="checkbox"/> Electrical Engineering | |
| <input type="checkbox"/> Business Management | |
| <input type="checkbox"/> Accounting | |
| <input type="checkbox"/> Mechanical Engineering | |
| <input type="checkbox"/> Shop Superintendent | |
| <input type="checkbox"/> Foremanship | |
| <input type="checkbox"/> High School in 2 years | |
| <input type="checkbox"/> Structural Steel | |

Name _____

St. No. _____

City _____ State _____

Age _____ Occupation _____



"I have landed a job with the Pacific Tel. and Tel. Co. in Seattle, and I must say that I am greatly indebted to the American School for my success. You have done all that you promised in helping me obtain employment."

F. C. White
Seattle, Wash.



"I have obtained a position as a junior draftsman with the Muncie Oil Engine Co., and so far I like the work real well. I appreciate your aid in obtaining this position very much."

M. N. Barcham
Muncie, Ind.

Would you trade
places with
him?

He's
Prosperous

He's
Popular



Learn Quick
at Home

Makes \$30 a Week Spare-Time

Knows a Host of People—

Doesn't Know a Dull Evening!

Everything that makes life worth living will make it well worth one to three months of your spare time to learn to play a matchless instrument like the Tenor Banjo.

I train you at home—by amazingly simple, fascinating method. Successful students everywhere are social leaders—making easy spare-time money with orchestras—many now regular Tenor Banjoists earning \$65, \$85, \$100 a week and up. Yet most of them had never touched a string or read a single note!

I Want to Send You My Big FREE Book

Play the popular, melodious instrument that's always in demand! Don't hesitate a minute. Clip the coupon below. Learn about the big opportunities and success in store for YOU. Learn about the handsome, professional-size Tenor Banjo, complete Outfit and demonstration Phonograph Records that I send you with very first lesson! My FREE Book, "The Play-Way to Popularity and Big Pay," will thrill you from cover to cover. Get the coupon off to me NOW!

NEW YORK ACADEMY OF MUSIC
100 Fifth Avenue Studio 1021
NEW YORK CITY



It
comes
with
your
very
first
lesson

Mail this NOW

A. F. BLOCH, President
New York Academy of Music, Studio 1021,
100 Fifth Avenue, New York City.

Send my copy of "The Play-Way to Popularity and Big Pay" right now. It appeals to me to become "good" on the Tenor Banjo in one to three months at home.

Name.....Age.....

Address.....

Learn to Write

I Teach by Mail

I CAN make a good penman of you at your home during spare time, no matter where you live or how poorly you now write. My simplified system has shown thousands of others the way to good penmanship during the past twenty years—it can and will do the same for YOU!

Beautifully Illustrated Book
"How to Become
a Good Penman"

It contains general information, with testimonials and beautiful specimens

FREE!

of penmanship showing what others have accomplished by the Tamblin System. (Your name elegantly written on a card if you enclose stamp for postage.) WRITE TODAY. Address

F. W. TAMBLYN

418 Ridge Bldg., Kansas City, Mo., U. S. A.

F. W. Tamblin

YOUR FUTURE ASSURED



Now is the time to safeguard yourself against such periods of depression as we have been having. Many good, profitable trades are not subject to hard times or slack seasons—trades meeting everyday human needs, such as Mechanical Dentistry. Your age, circumstances, or lack of experience need not stop you. The way is open to you. A helpful booklet, "Choosing a Trade," will be sent you without cost. Your copy is waiting. Simply ask for Bulletin 2.

BODEE INSTITUTE, 1755 Broadway, N. Y.
1305 N. Broad St., Philadelphia 85 Court St., Brooklyn

IF YOU STAMMER

Write for my free book "Millard's Advanced Natural Corrective Course" and a free copy of my speech magazine. 10,000 cases successfully treated. Est. 24 years. Largest school for stammerers in world. Millard Inst. of Normal Speech, 2317 Millard Bldg., Milwaukee, Wis.

AVIATION Information FREE

Send us your name and address for full information regarding the Aviation and Airplane business. Fled out about the many great opportunities now open and how we prepare you at home, during spare time, to qualify. Our new book "Opportunities in the Airplane Industry" also sent free if you answer at once.

AMERICAN SCHOOL OF AVIATION
3601 Michigan Ave. Dept. 1352 CHICAGO

LEARN WATCH REPAIRING



You can learn by our modern and original system of instruction every part of the Watch Repairing Trade at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn from \$50 to \$75 per week. For particulars apply to the Wisconsin School of Watch Repairing 524 E. Mason St., MILWAUKEE, WIS.

Muscles 5¢ apiece!

WOULD'N'T it be great if we could buy muscles by the bag—take them home and paste them on our shoulders? Then our rich friends with money to buy them, sure would be socking us all over the lots. But they don't come that easy, fellows. If you want muscle you have to work for it. That's the reason why the lazy fellow never can hope to be strong. So if you're lazy and don't want to work—you had better quit right here. This talk was never meant for you.

I Want Live Ones

I've been making big men out of little ones for over fifteen years. I've made pretty near as many strong men as Heinz has made pickles. My system never fails. That's why I **guarantee** my works to do the trick. That's why they gave me the name of "The Muscle Builder."

I have the surest bet that you ever heard of. Eugen Sandow himself said that my system is the shortest and surest that America ever had to offer.

Follow me closely now and I'll tell you a few things I'm going to do for you.

Here's What I Guarantee

In just 30 days I'm going to increase your arm one full inch. Yes, and add two inches to your chest in the same length of time. But that's nothing. I've only started; get this—I'm going to put knobs of muscles on your shoulders like baseballs. I'm going to deepen your chest so that you will double your lung capacity. Each breath you take will flood every crevice of your pulmonary cavity with oxygen. This will load your blood with red corpuscles, shooting life and vitality throughout your entire system. I'm going to give you arms and legs like pillars. I'm going to work on every inner muscle as well, toning up your liver, your heart, etc. You'll have a snap to your step and a flash to your eye. You'll feel the real pep shooting up and down your old backbone. You'll stretch out your big brawny arms and crave for a chance to crush everything before you. You'll just bubble over with vim and animation.

Sounds pretty good, what? You can bet your old ukulele it's good. It's wonderful. And don't forget, fellow—I'm not just promising all this—I **guarantee** it. Well, let's get busy, I want action—So do you.

SEND FOR
MY NEW
64-PAGE BOOK

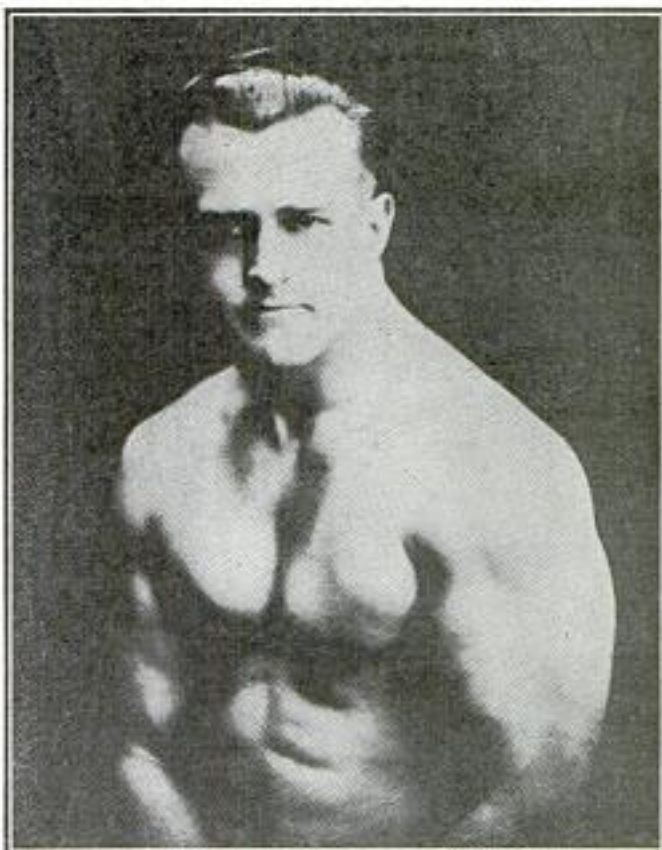
"Muscular Development"

IT IS
FREE

It contains forty-eight full-page photographs of myself and some of the many prize-winning pupils I have trained. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now and you will marvel at their present physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. This will not obligate you at all, but for the sake of your future health and happiness do not put it off. Send today—right now before you turn this page.

EARLE LIEDERMAN

Dept. 2002, 305 Broadway, New York City



EARLE LIEDERMAN, The Muscle Builder

Author of "Muscle Building," "Science of Wrestling and Jiu Jitsu,"
"Secrets of Strength," "Here's Health," "Endurance," Etc.

EARLE LIEDERMAN

Dept. 2002, 305 Broadway, New York City

Dear Sir:—Please send me without any obligation on my part whatever, a copy of your latest book "Muscular Development." (Please write or print plainly.)

Name..... Age.....

Street.....

City..... State.....

There's Quicker, Bigger MONEY for YOU in POULTRY RAISING!



Wherever You Live—
Whatever You Do Now—
\$2,000 to \$5,000 a Year
Can Be Yours!

Spare Time or Full Time YOU Can Cash-In BIG

The Poultry Industry is growing by leaps and bounds. Eggs and Poultry meat are commanding high prices—prices that mean real profits on every bird you raise—every egg your flock produces. Thousands of my students have turned to Poultry Raising for certified extra money of full time big pay. I'll show you how to start in a small way—in your own back yard—and make it pay—make your little investment multiply itself automatically. Or, if you want to work for someone else at a good salary—my FREE Employment Dept. will help place you in one of the thousands of splendid positions open to trained poultrymen. Why wait? I'll PROVE that I can get you among the big money makers QUICK!

My Proved Methods Assure Success Right from START

All the "mystery," all the "secrets," all the guesswork professed out of Poultry Raising by my sure, tested, proved successful methods. I will teach them all to you. Nothing left out, nothing for you to have to figure yourself. I make it easy for you. It's fascinating, healthful, pleasant, profitable. You'll be your own boss—I'll show you how to make \$1,000-\$2,000 every hour of your spare time. What's more, I'll show you the way to a salary of \$5,000 a year AND UP! Start as small as you want; my methods will get the maximum profits out of your flock and make it grow automatically, into a sure source of steady big money for YOU.

FREE BOOK Shows Way to BIG PROFITS

My big new FREE book, "How to Raise Poultry for Profit," will show you. It brings evidence a-plenty—absolute proof—of what I have done for thousands of others. My forty years' experience as Commercial Poultryman and former Senior Poultryman in the U. S. Dept. of Agriculture's years for real Success and Independence. The Poultry Business needs you—and you need the profits that the poultry business brings. You need my book. Get it for QUICKER, BIGGER MONEY. Do it this minute—don't delay a day. Get this coupon into the very next mail!

YOU Can Do What They Have Done

"Your Course on Poultry Raising is the most practical and complete in the country. You have opened up a pleasant and profitable way for me to make an independent living."—S. Anderson, Barrington, R. I.

J. L. Mosher of Buffalo, N. Y., started at \$25 a week after 10th Lesson. F. D. Anderson of Phoenix, Arizona: "Thanks to N. P. I. I got a job even before I finished your Course!"



48 Pages
of Money-
making FACTS

Get this FREE Book NOW!

Harry M. Lamon, Pres.,
NATIONAL POULTRY INSTITUTE,
Dept. 411-F, Washington, D. C.

Dear Mr. Lamon: Send me your FREE Book, "How to Raise Poultry for Profit." I want to know more about MY opportunity to make \$2,000 to \$5,000 a year, spare time or full time.

Name.....
Address.....
City.....State.....

Electrical Engineering

Training for men of ambition and limited time. Concise, comprehensive course in Theoretical and Practical Electrical Engineering including the closely related subjects of Mathematics and Mechanical Drawing. Students construct motors, install wiring,

test electrical machinery. Course designed to be completed in one college year by eliminating non-essentials. THIRTY-SEVEN YEARS' successful experience assures you maximum training in minimum time.



Send for
free catalog

Bliss Electrical School

132 TAKOMA AVE., WASHINGTON, D. C.

COLLEGE COURSES

AT HOME

Carry on your education. Develop power to initiate and achieve. Prepare for college. Earn credit toward a Bachelor degree or Teaching Certificates by correspondence. Select from 450 courses in 45 subjects including English, Mathematics, History, Education, Psychology, Economics, the Languages, etc. Write for catalog.



The University of Chicago

827 ELLIS HALL

CHICAGO, ILL.

WHY STAMMER?

Don't be a failure. Master perfect speech. Live a healthy, normal and happy life. Send for free book which tells you how. THE LEWIS INSTITUTE, 12972 Woodward Ave., Detroit, Mich.



"BECOME A LIGHTNING TRICK CARTOONIST"

Send \$1.00 for Laugh Producing Program of 28 Trick Drawings with Instructions. Catalog of Chalk Talk Supplies Free. BALDA ART SERVICE, Dept. 1, Oshkosh, Wis.

BIG Demand for Skilled Mechanics!

Skilled mechanics are in demand! Good pay—steady work—good opportunities for advancement! Master this fascinating trade with the aid of the

AMERICAN MACHINISTS' LIBRARY

6 volumes—2,000 pages—2,500 illustrations

(A combined home-study course and reference library)

This library of machine shop practice was written for practical men. It gives you the best methods for every kind of machine shop work. It explains machine tools and their operation, tool work, gears and grinding, jigs and fixtures, automatic screw machines, their tools, punches, dies, etc. Plainly written—completely illustrated—the best kind of help to the machine-shop man who wants to advance himself.

Free
T
R
I
A
L

No money down—
only 7c
a day



FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York
Send me for 10 days' free examination the AMERICAN MACHINISTS' LIBRARY. If satisfactory, I will send \$1.50 in 10 days and \$2 monthly until the special price of \$17.50 is paid. If not wanted, I will return the books at your expense.

Name.....
Address.....
City and State.....
Position.....
Company..... P. M. 5-31



National Salesmen's Training Assn.
Dept. B-103, N. S. T. A. Bldg.
Chicago, Ill.

Without cost or obligation you may
send me your free book, "The Key to
Master Salesmanship."

Name.....

Address.....

City.....State.....

Age.....Occupation.....

They Laughed When I Mailed This Coupon

*..But It Brought Me The Book That Showed Me
How to Make \$10,000 a Year!*

AS I walked up to the mail box, Joe nudged Ed and winked broadly for my benefit.

"Sh!" he hissed in a loud stage-whisper. "This is going to be the big turning point in Frank Parker's life! He's writing for a book that tells how to get into salesmanship. Pretty soon he'll be earning so much that he'll make the rest of us look like pikers!"

Ed snickered. "Won't it be grand!" he grinned. "Now he can quit punching time-clocks and eating 40-cent lunches." He raised his voice. "Drop me a postal sometime when you get out into big business and start making \$10,000 a year, will you, Frank?"

They both laughed uproariously. And probably it did seem like a joke to them that a \$30 a week clerk would have the nerve to think he could ever get anywhere or make real money without some special "gift" or "pull."

But they laughed too soon. Just yesterday I sat down and wrote to Ed who is still at the shop, dragging along at the same old job.

"Dear Ed"—I wrote. "You asked me to send you a card when I got into big business and started making \$10,000 a year. Well, here's your card. Yesterday I was promoted to the job of assistant Sales Manager of the Western Metal Works, at a salary that goes with it. I'll loan you my copy of that book on salesmanship you used to think was such a joke."

Only a book! Just seven ounces of paper and printers' ink—but it contains one of the most vivid and inspiring messages that any ambitious man can read. It reveals the real truth about the art of selling, explains the science of selling in simple terms, and tells exactly how the great sales records of nationally-known star salesmen are achieved. And not only that—it outlines a simple plan that will enable almost any man to master scientific salesmanship without spending a moment on the road—without losing a day or a dollar from his present position.

A Few Weeks—Then Bigger Pay

Reason it out for yourself. Salesmanship offers bigger returns and delivers them quicker than any other line of work under the sun. But many people have subscribed to the foolish notion that a man has to be "born" with some sort of "gift" for salesmanship. Nothing could be farther from the truth. Just like any other pro-

feession, salesmanship is governed by certain fundamental rules and laws—laws which you can master as easily as you learned the alphabet.

Right now an unusual demand for salesmen is being reported. City and traveling sales positions are open in nearly every line all over the country. Last year requests for over 50,000 trained men were received. This employment service is free to both employers and employees, and thousands have secured excellent positions this way.

Free to Every Man

See for yourself why "The Key to Master Salesmanship" has been the deciding factor in the careers of so many men who are now making \$10,000 a year. See how Mark Barichievich of San Francisco, Calif., for example, jumped from \$8 a week as dish-washer to \$150 as salesman. Find out how F. B. Englehardt of Chattanooga doubled his pay and commenced earning \$7,000. Learn for yourself the REAL truth about the art of selling! If we were asking \$2 or \$3 a copy you might hesitate. But the book is now FREE. You do not risk one penny nor incur the slightest obligation. And since it may alter your entire future, it certainly is worth your time to fill out and clip the coupon at the top of this page. Why not do it now!

National Salesmen's Training Association
Dept. B-103
N. S. T. A. Bldg. Chicago, Ill.



**Where Shall
We Send Your
Copy FREE?**

Mail Coupon Above Today

"I aint" "He don't"
 "It's me!" "You was?"
 "Can't hardly"



What Are YOUR Mistakes in English?

They may offend others as much as these offend you

IF some one you met for the first time made the mistakes in English shown above, what would you think of him? Would he inspire your respect? Would you be inclined to make a friend of him? Would you care to introduce him to others as a close friend of yours?

These errors are easy for you to see. Perhaps, however, you make different mistakes which offend other people as much as these would offend you. How do you know that you do not mispronounce certain words; are you always sure that the things you say and write are grammatically correct? To you they may seem correct, but others may know they are wrong.

Unfortunately, people will not correct you when you make mistakes; all they do is to make a mental reservation about you. "He is ignorant and uncultured," they think. So you really have no way of telling when your English offends others.

FREE—Booklet on English

Sherwin Cody, perhaps the best known teacher of practical English, has perfected and patented a remarkable device which will quickly find and correct mistakes you unconsciously make. Correct English soon becomes a HABIT.

If you are efficient in English, it will give you greater confidence; if you are deficient, you surely want to know it, so that you can correct your mistakes.

Mr. Cody's remarkable new invention, the 100% Self-Correcting Method, has already improved the English of more than 70,000 people. No useless rules, no tedious copying, no hard study. Only 15 minutes a day required. You learn by creating the HABIT of using correct English. Nothing like Mr. Cody's method has ever been used before!

A new book, "How You Can Master Good English in 15 Minutes a Day," is ready. It explains Mr. Cody's surprisingly easy method. Get a copy free and learn how to stop making embarrassing errors. You do not want others to judge you unfairly. Merely mail the coupon or a postal card. SHERWIN CODY SCHOOL OF ENGLISH, 52 Searle Building, Rochester, N. Y.

SHERWIN CODY SCHOOL OF ENGLISH
 52 Searle Building, Rochester, N. Y.

Please send me your free booklet, "How You Can Master Good English in 15 Minutes a Day."

Name.....
 Address.....

Books on Many Practical Subjects

Popular Mechanics Press specializes in supplying the outstanding best books on many subjects. As new books of merit appear, we will revise the list accordingly.

ARCHERY Modern.....\$3.00	JOINT WIPING (New Edition).....\$1.00
ARCHITECTURAL Design and Lettering...\$2.00	KITES THAT FLY How to Make.....\$1.25
ARMATURE WINDING Excellent new book...\$2.00	LANDSCAPING Practical.....\$2.50
AUTO ENCYCLOPEDIA Dyke's, (Covers New Model A Ford).....\$6.00	LATHE WORK (METAL) and Drilling and Thread Cutting.....\$1.00
AVIATION Everybody's Guide...\$2.00	LETTER WRITING Social and Business Only.....\$1.00
BIRD HOUSES How to Make.....\$1.00	LETTERING Modernistic.....\$2.00
BLUE PRINT READING For Building Trades...\$1.25	MACHINIST Complete, Practical...\$3.00
BOAT BUILDING 35 Popular Types, Outboard Motor, Sail, Row, etc.....\$3.00	MAGIC 200 New Tricks for Amateurs.....\$1.00
BOY MECHANIC Famous 4 Vol. Library, 4000 Things to Make...\$7.00	MARKETING BY MAIL Science of.....\$2.00
BUILT-IN FURNITURE Complete Instructions...\$2.50	MASONS AND BUILDERS Guides (4 vols.).....\$6.00
BUSINESS ETIQUETTE Most valuable.....\$1.00	MATHEMATICS Made Easy for the Practical Man.....\$1.50
CALCULATOR Mathematical Ropp's...\$1.00	MECHANICAL DRAWING Practical Course in...\$1.00
CARBURETORS Excellent book on all makes.....\$2.00	MODEL AIRCRAFT Building and Flying...\$2.25
CARPENTRY Hand book of 336 Kinks...\$1.50	OUTDOOR OPPORTUNITIES for Making a Living...\$2.00
CHALK TALK How to.....\$1.00	OUTDOOR SPORTS for All Year 'Round New Edition.....\$2.00
COLOR SIMPLIFIED Practical new Book (for Color Users).....\$2.50	PAINTING House (Best Methods)...\$2.00
CONCRETE 173 Ways of Using New Edition (Cloth)...\$1.00	PLUMBING 500 Plain Facts for Every Homeowner...\$1.50
CONTRACT BRIDGE at Sight.....\$1.00	POULTRY RAISING for Profit.....\$2.00
DOGS Care and Raising.....\$2.00	PUZZLES Amusing Mathematical...\$1.50
ELECTRICITY for Beginners.....\$1.50	RABBITS For Food and Fur...\$2.00
ELECTROPLATING Practical Results Easily Obtained.....\$1.00	RADIO A.C. Guide, all Electric...\$1.50
ENGLISH Self-Improvement In...\$2.50	SHOP NOTES 12 Vols. of 6000 Valuable Kinks.....\$3.75
ETIQUETTE New 560-Page Book. Only.....\$1.00	SLIDE RULE How to use.....\$1.75
FARMER'S BOOK of 861 Kinks and Book for Farmers' Wives...\$1.00	STAMP ALBUM (Modern) 12,000 Varieties.....\$2.00
FLYING Simplified.....\$1.00	STEEL SQUARE Pocket Book, Practical...\$1.00
FORMULAS 10,000 Money Making...\$4.00	STORAGE BATTERIES (New work) Best on subject.....\$3.00
FURNITURE (Mission) Homemade (3 vols.)...\$3.00	TOY MAKING Complete Instructions...\$1.50
GARDENS 1001 Questions Answered.....\$2.00	TREASURES Hunting Hidden.....\$2.00
GLASS Working.....\$1.75	WALL DECORATION (Interior) Newest Methods.....\$4.00
GLIDING A B C of.....\$2.00	WHITTLING The Art of.....\$1.35
HOME REPAIRS Practical Book of...\$2.50	WIRING House (New Book)...\$2.50
HOME WORKSHOP 900 Different Things to Make.....\$3.00	WOOD TURNING (LATHE) Practical Course in...\$1.50
IGNITION (High Speed) For Garage Mechanics...\$3.50	WOODWORKING SHOP Modern Motor-Driven...\$1.00

Books sent C. O. D. anywhere in U.S.

Just check the books you want, write your name and address below, and mail the advertisement. It is your order blank. When postman hands you books, pay him the price and few cents postage. If outside the U. S. remit when ordering and include 10 cents per book extra for postage. We have many other books on these and 2,000 other subjects. Catalog free.

Name.....
 City.....State.....
 Address.....

Mail to Popular Mechanics Press,
 Room P2-200 East Ontario St., Chicago, Ill.

TWICE AS EASY

to become a popular musician this simple home-study way

DOES the very thought of harsh-sounding scales—compulsory practice and impatient teachers, put a damper on your ambition to become a popular musician?

With such excuses as—"It takes too long"—"It costs too much"—"I don't know the first thing about music"—are you alibiing yourself right out of good times and a highly enjoyable attainment?

You're the Boss

You'd take up music in a minute, wouldn't you—if you thought there was a way of learning that made every lesson easy—that allowed you to study *when, where and as much or as little as you please*—that encouraged rapid progress—that did not cost too much?

All right. Such a method is far from being imaginary. It is *so real* that inside of a few short months you can learn to play your favorite instrument. Without taking lessons from a teacher! Without paying expensive fees! Without any tiresome technique to struggle through!

Thank the U. S. School of Music for the utter simplicity of this remarkable system. It removed completely the difficulty, boredom and extravagance from music lessons. Now to begin your musical career you don't even have to know "do" from "re" or a sharp from a flat.

Your own home is your studio. The lessons come to you by mail. They consist of complete printed instructions, diagrams . . . and all the music you need without extra charge.

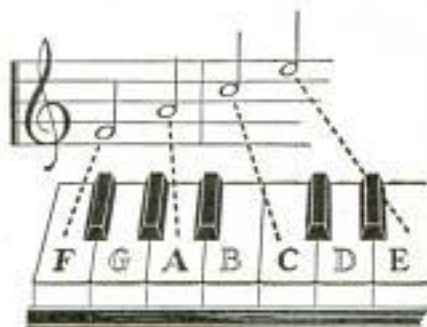
A sheet of music is not a riddle to you. You never have to guess what's right or wrong—you know! First you are told how a thing is done. Then a picture shows you how, then you do it yourself and hear it. Small wonder it's *twice as easy* as old-fashioned private teacher method.

Play Your Favorites

Instead of just scales you are playing real tunes from

actual notes—right from the very first lesson on. Sooner than you realize you will be bringing cheer to the folks at home with your playing. Gradually you gain confidence and professional expression. Then parties, popularity, orchestra work follow in short order. You'll know how good it feels to be out of the wallflower class and into the whirl of things.

Don't be afraid to begin your lessons at once. Over 600,000 people learned to play this modern way—and found it easy as A-B-C. Forget that old-fashioned idea that you need special "talent." Just read the list of instruments in the panel, decide which one you want



to play, and the U. S. School will do the rest. And bear in mind no matter which instrument you choose, the cost in each case will average the same—just a few cents a day.

Free Book and Demonstration Lesson

Our wonderful illustrated Free Book and Free Demonstration Lessons explain all about this remarkable method. They prove just how anyone can learn to play his favorite instrument in half the time and for just a fraction of what old slow methods cost.

If you really want to learn to play—if social popularity, and increased income appeal to you—take this opportunity to make your dreams come true. Now! Sign the coupon and send it in before it's too late. Instruments supplied when needed, cash or credit. U. S. School of Music, 72 Brunswick Bldg., New York City.

For your enjoyment, every Sunday night the U. S. School of Music presents an unusual and interesting radio program over the Columbia Broadcasting national chain. Consult your paper for exact time.

U. S. SCHOOL OF MUSIC,
72 Brunswick Building, New York City.

Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane, Free Demonstration Lesson, and particulars of your easy payment plan. I am interested in the following courses—

Have you
.....instrument?.....

Name.....

Address.....

City.....State.....

What Instrument for You?

Piano	Piccolo
Organ	Hawaiian
Violin	Steel
Clarinet	Guitar
Flute	Drums and
Harp	Traps
Cornet	Mandolin
'Cello	Sight Singing
Guitar	Trombone
Ukulele	Piano
Saxophone	Accordion
Banjo (Plectrum, 5-String or Tenor)	
Voice and Speech Culture	
Automatic Finger Control	
Italian and German	
Accordion	
Harmony and Composition	
Juniors' Piano Course	

Money can't buy better, more up-to-date equipment than what you actually work on in National's Million Dollar School.

\$25,000 worth of new model cars for you to work on



Learn Autos IN LOS ANGELES

and LEARN IT RIGHT!

A Few Short Weeks at National and You're Ready for a Big Pay Job!

For 26 years National has quickly helped men get ready for big pay, steady positions in the profitable Automobile fields. Don't worry about previous experience, or whether you're too old or too young. We train you by "Actual-Shop" Methods on thousands of dollars of right-up-to-the-minute equipment. Start any time of the year.

Your Railroad Fare Allowed to Los Angeles!

It's only human for you to want to come to California. Every one does. How much better to come and get started right—quickly qualifying for the best pay jobs. We are making a railroad fare offer from any point in the United States! Never again will you get an opportunity like this.

—and Don't Worry About Money! We'll Help You!

Even if you're short on cash you can easily get National Training. We help you secure good part-time jobs to earn living expenses while learning. Unlimited Employment Service assures you real, friendly co-operation in getting started on the road to real money, steady work and a prosperous future. Employers keep us busy sending them men—they know National Auto Men are the best, so they don't waste their time on half-baked, untrained mechanics.

National's Doors Are Open to You! Investigate at Once!

Write now—today—for the whole story. Our big free book with full details sent FREE. Don't lose another minute. These offers are necessarily limited for a short time. Mail the coupon, and soon you will be on the train for Los Angeles.

WRITE for FREE BOOK NOW

National Automotive School

NATIONAL AUTOMOTIVE,
Dept. 24-A, 4006 Figueroa St.,
Los Angeles, Calif.

Send me, absolutely free, your big illustrated catalog of Automotive Opportunities.

Name.....
Address.....
Age..... City..... State.....

Your Future assured!

National Automotive
LOS ANGELES

A Card Case Any MASON Would Be Proud To Own



Protects your lodge cards, \$1 auto license, passes, etc. under isinglass windows, ready to be seen at a glance. A genuine leather, 5-window sturdy card case, extra pocket—snap button—gold corners, for only \$1. Stamped with Masonic Emblem in heavy gold FREE—Same price without emblem. Name and other stamping 35c a line extra. Larger cases, 9 windows \$1.50, 13 windows \$2. Send for Catalogue.

Masonic Books, Monitors, Jewelry.
 Lodge Supplies. [Check Choice]

REDDING MASONIC SUPPLY CO.
200 Fifth Ave., Dept. P.M., New York

ART

COMMERCIAL

Taught by Meyer Both, an internationally known art organization with 8,000 advertisers as active clients. This training—based on 30 years' resultful experience—transforms indefinite theory into definite fact. Prepare in spare time for a career in Art—a fascinating, lucrative profession open to both men and women. Write for illustrated book telling of our successful students.

Meyer Both Co., Dept. 16, 20th & Michigan, Chicago, Ill.

"STAMMERING
Its Cause and Cure"

You can be quickly cured if you stammer. Send 10 cents, coin or stamps, for 288-page cloth-bound book on Stammering and Stuttering. It tells how I cured myself after Stammering and Stuttering for 20 years. **BENJAMIN N. BOGUE**
11138 Bogue Building, 1147 N. Illinois Street, Indianapolis



High School Course in 2 Years

This simplified, complete High School Course, specially prepared for home study by leading professors, meets all requirements for entrance to college, business, and leading professions.

20 Other Courses

Over 200 noted Engineers, Business Men, and Educators helped prepare the special instruction which you need for success. No matter what your inclinations may be, you can't hope to succeed without specialized training. Let us give you the practical training you need.

American School
Drexel Ave. and 58th St.
Dept. H-247, Chicago

Money Back When You Finish If Not Satisfied

American School, Dept. H-247 Drexel Ave. and 58th St., Chicago

Send me full information on the subject checked and how you will help me win success in that line.

- | | |
|-------------------------|--------------------------|
|Architect |Electrical Engineer |
|Building Contractor |General Education |
|Automobile Engineer |Lawyer |
|Civil Engineer |Mach. Shop Practice |
|Structural Engineer |Mechanical Engineer |
|Business Manager |Steam Engineer |
|C. P. A. & Auditor |Draftsman & Designer |
|Bookkeeper |High School Graduate |

Name..... Age.....

St. and No.....

Town..... State.....

VOICE!



NOW
 you can
 have the
VOICE
 you want!

100% Improvement Guaranteed!

No matter how hopeless your case may seem—send for free Voice Book. Discloses startling voice facts that may save you hundreds of dollars. Tells all about marvelous new SILENT Method of Voice Training. Increases Range. Improves quality. Banish huskiness—hoarseness. 100 per cent improvement *guaranteed*—or money back. Mail coupon *at once* for free book—the greatest voice book ever written—sent FREE with no obligation!

No matter how hopeless your case may seem — send at once for FREE Voice Book.
 Mail Coupon Now!

Perfect Voice Institute
 Dept. 13-52 1922 Sunnyside Ave., Chicago

Mail Coupon for Free Voice Book

Perfect Voice Institute, Dept.
 1922 Sunnyside Ave., Chicago 13-52

Please send me FREE and without obligation, Prof. Feachtlinger's new book, "Physical Voice Culture." I have checked subject in which I am most interested.

Weak Voice Singing Stammering Speaking

Name

Address

City State

"Seldom see an I.C.S. graduate OUT OF A JOB—"



"IN ALL the years I have known of the International Correspondence Schools, I have seldom seen one of your graduates out of a job."

A business executive made this statement in a recent letter commenting on the I. C. S. graduates and students in his employ and expressing regrets that it is necessary to reduce the personnel of his organization.

"However," he added, "all I. C. S. graduates and students will be retained, for I realize their value in the conduct of my business."

The reason I. C. S. men always have jobs is because they are *trained men!* You, too, can be an I. C. S. man. In this age of efficiency and specialization, to be an I. C. S. man means security for the present and assurance for the future.

Mark the subject in which you are most interested. Mail the coupon today. It has been the most important act in thousands of men's lives!

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

Box 5528-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> R. R. Locomotives |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Pipefitter <input type="checkbox"/> Tinsmith | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Marine Engineer |

BUSINESS TRAINING COURSES

- | | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Personnel Management | <input type="checkbox"/> Complete Commercial |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> Lumber Dealer |

Name.....Age.....

Address.....

City.....State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools, Canadian, Limited, Montreal, Canada

BEDFORD YMCA TRADE SCHOOL

Aviation Mechanic
Flying
Airplane Welding
Airplane Drafting
Air Navigation
Aero Starting, Lighting, Ignition
Auto Mechanic
Machine Shop, Electric Welding
Oxy-Acetylene Welding
Radio Mechanic, Battery Repair
Mechanical, Architectural Drawing
Sign Painting, Show Card Writing
Window Dressing
Commercial Art, Fine Art
DAY AND EVENING SESSIONS
Write for Catalog 50
Brooklyn Engineering Institute
(Operated by Bedford Y. M. C. A.)
1125 Bedford Avenue, Brooklyn
New York City


WELDING — ELECTRIC ARC OXY-ACETYLENE

Taught by Actual Welding Practice.

No Fine Equipment Anywhere at Any Price. Pipe-Line, Sheet Steel, Structural Steel, Cast Iron, Alloys and Commercial Welding, Cutting and Brazing. SPLENDID OPPORTUNITIES NOW FOR TRAINED WELDERS. Also Courses in Radio, Electricity and Automobiles. Full Information Free on Request.

Coleman Electrical School, 1628-X Main St., Kansas City, Mo.

Anyone CAN LEARN



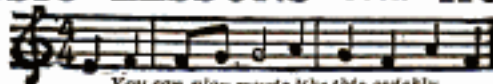
No talent or experience necessary. Fascinating work. Pays big money. Complete instruction book tells about Alphabets, Colors, How to Mix Paints, Show Cards, Window, Board and Wall Signs, Ready made letters, Gliding, Traps of the Trade, also gives 100 Alphabets and Designs. Book bound in durable art, leather-bound edges, and four full bearing Show Card Panels. Sent postpaid \$3.00. (C.O.D.) 10c extra.

DeVine Pub. Co., 57 Ross St., Dept. 29, N.Y. City

\$3

EARN MONEY IMMEDIATELY—
WE FURNISH EQUIPMENT TO START!!

MUSIC LESSONS IN YOUR HOME



You can play music like this quickly

Write today for our FREE BOOKLET and SAMPLE LESSON. It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. You pay as you learn. Costs you only a few cents a day. Thousands of satisfied students.

AMERICAN SCHOOL of MUSIC, 51 Manhattan Bldg., CHICAGO

LEARN WATCHMAKING AND ENGRAVING

BY OUR PROFIT-SHARING PLAN
OUR GRADUATES SUCCEED

One of our Iowa students started in a very small way—now doing over \$20,000 a year. Another in Wisconsin, over \$10,000 the first year. Day or night classes. Call or write for FREE BOOK

Chicago School of Watchmaking, Dept. 6301, 549 W. Randolph St., CHICAGO

GOV'T. POSITIONS

\$35 TO \$75 WEEKLY

- | | | | |
|---------------------------------|--|--|--------------|
| MEN - WOMEN | <input type="checkbox"/> Ry. Mail Clerk | <input type="checkbox"/> Steno-Typist | AGE 18 to 55 |
| | <input type="checkbox"/> Prohibition Agent | <input type="checkbox"/> Immigrant Inspector | |
| | <input type="checkbox"/> R. F. D. Carrier | <input type="checkbox"/> Seamstress | |
| | <input type="checkbox"/> Special Agent | <input type="checkbox"/> Auditor | |
| | <input type="checkbox"/> (Customs Inspector) | <input type="checkbox"/> Steno-Secretary | |
| | <input type="checkbox"/> City Mail Carrier | <input type="checkbox"/> U. S. Border Patrol | |
| | <input type="checkbox"/> Meat Inspector | <input type="checkbox"/> Chauffeur-Carrier | |
| | <input type="checkbox"/> P. O. Clerk | <input type="checkbox"/> Watchman | |
| | <input type="checkbox"/> File Clerk | <input type="checkbox"/> Skilled Laborer | |
| | <input type="checkbox"/> General Clerk | <input type="checkbox"/> Postmaster | |
| <input type="checkbox"/> Matron | <input type="checkbox"/> Typist | | |

GOVERNMENT INSTRUCTION BUREAU, 311 Arcade Bldg., St. Louis, Mo. Send me FREE particulars how to qualify for positions marked X. Salaries, locations, opportunities, etc. ALL SENT FREE.

NAME.....

ADDRESS.....

I Offer You a Chance to get this

Sport Model 3 Place

AIRPLANE

FREE!

When You Become
One of my
Students

MAJOR R.L. ROCKWELL



**I Will Train You at Home for
Aviation and Prepare You to
Earn \$75⁰⁰ to \$100⁰⁰ a Week**

AVIATION—America's newest big industry—offers many opportunities to ambitious men who want to enter a fast growing industry with a bright future.

Just a Few Months

Out of my 14 years of Aviation experience—starting back in war days—I have prepared a Home Training Course in practical Aviation. Just an hour a day for a few months devoted to my Home Training will enable you to master the principles of ground work which you must know before you can qualify for any of the better pay jobs open to men trained in Aviation.

My Home Training Course Is All You Need

When you have finished my Home Training you can qualify for any of the 40 well paid ground jobs. If you wish, I will arrange for your flying instructions in Dayton or at an airport near your home at special reduced rates.

Enroll NOW—and Qualify for This FREE Airplane

All students who enroll now are given a chance to get this Sport Model International 3 Place Airplane without one cent of cost. Become one of my students while this offer is on, and let me train you for one of the many well-paid Aviation jobs open only to the trained man. I will prepare you to take your place in the most fascinating, fastest growing industry. Rush this coupon to me for a copy of my famous FREE Book and your chance for a FREE Airplane.

Major Rob't L. Rockwell
THE DAYTON SCHOOL OF AVIATION
Desk J-1 DAYTON, OHIO

No Special Education Needed

You don't need to have an advanced education or even know anything about airplanes, motors, or mechanics. My Home Training course is thorough and complete. It is clearly explained, with easy-to-understand text and pictures, so that in a few short months you will be able to grasp the fundamental principles of Aviation ground work and be able to qualify for important aviation work, that will later lead to a job paying \$75.00 to \$100.00 a week. My Home Training Course will give you the knowledge necessary to pass the government's written examinations for mechanics' or pilots' licenses.

MONEY BACK AGREEMENT

I am so sure you can learn Aviation with my help that if you are not satisfied after you have completed my course, I'll refund every penny you have paid me.



Mail Coupon for FREE Book and FREE Airplane Offer

Major Rob't L. Rockwell,
The Dayton School of Aviation,
Desk J-1, Dayton, Ohio.

Dear Major: Please send me FREE a copy of your famous book on Aviation; and your FREE Airplane Offer.

Name.....Age.....

Address.....

Town.....State.....

There's A Better Living For Any Man of Limited Means and Education IN BARBERING



SHORT—PRACTICAL COURSE

*Protecting Laws Make It the Best Profession
in the Universe*

RALPH KUHLMAN has a Barber job on the Santa Fe running from Chicago to Los Angeles paying as high as \$60 a single trip. ARTHUR BAKER runs a shop in the exclusive great money district of Wall Street. He has accumulated a fortune. BOTH of these boys are MOLER GRADUATES. (Names of other graduates furnished on request.)

GOODNESS!!! GRACIOUS!!!

Why not learn a profession by enrolling in a school whose method of teaching and course of instruction is approved by all State Boards? There is a school near you. Write to the nearest one and see.

Standardized Branches Moler System of Colleges

139 E. 23rd St., New York City
512 N. State St., Chicago, Ill.
810 N. 6th St., St. Louis, Mo.
801 Main St., Kansas City, Mo.
206 E. 4th St., Cincinnati, Ohio
215 Huron Road, Cleveland, Ohio
559 Michigan Ave., Detroit, Mich.
1229-17th St., Denver, Colo.

1302 Douglass St., Omaha, Neb.
501 E. Water St., Milwaukee, Wis.
81 Forsyth St., N. W., Atlanta, Ga.
81 S. Second St., Memphis, Tenn.
1713 Commerce St., Dallas, Texas

Address Nearest Branch

Please send me without obligation on my part your Booklet B.

Name.....

Address.....

City.....State.....

AS A ROWING MACHINE

NO CABLE EXERCISER

HEAD STRAP

Get Strong! Eight Improved Muscle Builders All for \$3.75

Easily master feats which now seem difficult. If you want physical culture for health this equipment is what you need. **SAVE AT LEAST HALF!** We furnish ten cable chest exerciser adjustable to 100 lbs. resistance. Made of new live extra strength rubber to give resistance needed for sure muscle development. Pair of patented hand grips develop powerful grip and arm. Wall exercising pairs develop back, arms and legs. Head strap permits exercise of neck muscles. Develop leg muscles with foot strap—gives speed, endurance. Illustrated course shows how to develop any part of body.

GUARANTEE
Entire satisfaction guaranteed or money back.

SEND NO MONEY
Send name and address. We send all by return mail. Pay postman \$2.75 plus postage. (If you live outside U. S. A. price \$4.50 cash with order.)

MUSCLE POWER CO., Dept. PM-2
150 Nassau St.
NEW YORK, N. Y.

WORLD NEEDS PLUMBERS

Old style plumbers are fading like the horse and buggy. The world demands modern Plumbing and Skilled Trained Mechanics to do it. Unlimited, swift growing field. **Make \$50 to \$100 a week or start own shop. We train you quick. Learn in 8 to 12 WEEKS** to do any job with skill and science. Need no previous experience. Strictly tool using system. Opportunity knocks. Investigate today—amazing offer—low tuition. World's greatest school.

Write—
UNIVERSAL PLUMBING SCHOOL
2130 Troost Ave. Kansas City, Mo.

BE AN ARTIST

WE CAN TEACH YOU DRAWING in your own home during your spare time. Twenty-five years of successful teaching proves our ability. Artists receive large salaries.

Write Today for Art Year Book

SCHOOL OF APPLIED ART
ROOM NO. 2 BATTLE CREEK MICH.

LEARN WATCHMAKING

and become independent. We help you secure a position. Easy to learn. Send for FREE CATALOG.

ST. LOUIS WATCHMAKING SCHOOL Dept. 5, ST. LOUIS, MO.

NERVES?

Are You Always Excited? Fatigued? Worried? Gloomy? Pessimistic? Constipation, indigestion, cold sweats, dizzy spells and bashfulness are caused by **NERVE EXHAUSTION**. Drugs, tonics and medicines cannot help weak, sick nerves! Learn how to regain Vigor, Calmness and Bell Confidence. Send 25c for this amazing book.

RICHARD BLACKSTONE, N-472 FLATIRON BUILDING, N. Y.

"Jim!" she exclaimed..

So then I told Marge how the Hawaiian Guitar had made my ambitions all come true

I was just a plain discouraged "wash-out." No talent, no friends. No "social presence," no worth-while prospects at my job; no hard, solid cash salted away at the bank.

And then what could a girl see in me? No matter how much I thought about girls—the way I felt about Marge, for example—I couldn't do anything about it.

One night I tried reading a magazine. I began spinning the pages past my thumb.

And THEN It Happened!

Somehow one page flashed out from the rest. "Learn the Hawaiian Guitar at Home," it read. And it urged me to send for a free Book. That was three months ago.

Now let me tell you about the other night.

I asked Marge if I could call. She told me to come over after supper. Excited? I'll say I was!

Marge came out in a few minutes. I couldn't restrain myself any longer.

"Marge!" I cried. "I've got a surprise for you!" I reached down and lifted up my Guitar. Even in the semi-darkness I could see Marge's eyes grow big.

I played to her. Dreamy "Aloha"; throbbing "Carolina Moon"; all the blues of "Moanin' Low"—and two others. When I stopped, Marge didn't say a word for a full minute.

Then she exclaimed excitedly, "Jim! Why didn't you tell me before?"

I swallowed hard. "Because—" I began, "because, Marge—well, I guess there wasn't so very much to tell—'before.'"



"why didn't you tell me that before?"

"But now," I rushed on—"I'm started for the biggest thing that ever was opened up to me! Listen, Marge! I've done it at home, without a teacher, by a wonderful new method.

"I took a trip over to Bridgeton one night and played my Guitar at the 'Y.' They went wild, Marge! Paid me ten dollars for it.

"Since then I've played at two dances there, too, and Johnny Farrell says I start with his orchestra the first of the month. Think of it! It will mean doubling my salary!"

Marge was quiet again. Then, looking at me with level eyes, she said—"Jim, you've found yourself.

I didn't know it was in you. I'm so happy."

YOU can be the popular master of this thrillingly beautiful instrument—in 1 to 3 short months. Without one bit of previous musical knowledge or experience, you can begin playing actual tunes right from the very start.

Here at last is the unlimited Opportunity for making friends. Here is the chance above all others to make \$15 to \$25 a week and up, for part-time or full-time playing.

Get the FACTS now. With the very first lesson of this time-tested Course you receive a full-size, sweet-toned, genuine Hawaiian Guitar; picks, bar, tuner, etc. And we give you Phonograph Records which demonstrate every lesson in the Course—55 in all.

The coupon below brings your copy of "The Hawaiian Way to Popularity and Big Pay." We want you to read it, that's all—then make your own decision. Do as Jim did—get that coupon into the mailbox tonight.

**A. F. BLOCH, President
HAWAIIAN STUDIOS 52021 of
New York Academy of Music
100 Fifth Avenue NEW YORK CITY**

Clip and Mail NOW!

**A. F. BLOCH, President
Hawaiian Studios 52021 of
New York Academy of Music
100 Fifth Avenue, New York City**

Yes—without obligation I want to read "The Hawaiian Way to Popularity and Big Pay." Rush my copy.

Name.....Age....

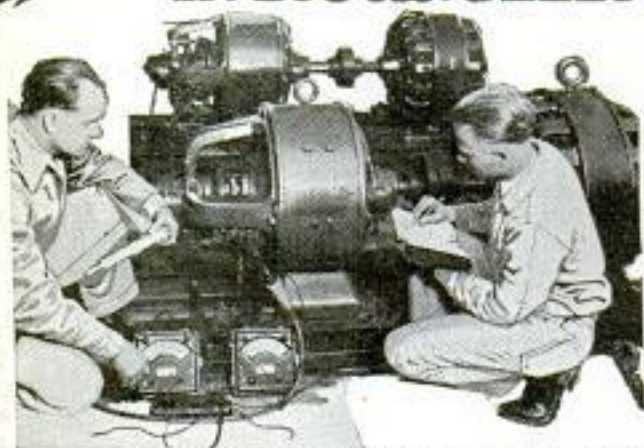
Address.....

City and State.....



This FREE Book will open your eyes Send for it!

Learn Electricity IN LOS ANGELES



and LEARN IT RIGHT!

You need **GOOD TRAINING**
to earn **BIG PAY!**

National Electrical School—a Million Dollar Institution—established in 1905—is recognized throughout the electrical industry as the foremost school of the West. National gives you practical intensive training in all electrical branches. No age limit. No previous experience necessary. Life Scholarship privileges. Start any time of the year.

Qualify Quickly for Big Pay Jobs!

We train you right in the shortest possible time. Our condensed practical training in one of the best equipped schools in the country qualifies you as a Practical Skilled Electrician. Don't take a chance without this training.

Don't Worry About Enough Money! We'll Help You!

If you are low on cash, we'll make it easy for you to get National Training. We help you secure part-time jobs to earn living expenses while learning. Unlimited Lifetime Employment Service assures you proper cooperation in getting started in the electrical game. The Electrical Industry needs you as soon as you can get this training—that's why it's easy for us to help you.

Your Railroad Fare Allowed to Los Angeles!

We'll allow your full railroad fare from any point in the United States. Come West, get trained, enjoy life, and make more money because you are qualified.

NEW descriptive books tell everything!

Fill out coupon now—and mail it today for full details of the greatest offer ever made ambitious men. You'll never equal this great offer—so send today for the complete story. Mail this coupon at once.

WRITE for FREE BOOK NOW!

**NATIONAL
Electrical School**

Dept. 24-C, 4006 Figueroa St.,
Los Angeles, California.

Send me your big free illustrated catalog of
Electrical Opportunities showing how I can learn
quickly and get a Big-Pay Electrical Job.

Name.....

Address.....

Age..... City..... State.....



Increase Your Earning Power

Apply time and labor-saving kinks to your work. Your efficiency will soon be recognized and you will be in line for advancement.

If you do machine shop work of any kind, sheet-metal work, painting, carpentry, auto repairing, farming, concrete work, plumbing, electrical work, welding, building, glass work, general repairing, tool-making, poultry raising, masonry or home repair work, get this

**LIBRARY OF 6000
TIME AND LABOR SAVING
IDEAS FOR SHOPMEN
AND HANDYMEN**

JUST PUBLISHED

**SHOP
NOTES**

for

1931

192 Pages

464 Illustrations

Price 50c

See partial list
of
contents below



Including the new 1931 issue illustrated above, there are now 12 volumes in the Shop Notes Library of 6,000 easily understood short cuts to every-day jobs. Here are just a few of the subjects taken from the latest issue.

- | | | |
|--|--|---|
| Auto Driving, Winter Hints | Growler for Armature Repair | Poultry Ranch for City Lot |
| Auto Trucks, Handy, for Photo Shop | Header for Garage or Workshop | Reeding and Fluting, Ornamental |
| Band-Lay Strips, Making | How to Make Broad-ax Big Squares Legs | Saws, Circular, Repairing |
| Belt Sander Reduces Labor | Injects, Simple Joiner in the Home Shop | Sawder, Vertical, Made from Slatting Head |
| Bench, Portable, for Machine, Saves Time | Kitchen Stool, Metal, How to Make | Silver Solder, Use of Shaper for Home Shop |
| Blower for Lowering Fuel Cost | Laboratory Stand | Sizes and Time Savers (for the Shop) |
| Book Ends, Hand Wrought, Making | Make Workshop Tool Lamp, Star, for Home | Spiral Turnings, How to Make |
| Cable Leg, Cutting the | Lantern Illuminates House Numbers | Stairway, Homemade |
| Drawing Instruments, Homemade | Machinist Chips, Vacuum Cleaner | Disappearing Water Heater for Sunny Climes |
| Fireplace, Portable, How to Build | Machinist Tools, Running Several with One Electric Motor | Workbench, Handy, for Model Airplane Building |
| Furniture, Drawer Pulls for | Milling Machine Made from Shaper | Table, Small Drum, Making |
| Gauge Glass, How to Install | Pipe Repair, Emergency | Twelve-Turning with Portable Router |
| Grinding, Surface, on Drill Press | Plating Tricks Made Easy | |

Each volume contains approximately 500 articles and 400 illustrations and has 192 or more pages. At the regular price of 50 cents per single volume this library costs \$6.00, but for a limited period we will supply the 12 vols. when ordered at one time at the special reduced price of only \$3.75.

SPECIAL OFFER COUPON

**POPULAR MECHANICS PRESS,
200 E. Ontario St., Room P2, Chicago, Ill.**

Send me, as per your special offer, the following books. I will pay postman price and small amount of postage. My money will be refunded if I am not satisfied. (Check what you want.)

- 1931 Shop Notes and Lathe Handbook, both for 98c.
 Complete Shop Notes Library (12 vols.) \$3.75.

Name.....

Street and No.....

City..... State.....

1000 Hotel Positions Open!

HOTELS, Restaurants, Clubs, Apartment Hotels, Institutions, Camps, Schools, Colleges, Hospitals, etc., everywhere need trained men. Over 70,000 high-class positions as Manager, Assistant Manager, Steward, Room Clerk, Purchasing Agent, Sports Director and scores of other executive positions, paying from \$2,500 to \$10,000 a year, are open each year in the hotels of the United States alone. Nearly one billion dollars' worth of new hotels, apartment hotels, clubs, restaurants and institutions being built this year will need over 100,000 trained men and women.

I WILL TRAIN YOU IN YOUR SPARE TIME

Thru our Personal Coaching Plan, which adapts the instruction to your individual needs and requirements, you can qualify for a well-paid position in your spare time. At any time there are over 1,000 positions open. I put my students in touch with positions. All over the United States they are eagerly sought by the biggest and best hotels. Hotels start you at salaries up to \$2,500 a year. Fine living, luxurious surroundings. If you want a steady, permanent position, with quick advancement, fascinating work, big pay, fine living, luxurious surroundings—you can find it in hotel work.

NO PREVIOUS EXPERIENCE NECESSARY

We train you by mail in your spare time at home with the Lewis Personal Coaching Plan and put you in touch with big opportunities.

All of your training under the personal supervision of Clifford Lewis, former U. S. Government Hotel and Restaurant Expert, who has been appointed Manag-

Opportunity Coupon 1000 Hotel Positions Open!

Lewis Hotel Training Schools,
Room DB-310, Washington, D. C.

Send me without obligation the FREE BOOK, "Your Big Opportunity," with details about Registration in the Lewis National Employment Bureau.

Name.....

Address.....

City.....State.....

ing Consultant by over 300 hotels throughout the United States.

Through Lewis Training, Robert Noble became Manager of a resort hotel, and Thomas Bass' was appointed Assistant Manager of an Ohio hostelry. Absolutely inexperienced in hotel work before taking the Lewis Course, Roy B. Cook was appointed Checker of a 200-room chain hotel, after he received his diploma from Lewis Schools.

FREE BOOK GIVES FULL DETAILS

No matter what your present occupation is—there are opportunities for you in the big-paying hotel and institutional field. Many students have obtained splendid hotel positions paying as high as \$2,500 a year, even before they had finished the course. My Free Book—"Your Big Opportunity"—shows how you can do as well and explains how you are registered in our National Employment Bureau FREE of extra charge.

Mail the coupon at once for your free copy of "Your Big Opportunity," explaining our Money-Back Agreement and showing how we can train you for one of these splendid positions. Send for it today—NOW—before you forget.

LEWIS HOTEL TRAINING SCHOOLS

Room DB-310

CLIFFORD LEWIS, Pres.

Washington, D. C.

The Original and Only School of Its Kind in the World



"The Boss Didn't Even Know My Name"

"He said my face was more or less familiar and he remembered seeing me around, but he didn't even know my name until the I. C. S. wrote him that George Jackson had enrolled for a course of home study and was doing fine work.

"Who's George Jackson?" he asked. Then he looked me up. Told me he was glad to see I was ambitious. Said he'd keep his eye on me.

"He did too. Gave me my chance when Frank Jordan was sent out on the road. I was promoted over older men who had been with the firm for years.

"My spare-time studying helped me to get that job and to keep it after I got it. It certainly was a lucky day for me when I signed that I. C. S. coupon."

How much longer are you going to wait before you take the step that will bring you advancement and more money?

It takes only a moment to mark and mail this coupon and send it to the International Correspondence Schools at Scranton, but that one simple little step may change your entire life. Isn't it better to do this today than to wait a year or five years and then wish you had?

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 5530-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> R. R. Locomotives |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Pipefitter <input type="checkbox"/> Tinsmith | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Wooden Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Marine Engineer |

BUSINESS TRAINING COURSES

- | | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Personnel Management | <input type="checkbox"/> Complete Commercial |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> Lumber Dealer |

Name..... Age.....

Address.....

City..... State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

1931 Radio Catalog

RADIO BARGAINS

WHOLESALE DISCOUNTS

LOWEST PRICES

Greatest bargains shown at **REGULAR WHOLESALE TRADE DISCOUNTS!**

Nationally-advertised, guaranteed radio reception, including the sensational **bandwidth** **LAFAYETTE ALL ELECTRIC RADIO RECEIVER** with tone control. Write at once for **FREE 1931 Radio Bargain Catalog**, showing complete selection. Don't say until you see this wonder catalog!

WHOLESALE RADIO SERVICE CO.
Dept. B-11
38 Vesey St. New York

FREE!

Learn Watchwork, Jewelrywork and Engraving

A fine trade commanding a good salary, and your services always in demand. Address **Horological, Dept. P, Bradley Institute, PEORIA, ILLINOIS**, for our latest catalog.



Now science has added low cost to the convenience of automatic oil heat. Amazing discovery of the Laco Mineral wick does it—ends fuel waste, smoke, soot, grease. Banishes the high cost of heating forever.

Dealers Wanted Quick! Think what an opportunity for dealers. Sells fastest because lowest priced, cheapest to operate. Latest mechanical exclusive territories. Openings for 300 jobs. Get full information and sensational low price offer at once! Listed as standard by Underwriters. Price as low as \$70.

LACO OIL BURNER CO., 140 Union St., Griswold, Iowa, U. S. A.

LEARN MECHANICAL DENTISTRY

SEND FOR FREE BOOK

Earn Big Money—Steady Work

Don't waste the best years of your life. Prepare now for your future. Learn this money-making business in a few months in Day or Evening sessions. Big Demand. School is highly endorsed. Practical training. Individual instruction. Easy terms. Write NOW for catalog P and special tool offer.

New York School of Mechanical Dentistry
125 West 31st Street
New York

TRI-STATE COLLEGE

B. S. degree in 2 years in Aeronautical, Civil, Electrical, Mechanical, Chemical, Administrative Engineering. Students who left H. S. can make up work. Tuition low. Catalog.

411 College Street
Angola, Indiana

WHY NOT spend Spring, Summer and Fall gathering butterflies, insects? I buy hundreds of kinds for collections. Some worth \$1 to \$7 each. Simple outdoor work with my instructions, pictures, prizes. Send 10 cents (not stamps) for my illustrated Prospectus before sending butterflies.

MR. SINCLAIR, DEALER IN INSECTS,
Dept. G, Box 1424, San Diego, Calif.

FREE BOOK SENT FREE

SONG WRITERS

Advance Royalty Payments, New Talking-Picture Song requirements, etc., fully explained in our free instructive book. Writers of Words or Music for songs may submit their work for free advice. We revise, compose, arrange and copyright music. Write today.

Newcomer Associates, 1676-V Broadway, New York

FREE

Get two wonderful books by mailing coupon below.

You get these Genuine High Quality, Imported Drawing Instruments, 14 Other Tools and a Drafting Table—all included in my Home Training Course.

These Two Books—
Mail Coupon!
Yes, Absolutely
FREE



2
Books
FREE



Just Send the Coupon Below!

Jobs for Draftsmen in Great Industries—Learn At Home

Automobiles—Electricity—Motor Busses—Aviation—Building Construction.

There are jobs for Draftsmen in all of these industries and in hundreds of others.

Aviation is expanding to enormous proportions.

Electricity is getting bigger every day.

Motor Bus building is becoming a leading world industry.

Building of stores, homes, factories and office buildings is going on all the time.

No structure can be erected without plans drawn by a draftsman. No machinery can be built without plans drawn by a draftsman.

I train you at home, in Drafting. Keep the job you have now while learning drafting.

I will train you in drafting right where you are in your spare time. I have trained men

who are making from \$3,500.00 to \$5,000.00 a year. There is a big future for draftsmen because you plan and supervise the work of others, or you go into business for yourself. Get started now toward a better position, paying a good, straight salary, the year around. Comfortable surroundings. Inside work.

Earn As You Learn

I tell you how to start earning extra money a few weeks after beginning my training.

Employment Service

After training you I help you to get a job without charging you a cent for this service. Employers of Draftsmen come to me for men because they know that Dobe Trained Men make good as they have learned drafting by actually doing the work themselves, in a practical way. Employers know they are not taking chances on men trained by me.

Money-Back Agreement

I train you at home under a positive Money-Back Agreement. If my training does not satisfy you after you have finished, you get every penny back.

Age or Lack of Education, No Drawback

Previous experience is not necessary. You do not need to be a college man or high school graduate.

Help As Long As You Need It

As my student you can write to me any time you want to and as often as you like and I will give you help on any subject pertaining to draftsmanship. I will advise you about jobs, extra work, fees and how to make extra money.

If You Earn Less Than \$70.00 a Week Ask for My 2 FREE Books



"I'll train you at home" Engineer Dobe

Mail this coupon, at once. Get "My Pay Raising Plan" and "Successful Draftsmanship". Both of them point the way to Success. You owe it to yourself to find out what a big opportunity there is in practically all industries, for Draftsmen. These two books are Free. They come to you post paid. Mail the Coupon for them TODAY.

ENGINEER DOBE

1951 Lawrence Ave., Div. 13-52 Chicago

FREE BOOK COUPON

ENGINEER DOBE

1951 Lawrence Ave., Div. 13-52 Chicago

Send me free of all cost your book, "Successful Draftsmanship", also plan to earn money while learning and proof of big money paying positions. Also your new book "My Pay-Raising Plan."

Name..... Age.....

Address.....

Post Office..... State.....

Easy home method quickly teaches HAWAIIAN GUITAR



Play all the latest hits just as the Hawaiians do! Have good times aplenty!

Native Hawaiian expert directs you

You get expert instruction directed by a world-famous player and teacher, Prof. Walter Kolomoku. He quickly reveals to you the secrets of this fascinating instrument.

Only 4 Motions to learn. Then you can play any music—popular songs, classical, old-time melodies, native Hawaiian air—or real jazz. You'll never be lonesome after you learn the Hawaiian Guitar.

Complete Course

52 lessons. Nothing omitted. Pictures explain every move. You are sure to learn—what we can do for others we can do for you. Over 50,000 successful students.

Pay as you play

We make it easy for you. Start with small first payment—then pay while learning. Costs only few cents per lesson. You only pay the cost of instruction—we furnish everything.

Win fame—friends—fortune! Play the Hawaiian Guitar!

Learn at home in spare time

Study in spare time at home. Even if you don't know a note our method is so simple, plain and easy, you begin a piece your first lesson. In half an hour you can play it!

Sweet Toned HAWAIIAN GUITAR

GIVEN when you enroll

—with genuine seal grain Fabrikoid Cover and complete playing outfit. Reliable retailers ask \$18 to \$20 for a similar instrument and outfit without the fine Fabrikoid Case, which alone is valued at \$3.50.

TENOR BANJO and other courses

The same thorough instruction on the Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele—well known instructors. Write for full information.

FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
9th Floor, Woolworth Bldg., Dept. 748, New York

Approved as a Correspondence School Under the Laws of the State of New York

Member National Home Study Council

Send This Coupon for Liberal Offer!

FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
9th Floor, Woolworth Bldg., Dept. 748, New York, N.Y.
Please mail full information about your 52-lesson Hawaiian Guitar Course. I am not obliged to enroll unless I want to.

Name _____

Address _____

City _____

State _____

WASHES CARS in A JIFFY!

Here's the cleverest invention of the age! GY-RO washes cars CLEAN, without chemicals, soap or spray! Water pressure from garden hose makes it operate. And in the easiest, simplest manner ever! Whirling brush cuts right through dirt and road film—car becomes spotlessly clean in a jiffy. Saves autoists valuable time and a nasty job. They buy GY-RO on sight. USEFUL IN EVERY HOME—Cleans screens, walls, etc., like new.

100% PROFIT FOR AGENTS!

AGENTS WANTED AT ONCE. Valuable territories still open. No experience needed. Exceptionally large profits for business. Car owners, garage service stations, etc., are prospects. COSTS NOTHING TO HEART. Write today for full facts. GY-RO BRUSH COMPANY, Dept. B-14, Bloomfield, N. J.



Learn Watchwork, Jewelrywork and Engraving

A fine trade commanding a good salary, and your services always in demand. Address **Horological**, Dept. P, Bradley Institute, PEORIA, ILLINOIS, for our latest catalog.

ENGINEERING ELECTRICAL-MECHANICAL-STRUCTURAL and ARCHITECTURE

INTENSIVE PRACTICAL TECHNICAL COURSES. Degree in 2 years. Diploma in 1 year. Special short courses 6 Weeks to 4 Months in Electricity, Radio, Power Plant, Electric Refrigeration, Armature Winding, Wiring, Testing, Drafting, Welding. **LOW TUITION.** Expert instructors. Extensively equipped laboratories. Free lifetime employment service for graduates. Part-time work while attending. Write for free illustrated catalog giving all facts. 29th year.

FINLAY ENGINEERING COLLEGE

1001 A Indiana Avenue

Kansas City, Missouri



Wonderful, new device, guides your hand; corrects your writing in a few days. Big improvement in three hours. No failures. **Complete outline FREE.** Write C. J. Osmont, Dept. 34, St. Louis, Mo.

Study LAW AT HOME

Lincoln did it! Also thousands of other great lawyers, politicians and business men. YOU, too, can become a lawyer or law trained businessman through home study guided by the successful practicing lawyers of our faculty. Write today for free book.

AMERICAN CORR. SCHOOL OF LAW
3601 Michigan Ave., Dept. 1352, Chicago

BASHFUL?

"Shame on you!" Are you nervous, embarrassed in company of the other sex? Stop being shy of strangers. Conquer the terrible fear of your superiors. Be cheerful and confident of your future! Your faults easily overcome as you can enjoy life to the fullest. Send 25c for this amazing book.

RICHARD BLACKSTONE, N-472 Flatiron Bldg., N. Y.

"Pick YOUR Government Job"



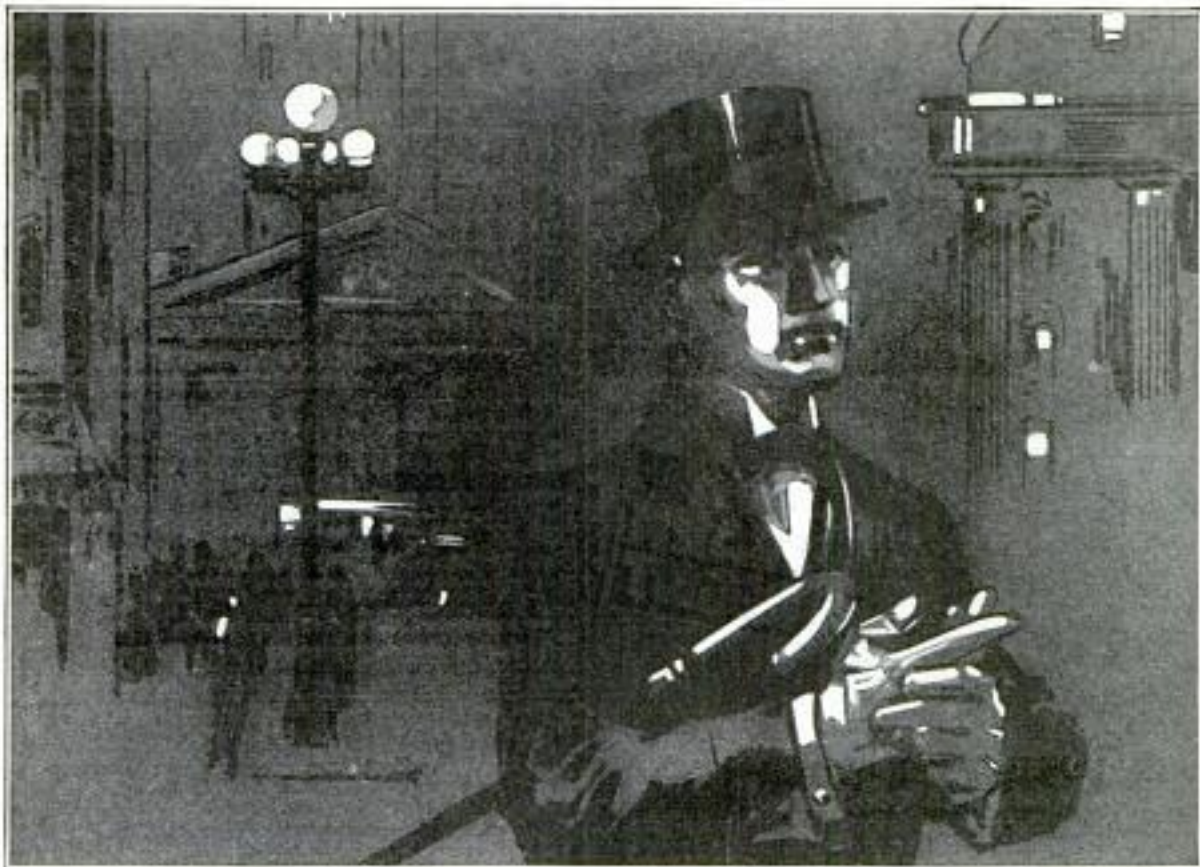
"Work for Uncle Sam. Get good pay, regular increases, vacations and sick leave with pay, steady advancement, pension. Send for my free book 'How to Secure a Government Position'—tells about all jobs, near home or traveling, the money, what you need to know and how to get posted. Forget job hunting."

IMPORTANT NOTICE—Railway Postal Clerk examination coming. Yearly pay with allowances averages \$2700.00. Prepare yourself NOW. Send coupon at once.

A. R. Patterson, Civil Service Expert, PATTERSON SCHOOL, 82-A Waver Bldg., Rochester, N. Y. Please send me, without obligation, your free book "How

to Secure a Government Position."

Name _____
Address _____



Follow this Man!

Secret Service Operator 38 Is on the Job

Follow him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The operator's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon.

FREE The Confidential Reports No. 38 Made to His Chief

And the best part of it all is this. It may open your eyes to the great future for YOU as a highly paid Finger Print Expert. More men are needed right now. This school has taken men just like you and trained them for high official positions. This is the kind of work you would like. Days full of excitement. Big salaries. Rewards.

Earn \$3000 a Year and Up *You study at home in spare time*

No advance education is needed. Any man who can read and write, and think can make good. A wonderful book tells all about what others have done. Shows pictures of real crimes and the men who solved them. We'll send you a FREE copy with the free reports. Get our low prices and easy terms. Mail the coupon.

INSTITUTE OF APPLIED SCIENCE
1920 Sunnyside Ave., Dept. 13-52 Chicago, Illinois

INSTITUTE OF APPLIED SCIENCE

1920 Sunnyside Ave., Dept. 13-52 Chicago, Illinois

Gentlemen:—Without any obligation whatever, send me your new, fully illustrated Free Book on Finger Prints, also FREE Copy of operator No. 38's confidential report. Tell me about your low prices and easy terms. Literature will NOT be sent to boys under 17 years of age.

Name

Address

Age

Los Angeles,
CALIFORNIA
IS THE BEST PLACE TO
LEARN AUTOS



Come West at Our Expense!

For a limited time we are making a railroad fare offer from any point in the United States to Los Angeles. Just think of it! A Trip to California with traveling expenses allowed!

Spend a Few Short Weeks Learning Autos!

Quickly train for Big Pay Jobs in the Auto Game. Unlimited Lifetime Employment Service. Employers insist on our men instead of green, half-baked mechanics who don't know what it's all about. That's why you don't find National Trained Men walking the streets for jobs.

Don't Worry About Money! We'll Help You!

If you are low on cash, we'll help you. We help you secure a part time job to earn living expenses while learning.

It's Easy at National!

Short, condensed training in our Million Dollar Practical "School of Shops"—instruction on the most modern equipment money can buy—with the country's best staff of expert, experienced master mechanic instructors. No dry lectures or text books. Straight practical work on real jobs. No previous experience needed. None too old or too young to learn. Start any time.

WRITE TODAY!

We'll send you the full story about Railroad Fare Offer, Unlimited Employment Service. New Book sent FREE.

SEND FOR THIS BIG, FREE BOOK

NATIONAL AUTOMOTIVE SCHOOL
Dept. 24-B, 4066 Figueroa St.,
Los Angeles, California

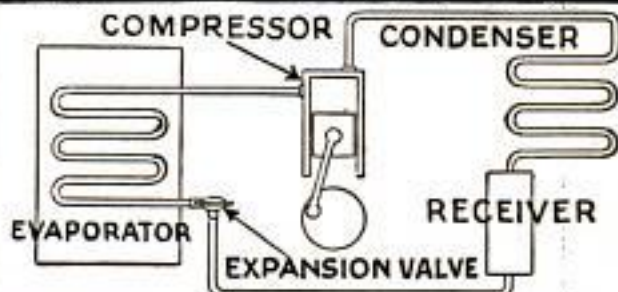
Send me, absolutely free, your big illustrated Catalog of Automotive Opportunities.

Name _____
Address _____
Age _____ City _____ Year _____



NATIONAL AUTOMOTIVE SCHOOL

NEW INDUSTRY NEEDS MEN



ELECTRIC REFRIGERATION Calls You!

Newest American Industry needs men for \$200 to \$1,000 a month jobs in production service, installation and sales. Fastest growing, money-making field—backed by General Motors, General Electric, etc. New easy home training qualifies you for big pay job. This training is done by Serrin, Kelvinox, Copeland and other large manufacturers.

Get Valuable New Book—FREE

Our new illustrated book—*Rich Rewards in Electric Refrigeration*—just off the press, reveals amazing plan to ambitious men. Sent absolutely free, without obligation. Be the first in your locality to get into this new magic industry. Write today!

UTILITIES ENGINEERING INSTITUTE
4403 Sheridan Road, Dept. 121, Chicago, Ill.



HOT PIANO



Ultra-modern Piano
Jazz taught by mail. Note or ear. Easy rapid lessons for adult beginners. Also Self-instruction system for advanced pianists. Learn 358 Bass Styles, 976 Jazz Breaks, hundreds of Trick Endings, Hot Rhythms, Sock, Stomp and Dirt Effects; Symphonic and Wicked Harmony in latest Radio and Record Style. Write for Free Booklet.

WATERMAN PIANO SCHOOL, 1826 W. Adams St., Los Angeles, Calif.

Greatest Encyclopaedia Value Ever Offered

ENCYCLOPAEDIA BRITANNICA

Write for FREE Booklet

THE ENCYCLOPAEDIA BRITANNICA, Inc.
342 Madison Ave., New York City



Minstrels

Unique First Parts for complete show with special songs and choruses. Make-up. Catalog Free.

T. S. Denison & Co., 623 S. Wabash, Dept. 19 Chicago



WANT A STEADY JOB?

New Bandit Proof Railway Mail Car

U. S. GOVERNMENT JOBS \$1260 TO \$3400 YEAR

Men—Boys, 18 Up

Paid Vacations
Common Education
Usually Sufficient
Mail Coupon
—TODAY SURE

FRANKLIN INSTITUTE
Dept. W179, Rochester, N. Y.

Gentlemen: Rush to me without charge 32-page book with list of U. S. Government big paid positions. Tell me regarding salaries, hours, duties, vacations and full particulars.

Name.....

Address.....

Opportunities

were never so great for technically trained men!



You Can
Learn
Practical

DRAFTING

At Home By Mail
UNDER EXPERT
COLLEGE INSTRUCTORS

No other calling open to young men of limited schooling, leads so quickly and surely as drafting to big-pay jobs. The field is enormous—world wide. Wake up! Look around you! This is a mechanical and engineering age. Consider our amazing inventions, sky-scrapers, ocean liners, air ships, aeroplanes, automobiles, industrial plants, bridges, dams, power houses, etc. Every-

thing planned or built comes first through the hands of expert draftsmen. What creative work could be more fascinating—a greater inspiration and guide to worthwhile careers? Scores of our noted architects, engineers and builders won their way to fame and leadership with a common school education and a self acquired knowledge of drafting.

\$100 a Week Paid Expert Draftsmen

Let the facts about Chicago TECH successes prove that you, too, can train in spare time. Send the coupon below. Investigate! You'll be amazed when you learn how easily young men have mastered drafting through our practical home-study plan. Nothing difficult about it—the simplest, shortest, step-by-step method you can imagine . . . the result of years of successful experience in teaching by mail and in our resident classes. Read the stories of Chicago TECH successes in our big catalog. Hundreds of our graduates are now engineers, architects, designers, builders, contractors, chief draftsmen, superintendents. Drafting was the ladder on which they climbed to big incomes. Chicago TECH is

famed everywhere for its successful graduates. Don't delay another minute. Send for all the interesting facts at once. Our low cost and easy terms place this training within the reach of every ambitious man. The first small tuition payment brings everything needed to start the course. Draftsman's table, all drawing instruments, tools, etc.—a complete, high-grade outfit is furnished each student free of extra cost.

Send For
Proof Today!

Let the success
of others be your
guide to a big-
pay job.



DRAFTING OUTFIT

furnished FREE
of extra cost

This exceptionally high-grade outfit, a \$25 value, complete in every respect, the same as used by expert draftsmen, is furnished without extra charge. Enrollment includes full equipment. No extras to buy. A small first payment under our easy installment plan brings at once EVERYTHING needed to begin the course and assure rapid progress.

Big FREE Book on Drafting

Send coupon now for your copy. Tells everything you want to know—what to do and how to do it—to succeed quickly in practical drafting work. Opportunity is calling. This is the big chance you've long wanted. Grasp it today.

Chicago TECHNICAL College

Architecture—Engineering—Drafting—Electricity—Building

We also offer complete resident day and evening classes in above subjects. Founded 1904, our College-Training-At-Home Plan is the result of 26 years' experience in training men both in our Chicago College and at their homes by mail.

Chicago Technical College
Dept. B-204, 118 E. 26th St., Chicago, Ill.

Please send me postpaid, your big Free Book on Drafting, telling about opportunities and your College-Training-At-Home Plan. I have checked below the field in which I am particularly interested.

Architectural Mechanical Electrical
 Structural

Name.....Age.....

Address.....

City.....State.....

Check here if you prefer coming to Chicago to take our short resident day or evening course in Drafting.

More Money



Be a Trained Radio Expert

If you're earning a penny less than \$50 a week, get my free book of information about the Radio business. Trained Radio Experts are needed in more than twenty different lines of this new and growing profession (three hundred thousand new openings created by the swift growth of Radio in past few years). Why go along at \$25 or \$35 or \$45 a week all your life? Study Radio and after only a short time land yourself a REAL job with a REAL future! Be a man who has money in his pocket and in the bank—don't scrimp and scrape for the rest of your days.

Salaries of \$50, \$75 & \$100 a Week Not Unusual in Radio

The good positions in Radio pay all the way from \$50 to \$100 a week—and some pay \$200, and even \$250 a week. Suppose you don't climb to the very top but that you do advance to a position that pays you \$125 a week, year in and year out. Any chance to make that much where you are now? Then send for my free book, and learn about a field where there's some real opportunity.

Money Back If You Aren't Fully Satisfied

I'll give you all the training you need to get into any line of the Radio business. And I back up this training by a signed agreement to refund every penny you pay me if upon completion of my course you are not satisfied with the lessons and instruction service I give you.

Where good men, if they have the right training, can work their way into really big salaried jobs!

Eight Big Laboratory Outfits Given You To Help You Learn

I teach you both the "why" and the "how" of Radio. You learn to DO a thing, and you learn WHY it's done. I send you, WITHOUT EXTRA COST with your course, eight big laboratory outfits of material to experiment and work with. These outfits are the real thing—not toys. The parts are, complete in and build approximately one hundred different Radio circuits. With all this material you do practical work from start to finish of your training. You get your hand in, and you get confidence in yourself. Then when you run into a Radio problem later on, on the job, you KNOW you can do it because you've already done it with these eight outfits of laboratory material. With me you don't learn to be a "paper Radio Expert"—you learn to be the kind of expert that shows his worth on the payroll. Full details in my big book—sent free.

Send For Free Book of Information



Broadcasting Stations offer fascinating jobs paying from \$1,800 to \$5,000 a year.



Radio factories employ thousands. Salaries for well trained men range from \$1,800 to \$5,000 a year.



Spare time set servicing is paying R. E. men \$200 to \$1,000 a year. Earnings begin almost at once after enrolling.



Operating on board ship gives you world-wide travel without expense and a salary of \$60 to \$200 a month besides.

YOU
must have
NRI training
to be a
CERTIFIED
RADIO-TRICIAN

see
coupon
next
page



Learn Quickly, Easily Train at Home in Spare Minutes

Stay home! Hold your job! I'll bring your Radio training to you, and you can learn in your spare time after work. No need to go to a strange city and live for months on expense when you learn my way. You study in the quiet of your own home. As for this training—it's written just as I would talk—in straightforward, every-day, understandable language. You'll get it, and you'll get it quickly—in a few months' spare time—because I've made it so clear and interesting! No particular education needed—lots of my successful students didn't finish the grades.

Many Earn \$10, \$20, \$25 Weekly Right Away "On the Side"

Deloss Brown, South St., Foxboro, Mass., made \$1,000 from spare-time Radio jobs before he even finished my course. H. W. Coblenz, Washington, averaged \$45 a week; Leo Auchampaugh, 6432 Lakewood Ave., Chicago, made \$500 before graduation; Frank Toomey, Jr., Piermont, N. Y., made \$833 while taking the course. All this done IN SPARE TIME away from the regular job, while these fellows were still studying the course—and they're only a few of hundreds. As soon as you start this training I begin teaching you practical Radio work. Then a few weeks later, I show you how to make use of it in spare time, so you can be making \$10, \$20, \$25 a week "on the side," all the while you're learning.

64-Page Book Sent Free for the Asking

My big book of Radio information won't cost you a penny, and you won't be under any obligation by asking for it. It's put hundreds of fellows on the way to big pay and brighter futures. Sending for it has been the turning-point where many a man has made his start toward real Success. Get it. See what it's going to mean to you. Send coupon TODAY!

Address: **J. E. SMITH, President**
National Radio Institute

Dept. 1BP

Washington, D. C.

Hundreds of fine jobs opening in Radio every year

Radio needs more trained men to take care of its rapid growth. Every year there are many fine jobs for men with the right training in broadcasting stations, commercial land stations, Radio factories, with Radio dealers and jobbers, with shipping companies which offer world-wide travel and good pay. Besides there are countless opportunities to have a spare time or full time business of your own.

Talking movies, Television and many other new and recent developments in and uses for Radio are increasing the need for trained men continually. This is best proved by the fact that the Employment Department of the National Radio Institute is getting three times as many calls for our graduates this year as it did last.

Your Choice of 5 New Advanced Courses if You Act Now

My training not only gives you a thorough knowledge of Radio—all you need to get and hold a good job—in addition, you may take any one of my new advanced courses, without extra charge. They are Television, Aircraft Radio, Broadcasting Commercial and Ship Radio Stations, Sound Pictures and Public Address Systems, and Advanced Radio Servicing and Merchandising. You won't be a "one job" man when you finish my training. You'll know how to handle a job in any one of Radio's 20 different branches of opportunity. Send for my free book now.

Find out about my methods that have increased the earnings of so many others. Mail the coupon today.



This big 64-page book, printed in two colors, crammed with interesting facts and photos about money-making opportunities in Radio, sent free to everyone who clips the coupon. No obligation by sending for the book—it's absolutely free. One of the most valuable books about Radio ever written.



Mail This Now

J. E. Smith, President,
National Radio Institute,
Dept. 1BP, Washington, D. C.

Dear Mr. Smith: Kindly send me your big free book, "Rich Rewards in Radio," giving all information about the big-money opportunities in Radio and how you will train me to take advantage of them. I understand this places me under no obligation, and that no salesmen will call on me.

Name.....

Address.....

Town.....State.....



He Found the Key to \$10,000 a Year!

"Just a bookkeeper"—that's how J. A. Hogg, now Public Accountant at Logan, W. Va., would have classified himself six years ago when he first enrolled with LaSalle for home-study training in Higher Accountancy.

Little he dreamed that within two years—thanks to his specialized training—his yearly income would be \$5,000, and that two years later he would be making better than \$10,000 a year! But read what he writes, under recent date—

"It isn't often that an investment brings money profit of more than 7500 per cent in only six years, yet that's exactly what my enrollment in two LaSalle courses—Higher Accountancy and Law—has meant to me. I estimate it worth more than \$30,000 in cash returns, besides additional returns in personal and business prestige, in self-confidence and all-round larger success.

"Whereas when I first became a LaSalle member I was earning about \$100 a month, today I have my own successful public accounting firm, and have been mayor and police judge of my home town for the past five years, and LaSalle has made all this possible.

"I have enjoyed very much my LaSalle work. Your Problem Method has been a revelation—so much easier and more efficient than the classroom methods of my school days."

His Opportunity Is Yours— Send for Free Book

Are you ambitious to make a real success in business—to fit yourself for positions paying \$3,000, \$5,000, \$10,000 a year, and even better?

Here, then, is your chance—the same chance that faced J. A. Hogg when he clipped a LaSalle coupon.

Below is the coupon, and it will bring you—free—LaSalle's 64-page book, "Accountancy, the Profession that Pays." You will find it of the greatest help and inspiration.

If you mean what you say when you say that you want to get ahead—fill in, clip and mail the coupon NOW.

— Find Yourself Through LaSalle! —

LaSalle Extension University

The World's Largest Business
Training Institution

Dept. 264-HR Chicago

I should be glad to have details of your salary-increasing plan as applied to my advancement in the business field checked below. Also a copy of "Ten Years' Promotion in One," all without obligation.

- | | |
|--|---|
| <input type="checkbox"/> Higher Accountancy | <input type="checkbox"/> Modern Business Correspondence |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Modern Foremanship |
| <input type="checkbox"/> Modern Salesmanship | <input type="checkbox"/> Expert Bookkeeping |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> C. P. A. Coaching |
| <input type="checkbox"/> Railway Station Mgmt | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Railway Accounting | <input type="checkbox"/> Commercial Spanish |
| <input type="checkbox"/> Law—Degree of LL.B. | <input type="checkbox"/> Effective Speaking |
| <input type="checkbox"/> Commercial Law | <input type="checkbox"/> Stenotypy—Stenography |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Telegraphy |
| <input type="checkbox"/> Banking and Finance | <input type="checkbox"/> Credit and Collection Correspondence |
| <input type="checkbox"/> Personnel Management | |



Name.....

Present Position.....

Address.....

BE A RAILWAY TRAFFIC INSPECTOR

Active men—19 to 55—needed at once in Railways and Bus Traffic

RAILWAYS AND BUS

Earn up to \$250 Monthly

Inspection. This steady, profitable work pays up to \$250 per month plus expenses. Interesting outdoor work. Travel or remain near home.

Ages 19 to 55
Years



We'll train you for this uncrowded profession and on completion of a few months' spare time home instruction will assist you to a position paying from \$120 up per month or refund your tuition. Our free booklet tells what Traffic Inspection can do for you. Write for it today. Don't delay. Write

STANDARD BUSINESS
TRAINING INSTITUTE
Div. 2 Buffalo, N. Y.

ELECTRICITY RADIO WELDING AUTOMOBILES

PRACTICAL TRAINING ON MASSIVE LAY-OUT OF UP-TO-DATE EQUIPMENT

Oxy-acetylene and Electric Welding, Armature Winding, Power Plants, Switchboards, Transformers, Motors, Generators, Batteries, Radios and Automobiles. Write now for Free Catalog.

Coleman Electrical School, 1628 Main St., Kansas City, Mo.

BE AN OIL EXPERT!

New, easy, practical way to learn at home in spare-time. Geology, Drilling Methods, Pipe Line Transportation, Refining and Marketing.

Write Today! FREE Book!
PETROLEUM ENGINEERING UNIVERSITY, Dept. 222, FORT WAYNE, IND.



Free TO MECHANICS

Amazing Offer on Brand New

Books just off the press, which cover every phase of Modern Shop Practice. These seven big books contain over 2600 pages, nearly 3000 illustrations and are bound in special gold stamped flexible covers. Everything that any mechanic could possibly be interested in is explained in detail and in simple language that anyone can understand. Machine shop work, machine set-ups, machine repairs, mechanical drawing, metallurgy, forging, shop arithmetic, tool making, pattern making and hundreds and hundreds of other items, any one of which is worth the special price of these books.

Shipped FREE Anyone doing mechanical work of any kind can have these books shipped for examination without one penny down. If you want to fit to be a tool maker, pattern maker, shop foreman or factory superintendent don't fail to look these books over. We mean just what we say, they will be sent to you absolutely free. Don't send us a penny, just your name and address. After you receive the books, then decide whether or not you want to keep them. This is the best way to prove that these UP TO THE MINUTE books should be in every mechanic's hands and that they are worth at least ten times their price to you. This is a Brand New edition.

JIFFY INDEX

Don't waste time. Don't study long hours to get a result; the Jiffy Index puts facts at your finger tips instantly

American Technical Society,
Dept. S-213,
Drexel Ave. at 58th St., Chicago, Ill.

Send the seven volumes, Modern Shop Practice, FREE. If I decide to keep them I will send \$2.00 in 10 days and then only \$2.00 a month until the special low price of \$25.50 is paid. Otherwise I will return the books and owe you nothing. By sending now I will get a free membership in the American Technical Society entitling me to free consultation privileges for one year by letter or wire with 18 experts.

Name.....

Address.....

Employer or ref.....

Address.....

Start to Play Very First Day

This Year Give Yourself
*Lifelong Fun
Profit and
Popularity*



PARENTS!

What greater gift can you confer on your children this year than lifelong fun and entertainment?

Love of music means love of home, an appreciation of the finer things in life. Here is a chance to give your boy or girl that love without the tedious practice that most instruments require. The Xylorimba is easy to play. No teacher is needed. Practice is actually a joy.

Remember, the Xylorimba is the guaranteed product of a company established nearly half a century ago—a company that stands back of every promise it makes.

THINK of the best gift you have ever received. Multiply the pleasure it gave you by ten, and still you have only an idea of the joy you can give yourself right now if you act at once!

Start to Play the Very First Day!

Haven't you, like millions of others, envied the fellows who "bring down the house" with snappy xylophone or xylorimba numbers? Haven't you longed to create your own music, to be looked up to wherever you go, to be able to make real money in spare time? If you have, this ad spells O-p-p-o-r-t-u-n-i-t-y. The xylorimba—wonderful for home, in demand at dances and gatherings—is nevertheless the easiest of all instruments to play. In fact, on the very day you get yours you play simple melodies, even if you can't read a note of music right now. In a few weeks you astonish your friends and family. All your life you have the joy that comes to those who can entertain.

Plays 20 Minutes; Gets \$20!

Ralph Smith, Chicago, played twenty minutes at wedding; his "pay" was \$20. Altho only 12, Turk McBee, Jr., plays big-time vaudeville exclusively. Harry Brewer, New York, has

made thousands of friends thru his xylophone selections on the radio. I. E. Hallman, Reading, Pa., writes: "Made \$300 in 5 weeks—spare time."

And now J. C. Deagan, Inc., (world's largest manufacturer of xylophonic instruments) has made it so easy to own a xylorimba that nothing stands in your way. Sizes and styles to fit every age and pocketbook. A five-day free trial that eliminates risk. Free, easy lessons that make teacher unnecessary—and, best of all, such easy payments that they are hardly noticed.

Will You Investigate?

Everyone wants to be popular. Everyone wants to make extra money. Everyone wants to be center of attraction at gatherings. But these advantages don't come by themselves. Opportunities must be seized. This is your opportunity—will you pass it up without investigation? The accompanying coupon will bring our big FREE book to your door. It tells all about the Deagan line, the free trial, the easy payments. Remember, no cost or obligation! Simply fill in and mail the coupon—but do it before it slips your mind. Today is as good a day as any. Do it NOW!

YOUR
MAGIC

to Popularity

KEY

Mail
Now!

Send for
BIG FREE
Book!

Please send me full details on the Free Trial offer and easy payment plan of the Deagan Xylorimba.

J. C. DEAGAN, Inc.
Dept. 4453, 1770 Bertraw Avenue, Chicago

Name.....
Address.....
City.....
State.....

20 Years of Shirt-Sleeve Practice In ELECTRICITY



The Croft Library of Practical Electricity

**NEW
EDITION
Revised
and
Enlarged**

THIS is the electrical age, with unlimited opportunities for the man who has educated himself in the finer points of electrical practice.

Fit yourself for a big-pay job by knowing electrical practice complete, including inside and outside work, central stations, and the whole subject. With the aid of the Croft books you can know electricity as experts know it and put yourself in line for an expert's pay.

Standard Electrical Training

The Croft Library is a complete electrical educator. It is founded on practice—on work as it is actually done. It is jammed from cover to cover with the kind of hard-headed facts you want. Written so that the beginner can easily understand it, yet so sound, so thorough, that it is the daily guide of 55,000 highly paid electrical workers and engineers. Croft tells you the things you need to know about motors, generators, armatures, commutators, transformers, circuits, switchboards, distribution systems—electrical machinery of every type—wiring for light and power—wiring of finished buildings—underwriters and municipal requirements—illumination in its every phase—the latest and most improved methods of lighting—lamps and lamp effects, etc.—how to do a complete job, from estimating it, to completion. Make no mistake about it—there are big jobs in electricity ready for you when you're ready for them. Thousands of men who have the Croft Library know that to be a fact. The Library itself, on a FREE TRIAL BASIS, will prove it to your own absolute satisfaction.

3000 Pages, 2100 Illustrations

In these volumes Croft teaches you electrical practice complete. He takes you in quick, easy steps from the simplest principles to the complete and economical operation of a great central station. He tells you all that he has learned in twenty years of shirt-sleeve practice. With these books at his elbow a man can learn as much about electricity in six months—good practical "bread and butter" stuff—as he would ordinarily learn in a lifetime of practice.

**10 Days
FREE
TRIAL**
Just Mail
The
Coupon

NO MONEY DOWN SMALL MONTHLY PAYMENTS

Fill in and mail the coupon attached and we will send you the entire set of seven volumes for ten days' Free Examination. We take all the risk—pay all the charges. You assume no obligation—you pay nothing unless you decide to keep the books. Then \$1.50 in ten days and the balance at the rate of \$2.00 a month. Send the coupon **NOW** and see the books for yourself.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 376 Seventh Ave., New York.

Send me for 10 days' free examination the Croft Library of Practical Electricity. If satisfactory I will send you \$1.50 in 10 days and \$2.00 monthly until the special price of \$19.50 is paid. If not wanted, I will return the books at your expense. (To insure prompt shipment write plainly and fill in all lines.)

Name.....

Address.....

City and State.....

Position.....

Company..... P. M. -2-31

FREE BOOKS of BUSINESS HELPS

We publish over 200 Home Study Books, each a complete treatise of its subject. We have one or more for you. Books on

- | | |
|--|---|
| <input type="checkbox"/> Commercial Art | <input type="checkbox"/> Decoration |
| <input type="checkbox"/> Lettering | <input type="checkbox"/> Automobiles |
| <input type="checkbox"/> Advertising | <input type="checkbox"/> Battery Work |
| <input type="checkbox"/> Sign Making | <input type="checkbox"/> Electricity |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Carpentry |
| <input type="checkbox"/> Aviation | <input type="checkbox"/> Building |
| <input type="checkbox"/> Painting | <input type="checkbox"/> Contracting |
| <input type="checkbox"/> Silk Screen Process | <input type="checkbox"/> Sheet Metal Work |

and many other subjects. All fully described in our FREE CATALOG. Check the subjects in which you are interested and write today.

FREDERICK J. DRAKE & CO., Publishers

Room 508—179 No. Michigan Blvd., Chicago

Drake books are for sale in all book stores.

**LEARN
EXPERT**

WRESTLING



Taught at home, by mail, by greatest of all world champions—Farmer Burns and Frank Getch. Be a wonderful athlete. Handle bigger, stronger men with ease. Learn the secrets of experts, Jim-Jitsu, Physical Culture. Have perfect health, fame, a perfect body admired by both sexes.

Send 10c (coin or stamp) for highly-illustrated, tear-out booklet, 32 pages. Tell us we teach expert wrestling at home. Only 10c. Write now—State age.

FARMER BURNS SCHOOL
3372 Courtney Bldg., Omaha, Neb.



Astrology

Will You Be Lucky in 1931?

What do the Stars foretell for 1931? Would you like to know? Our Special 12-page Astrological Reading gives predictions, month by month—with exact days, dates and horoscopes for 1931 based on your Sign of the Zodiac. Contains it before making any change in home or business affairs, starting papers, love, marriage, seeking employment, raise in salary, speculation, travel, friends, enemies, health, accidents, lucky days, etc. Send exact birthday with \$1.00 for reading.

FRANKLIN PUB. CO., 800 N. Clark St., Dept. A-11, Chicago



HELPS for

Home Builders

or anyone planning to build
How to Build—What to Build—When to Build

A gold mine of facts can often be converted into a gold mine of dollars, for builders not only save money but learn how to make more money with the five big books on architecture, carpentry and building. Carpenters make themselves contractors by learning how to estimate correctly; contractors are able to handle

bigger and more profitable jobs by learning how the big fellows do it. Men who want to build homes can save money by learning how it should be done. The new **Jiffy Index** puts before your eyes without wasted time, the things you want to know. Nothing has been overlooked. Use of tools, building construction, heating, lighting, plumbing, architectural drawing; all fully covered. We will include with the five volumes above, at the special reduced price of only \$19.50 (easy payments) a handsome book, "Blueprint Reading," 120 pages, full of diagrams, etc., without extra charge.

NO MONEY NEEDED—DON'T SEND A PENNY

You take no chance of any kind. Just send us your name and address on the coupon and we will slip the complete set of five big volumes, 2,400 pages, without a penny of down payment. Look them over, and cut anything you want to know and then, at the end of ten days, if you want to keep them, send only \$2.00. After that send only \$3.00 per month until the special price of only \$19.50 has been paid. (Former price \$24.80.)

FOR FREE OFFER USE COUPON

American Technical Society, Dept. G-219

Drexel Ave. at 58th St., Chicago, Ill.

I would like to look at the five books described above. Send them on your free offer. I will examine them thoroughly and return them in ten days unless I like them, in which case I will send you \$2.00 and after that \$3.00 per month until the total price of only \$19.50 is paid. You are also to send me your book, "Blueprint Reading," without extra charge.

Name.....

Address.....

Employer's Name and Address.....



Don't Be Lonesome— Be The One Who Leads The Crowd!

ARE you the popular one in your crowd? Do you set the pace for others to follow, or are you the one who is never noticed, who can't do anything to entertain at parties—always on the edge of the group wishing you were the one in the center being admired and envied?

Well, you needn't wish you were popular, any longer,—you CAN be popular for here's a secret that will make you a leader, with so many friends you won't know what to do with all your invitations. Learn to play the Harmonica!

Easiest of all Instruments to Play

And maybe learning to play the harmonica isn't easy! Just read what Earl Dickerson of Minnesota writes. He says, "I had always imagined that a harmonica was a difficult instrument to master. I found, however, that with the Instruction Book as a guide, learning to play was astonishingly simple. In a few hours I could play Home, Sweet Home, Old Black Joe, America, and Old Folks at Home. I have found that to play a harmonica at any gathering or party adds a lot to a boy's popularity."

Instruction Book Free

Why don't you send for the Harmonica Instruction Book, too? It's FREE. Just fill in and send the coupon below. Besides telling you what to do, the Instruction Book is full of pictures that show you just how to do it. It's all so easy you'll be amazed at the thrills and tremolo effects you'll get and the expert way in which you can play in only a short time. Mail the coupon today for your free book.

FREE Illustrated
Harmonica
Instruction Book—Mail
Coupon Today—See how
easy it is to play.



WHAT IRVING BERLIN

popular composer of "All Alone", "Blue Skies", "Remember", "Russian Lullaby", "Always", "Just a Little While", says about the Hohner Harmonica:

"It is positively amazing to observe the way America has taken to the Harmonica. The first musical instrument I ever played was a Hohner Harmonica. It is entirely natural that a healthy youngster should take to the Harmonica, and it will not surprise me if the Harmonica swiftly becomes a most important factor in making America a more musical nation."

A Quality Instrument

Hohner Harmonicas come in a wide range of styles and prices but each instrument is equally true in tone, accurate in pitch and perfect in workmanship. From the popular and easy-to-play "Marine Band" to the elaborate "Super-Chromonica" with a playing range of three chromatic octaves and recognized by musical authorities as an orchestral instrument, there is a Hohner Harmonica for every price and musical requirement. Learn to play a Hohner.



M. HOHNER, Inc.

114 E. 16th St., Dept. 109-B, New York

Please send me FREE Illustrated Instruction Book which tells how to play the Harmonica.

Name.....

Address.....

Magic



Learn at Home—by Mail Easily! Quickly!

New! Different! Dr. Harlan Tarbell, Famous Magic Wizard, teaches you Big Tricks, Illusions, Stage Stunts, "Patter" and the Principles of Magic. You learn easily and quickly at home by mail. Earn big money with magic. Write today for free literature and details.

Astonish Your Friends

Gain that magnetic popularity that makes you the center of any crowd. Why envy others' skill? You can learn Magic yourself, quickly, easily—at home—by mail—during your spare time!

WRITE! Mail coupon now for free Magic literature telling all about the great Tarbell Course in Magic.

Get Our Low Prices and Easy Payment Plan.

TARBELL SYSTEM, Inc., Studio 13-52
1926 Sunnyside Avenue, Chicago, Ill.

Tarbell System, Inc., Studio 13-52
1926 Sunnyside Avenue, Chicago, Ill.

Gentlemen: Without any obligation send me your free literature and information all about your wonderful "Tarbell Course in Magic." Also tell me about your Low Price Offer and Easy Payment Plan.

Name

Address

Age

Learn AVIATION

WHERE LINDBERGH STARTED!

Men, opportunities in aviation are unlimited. Airports, factories and transportation companies must have well trained pilots and mechanics! Leading air-transport companies pay an average of \$550 per month for pilots. Government licensed mechanics are in good demand. But first, you must be properly trained.

This School Is Government Approved. We train you for licensed mechanic or pilot. \$250,000 worth of buildings and equipment. \$100,000 airport. Connected with large aircraft factory. Learn right here where Lindbergh learned. Reasonable Tuition. Part Time Employment Offered. Write for details today, (stating your age).

LINCOLN AIRPLANE & FLYING SCHOOL
206 Aircraft Bldg. Lincoln, Nebr.

SAVE YOUR JOB

Employers promote men who show interest, who read up on

ELECTRICITY

AUDEL'S NEW ELECTRIC LIBRARY makes Electricity as easy as ABC for beginners; interesting as fiction. Engineers carry in pocket for spare time reading and reference. Questions, answers, diagrams, calculations, underwriter's code; design, construction, operation and maintenance of modern electrical machines and appliances FULLY COVERED. AUDEL'S BOOK-A-MONTH HOME-STUDY PLAN gives complete knowledge of Applied Electricity. Helps overcome handicap of education. Go a day. No cash in advance. Write today for free Electric Folder. THEO. AUDEL, 65 W. 23rd Street, NEW YORK, Dept. P.M. 2-31.

Mysterious Power of Pelmanism

Let us send you a free copy of "Scientific Mind Training." An instructive book which explains an amazing system of mind training already used by more than 650,000 people. It will show you how and why Pelmanism is the only system of teaching for developing all the mental powers at the same time. Endorsed by such distinguished men as Judge Ben B. Lindsey, Sir Harry Lauder, Jerome K. Jerome, Prince Charles of Sweden and hundreds of others. Write TODAY to

THE PELMAN INSTITUTE OF AMERICA

71 WEST 45th STREET DEPT. 62 NEW YORK CITY

STRONGFORTISM

Restores Vigor and Strength



Strongfortism gives you restful, peaceful sleep; eagerness for work; sustaining energy throughout the day; better earning power; desire for pleasure and athletics; a springy step; bright eyes, a hearty hand clasp; a more cheerful outlook on life; optimism; hopefulness; happiness.

These come with health—all of them, just as sure as sunrise. If you have a healthy body—full powered, muscular, energetic, manly—you will make good throughout life, at work, in business, in society and in athletics.

Be a Man of Muscle

You can't imagine the terrible price you pay for being a physical weakling. You are being robbed of most of the joys of life. You are despised, sneered at, avoided everywhere—a veritable outcast socially. Rid yourself of weakening ailments.

YOU CAN BE MANLY

Don't go through life as a hapless for a man. Become a manly fellow—a cool, lovable, wholesome man—attracting friends and favor. Build up pep and power and reserve stamina. Develop a physique to be envied by men and admired by women. Listen to Lionel Strongfort who has lifted thousands from deplorable weakness to vigorous manhood through his famous Course in Strongfortism.

Write for FREE BOOK

Strongfort Builder of Men It reveals startling inside facts about the human body. It tells how to become powerful. It is priceless.

This Coupon Brings It

Lionel Strongfort Institute, Dept. 105, Newark, N. J.

Send me my FREE copy of your NEW BOOK—"Promotion and Conservation of Health, Strength and Mental Energy."

My Ailment Is

Name

Age Occupation

Street

City State

RADIO

Lesson and Job Ticket . . . Actually FREE!

Mightiest in Opportunities

Did you read about the \$500,000,000 "radio center" Rockefeller is building in New York? Do you realize that the home radio set business has hit the billion-dollar mark in 1930? Do you see right in your home town how every movie theatre has installed "talkie" equipment? Auto-radios—pictures by wireless—commercial wireless—the giant networks of broadcasting stations with their high-priced technical staffs—and soon, greatest of all—TELEVISION!

While you sit and read this—while you listen to your own radio—imagine the great army of experts and engineers, already employed to handle these great enterprises—and think of how many more trained men will be needed in the tremendous expansion programs of the near future.

Investigate RADIO—get the facts—let us show you how you can increase your earnings—advance in position—get a job that's more interesting—and insure your future. Coupon brings everything—mail it today.



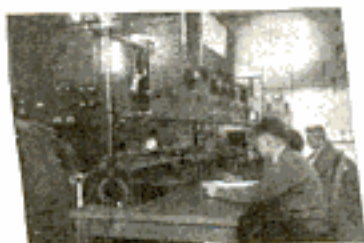
American School

Chartered NOT FOR PROFIT

Like the best resident schools and universities, the American School is an educational institution, and has never paid dividends or income tax. That means, we can and do give the highest quality of instruction at the lowest cost. That explains why employment service, when you're half way through and when you finish is a vital part of our agreement with every student. Among the authors of our instruction are the leading radio and electrical engineers of the country. Small monthly payments may be arranged.

American School

Dept. R-247, Drexel Ave. and 58th St.
Chicago, Ill.



Get ready for positions as operator or superintendent of broadcasting stations.



Positions paying \$50 to \$100 a week now open to install, operate and service talking movie equipment.



Soon there will be thousands of fine positions open in TELEVISION

See how easy to learn

—see how quickly you can get ready for a well-paid position in one of the fastest-growing and most prosperous industries on earth!

Just get this picture—three million radio sets manufactured this year on top of 13,000,000 already in use. Hollywood and the movie theatres of the U. S. all gone "talkie". Gigantic expansion of broadcasting—amazing demand for auto-radios—television just about ready to "break". Man! what a chance to get in on the ground floor, like 30 years ago in the auto game—or 50 years ago in electricity!

A FINE RADIO JOB

. . . when you're ready

To meet the growing demand from manufacturers, dealers, jobbers, broadcast studios, "talkie" theatres and other employers, for men with a knowledge of *Radio Engineering*—for inspectors, designers, broadcast operators, and superintendents—The American School offers you a combined training and employment service, which prepares you for these good jobs in your spare time, then helps you get one.

\$40 to \$75 a week . . . and more!

No waiting until you finish—we help you get a beginner's job when you're only half way through this course. And after you finish we guarantee to help you find a position, *satisfactory in salary*, or money refunded.

Amazing offer right now to office and factory workers, 20 to 35 years of age. Mail coupon for lesson, job ticket, and radio book—all free and without obligation.



Radio Tester Given

\$20.00 set analyzer and trouble-shooting job tickets a part of this training without extra charge.

THE AMERICAN SCHOOL,
Dept. R-247, Drexel Ave. & 58th St., Chicago

Please send without cost or obligation, free radio lesson and job ticket and radio bulletin.

Name.....Age.....

St. No.....

City.....State.....



Is Tobacco Hurting You?

Look the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For you know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but sure.

Tobacco lowers efficiency. It slows a man down. Makes it harder to concentrate the mind on work. Tobacco users seldom have the amount of "pep" and energy of those who do not use the weed. There's many a man older than you in years who is younger in energy, simply because he lets tobacco alone.

Some day, probably, you will realize to what an alarming extent tobacco does undermine the system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that
TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And YOU know that the use of tobacco in any form is an expensive, utterly useless habit. You know you ought to quit.

Tobacco Habit Banished In Many Cases—Let Us Help You

It doesn't make a particle of difference whether tobacco has been used for a single month or fifty years, or how much, or in what form—whether cigars, cigarettes, pipe, plug, fine cut, or snuff. In most cases, Tobacco Redeemer removes all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. The tobacco craving will usually begin to decrease after the very first dose—there is no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is quick, safe, pleasant and thoroughly reliable.

It is in no sense a substitute for tobacco. It helps to quiet the nerves and makes one feel better in every way.

Our Guarantee

A single trial will convince you. Our legal, binding, money-back guarantee goes with each full treatment. We will refund every cent you pay for the treatment if, after taking it according to the easy-to-follow directions, it should fail to banish the tobacco habit completely.

SEND Coupon for Free Proof

Let us send you our free booklet on the injurious effects of tobacco, together with testimonial letters from men all over the country telling how they have been absolutely freed from the tobacco habit by this simple home treatment. You could not ask for stronger proof than the evidence we will gladly send on request. Just mail the coupon—or a postal will do.

NEWELL PHARMACAL CO.
Dept. 300 Clayton Station St. Louis, Mo.



Free Book Coupon

NEWELL PHARMACAL CO.

Dept. 300 Clayton Station St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that Tobacco Redeemer has relieved the tobacco habit in thousands of cases. If it fails my money will be refunded.

Name.....

Street and No.....

Town..... State.....



**WANT
A
STEADY
GOVERNMENT
JOB?**



**\$1260 TO \$3400 A YEAR
MEN—WOMEN 18 TO 50**

U. S. Government Positions are steady. Strikes, poor business conditions, lockouts or politics do not affect them. U. S. Government employees get their pay for twelve full months every year. There is no such thing as "HARD TIMES" in the U. S. Government Service.

TRAVEL—SEE YOUR COUNTRY

Railway Postal Clerks get \$1,900 the first year, being paid on the first and fifteenth of each month. \$79.00 each pay day. Their pay is quickly increased, the maximum being \$2,700 a year. \$112.50 each 15 days.

PAID VACATION

Railway Postal Clerks, like all Government employees, get a yearly vacation of 15 working days (about 18 days). On runs they usually work 3 days and have 3 days off duty, or in the same proportion. During this off duty and vacation, their pay continues just as though they were working. When away from home they get extra pay for hotel expenses. When they grow old, they are retired with a pension. Many Spring examinations expected.

CITY MAIL CARRIERS—POST OFFICE CLERKS

Clerks and Carriers commence at \$1,700 a year and automatically increase \$100 a year to \$2,100 with special increase to \$2,300. They also have 15 days' paid vacation. February examinations will be held in a number of cities. City residence is unnecessary.

GENERAL CLERKS—FILE CLERKS

(Open to men and women—18 and over)
Salary \$1,260 to \$2,560 a year. Pleasant clerical and file work in the various government departments at Washington, D. C., and throughout the country.

Railway Mail Clerks



WHAT IS YOUR FUTURE?

Compare these conditions with your present conditions perhaps changing positions frequently, looking around from post to post, no chance in sight for PERMANENT employment; frequently out of a position, and the year's average salary very low. DO YOU EARN \$1,900 TO \$2,700 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET \$2,700 OR MORE A YEAR?

YOU CAN GET A POSITION

Country residents and City residents stand equal chance. Experience is unnecessary and political influence is not used.

- Railway Postal Clerk..... (\$1,900-\$2,700)
- Post Office Clerk..... (\$1,700-\$2,300)
- City Mail Carrier..... (\$1,700-\$2,100)
- Rural Mail Carrier..... (\$2,100-\$3,300)
- General Clerk—File Clerk..... (\$1,260-\$2,500)
- Customs Inspector..... (\$2,100 up)

**FRANKLIN
INSTITUTE
Dept. W174
ROCHESTER, N. Y.**

Rush to me free of charge (1) a full description of the position checked below; (2) Free copy of 32-page illustrated book "How to Get a United States Government Job"; (3) A list of the United States Government Jobs now obtainable.

Name.....

Address.....
Use This Coupon Before You Mislay It—Write or Print Plainly.

GET FREE LIST OF POSITIONS. Fill out the coupon. Tear it off and mail it today—now, at once. This investment of two cents for a postage stamp may result in your getting a Life Time Government Job.

.. Here's the RADIO TRAINING you've been waiting for



Why envy the man who knows radio... who is able to assemble and repair fine sets... who knows the "why" and the "how," the theory and the practice of radio?

You, too, can learn about radio servicing, operating, radio telephony and telegraphy, broadcasting... radio in all its branches.

Learn at Home, in Your Spare Time

In order to make it easy for every man to study radio, RCA Institutes is now training men in every branch of radio... So that men can get this training at home in their spare time, or at any of the resident schools throughout the country.

The RCA Institutes complete Home Laboratory Training Course gives you thorough and reliable radio training. You progress easily, step by step, and you receive with your training the complete RCA Institutes' Laboratory equipment—a modern outlay of apparatus furnished to every student, enabling you to solve radio problems. This is the logical way for you to acquire in your spare time the commercial knowledge and ability required by the radio industry.

Home Training Course by America's Oldest and Foremost Radio Training Organization

This home training course and laboratory equipment are backed by more than twenty years' experience.

Send for this FREE BOOK Today!

Learn the facts about the radio industry... all about the opportunities in radio... about RCA Institutes and the staff of RCA Institutes instructors who train you. This book should be read by every ambitious man who wishes to train for the future. Forty pages of pictures and text. Describes in detail the training that has placed thousands of men in responsible positions in radio.



RCA INSTITUTES, Inc.

RCA INSTITUTES, Inc.
Dept. MP-2
25 Varick St., New York, N. Y.

Gentlemen: Please send me your FREE 99-page book which tells about the many opportunities in Radio and about your famous laboratory method of radio instruction at home.

Name.....

Address.....

Occupation.....

NEW YORK ELECTRICAL SCHOOL

Teaches all branches of Practical Electricity through the "Learn by Doing" Method. Enroll with N. Y. E. S. and gain a thorough understanding of the problems, a broad experience in applied engineering practice, and qualify quickly to follow an electrical career.

No books used. Day and evening classes open all year.

Write for FREE School Booklet

New York Electrical School
44 W. 17th St. New York

Learn to MOUNT Birds and Animals

Learn at Home by Mail

Be a taxidermist. Learn to mount BIRDS, ANIMALS, GAME HEADS, FISH. Wonderful fascinating new art. All secrets revealed. Easily, quickly learned by men, women and boys. Decorate home and den with nature's finest art. SPORTSMEN save your trophies. BIG PROFITS for spare time. Sell your mounted specimens and mount for others. Have a business of your own. Big demand, high prices. Learn from old reliable school, 20 years' experience.

FREE! Beautiful illustrated book, "How to Learn to Mount Game," with dozens of photos of mounted specimens. FREE—if you state AGE—Write Now. Taxidermy is a NECESSITY for sportsmen and nature lovers—INVESTIGATE. Get this wonderful FREE BOOK NOW—no obligations. Send Coupon Today!

Northwestern School of Taxidermy
3372 E. Wood Bldg. Omaha, Neb.

Send me your free illustrated book "How to Mount Game." Also tell me how I may learn this fascinating art easily and quickly by mail. No obligation.

FREE BOOK COUPON

Name..... Age.....

Address.....

Boys Get This Curtiss Falcon

Complete Kit and All Materials and Directions
FREE!
TO SUBSCRIBERS

of All Ages—
AND YOU TOO, DAD!



YOU RECEIVE

1. Curtiss-Falcon Kit for Making Model Airplane
2. Membership card in the A. B. A.
3. Golden Wings
4. Home Study Aviation Course

Flies on Its Own Power

Be the first in your neighborhood to make this Curtiss-Falcon Model.

Without extra charge when you subscribe for a year to—

National Power GLIDER



Here you are, Son—and Dad! Here's the easy and quick way to dig right into learning aviation. The coupon down below is your ticket of admission to the sport of a lifetime, bringing you a hobby that you'll soon turn into joy—and profit.

First, you get all the materials for making a prize-winning model—the Curtiss-Falcon, one of the most popular airplanes in the U. S. Mail Service. Kit includes full directions for making and flying this practical scale model.

At the same time, we send you the Golden Wings and membership card in the A. B. A. (Aviation Boosters of America). All these come to you at once with your year's subscription to the liveliest, most complete aviation magazine published—the National Power Glider.

Livest Aviation Magazine in the U. S. A. —Keep Up to Date!

Boys—this is a **real** flying magazine. Starts you on making models. Then by easy stages through the theory and practice of gliding. And finally, a complete home study course in aviation by Major Purcell of the U. S. Army Reserve—theory and practice complete. Easy to read, learn and follow. This course alone is worth many times the price of a year's subscription. Dozens of working diagrams, scale plans, tables, formulas.

SEND NO MONEY! Just mail this convenient coupon today. Get started making this Curtiss-Falcon.

Home Study Course in Aviation Included

You boys are the Lindberghs and Rickenbackers of the future—Orville Wright got his start fooling around with model planes as a boy. How about you trying your hand with models?

Aviation isn't solved yet by any means. We want a plane that will land right side up in the back yard—a plane that Grandma can wheel out to go to the grocery store in—an airplane as safe and easy and cheap to run as a Ford.

What a marvelous opportunity the National Power Glider magazine gives you! Just like having an army pilot and mechanic as a daily teacher. Everything easy as ABC in the peppy new monthly. Starts you with modeling—takes you through gliding, power gliding and practical aviation.

GOLDEN WINGS FREE!

Your subscription makes you an A. B. A. member. Wear the wings in your lapel. **Rush this Coupon!**

ROGERS PUBLISHERS SERVICE,
67 Irving Place, New York, N. Y.

Send me National Power Glider, monthly for 1 year; and the Curtiss-Falcon complete Kit, Golden Wings and A. B. A. Membership Card, without extra charge. I will pay postman \$1.50 and postage charges. My satisfaction guaranteed.

Name.....

Address.....

City..... State..... 2PM

(Postage free if you send the \$1.50 with this coupon.)



Come to sunny
CALIFORNIA




**and LEARN
Electricity
RIGHT!**

NATIONAL opens its doors to you!

Right in the heart of America's most interesting place to live and learn—National—the approved trade school of the West—invites you to Los Angeles! Come West, enjoy life, learn a profitable trade in the land of prosperity, progress, sunshine and happiness.

Your Railroad Fare Allowed for a Limited Time!

Every one dreams of coming to California. National will pay your railroad fare from any point in the United States. Never again another opportunity like this! Investigate this great offer at once!

REAL Big Pay Jobs Await You!

Boulder Dam means millions for Southern California! Thousands more will soon be working on this world's greatest hydroelectric project. Learn quickly at NATIONAL for big pay jobs in profitable Electrical Trades.

Don't Worry About Enough Money! We'll Help You!

If you are short of money, we help you secure part-time jobs to earn your living expenses while learning. We place scores of graduates on good pay jobs with real futures. Unlimited Lifetime Employment Service.

Write Today About the Greatest Offer Ever Made!

This great Million Dollar Institution, equipped with the best money can buy—the finest faculty of electrical experts in the country—a school with a heart and personal interest in your success and personal welfare opens its doors to you. Send at once for NEW Book with full details. No age limit—no previous experience required; start any time. Send for your copy of this new book TODAY!

**Send for this
FREE BOOK..**




NATIONAL ELECTRICAL SCHOOL
Dept. 24-D, 4006 Figueroa St.,
Los Angeles, California

Send me your big free illustrated catalog of Electrical Opportunities showing how I can learn quickly

Name _____
Address _____
Age _____ City _____ State _____

NATIONAL ELECTRICAL SCHOOL

SALESMANSHIP

**The Sheldon Course selected
by big companies and successful sales managers**

**Dr. Arthur
Frederick
Sheldon**

Founder of the science of successful salesmanship in 1902. Pioneer in "Human Engineering"—the creator of the idea of success through mastering of the Laws of right thinking—health—character analysis, etc.

J. C. Penney says: "Sheldon Course greatly benefited me. I recommend it" H. S. Johnson, Vice-Pres. Armour & Co., says: "While President of Beatrice Creamery we used 50 Sheldon Courses with profit. 44 Sales Managers of Armour's have studied Sheldon. They build right thinking, create self-confidence. A pleasure to recommend the Sheldon Course."

Send for lessons on Salesmanship—Self-mastery and Compensation—free. See why SHELDON SALES TRAINING is preferred by big sales executives of America. See how interesting, how powerful; how it will boost your earnings. Built for beginners as well as experienced salesmen.

SHELDON SCHOOL Room 901-B
36 S. State St. CHICAGO

**LESSONS
FREE**

LAW

STUDY AT HOME
Become a lawyer. Legally trained men win high positions and big success in business and public life. Be independent. Greater opportunities now than ever before. Big corporations are headed by men with legal training. Earn \$5,000 to \$10,000 Annually.

We guide you step by step. You can train at home during spare time. Degree of LL.B. conferred. LaSalle students found among practicing attorneys of every state. We furnish all text material, including fourteen-volume Law Library, Low cost, easy terms. Get our valuable 64-page "Law Guide" and "Evidence" books FREE. Send for them NOW.

LaSalle Extension University, Dept. 264-L, Chicago.
The World's Largest Business Training Institution

FEET PAY

A business and profession that is a big income producer from the start.

Few weeks study starts you earning. Study and practice FOOT CORRECTION by mechanical means—not medical nor chiropody. EASY HOME TRAINING for men or women. Some foot Practitioners earn as high as \$15,000 yearly. Thousands of suffering feet. MUCH TRADE WAITING. Ask about Free Tuition Plan. LINCOLN CORRESPONDENCE INSTITUTE, Inc., 1500 A Walnut St., Philadelphia.



DRAFTING

BOOKS SENT FREE!
ON APPROVAL

NEW 1931 EDITION
Only 15 minutes a day with these WONDER BOOKS will prepare you for a good drafting job in less than a year. Mechanical and architectural drafting from simple straight lines to important complex plans. A step at a time! Built especially for beginners, for men with only grammar schooling. Drafting room practice, PLUS ENGINEERING, made easy and clear. Includes complete course in blue-print reading.

Big Field Big Demand Big Pay
Competent draftsmen are urgently needed right now in all building and manufacturing lines at \$50.00 to \$100.00 a week. That's just the beginning—FOR DRAFTSMEN HAVE THE BEST CHANCES FOR ADVANCEMENT. Pleasant, fascinating work, easy to learn and do. Learn quickly with these books—send coupon for a set FREE and see for yourself. 4-year consulting membership in the American Technical Society now given free to all readers of this famous cyclopedia of drafting. Many say that it is worth more than the cost of the books.

SEND NO MONEY

Don't send a cent on this great offer. Your name and address, with that of your employer or other reference, will bring three books to you absolutely free for examination. Test them, read them, find out anything you want to know and then if you are not more than pleased send them back and you will not owe us one cent. If you decide to keep them, then pay only \$3.00 a month until the special introductory price of only \$19.50 is paid.

AMERICAN TECHNICAL SOCIETY
Dept. D-219, Drexel at 58th St., Chicago, Ill.

**American Technical Society, Dept. D-219,
Drexel at 58th St., Chicago, Ill.**
Send for 10 days' free use New 3 volume set of drafting. I will pay the few cents delivery charges. If I wish, I may return books in 10 days and owe you nothing but if I decide to keep them I will send \$2.00 after 10 days, then only \$3.00 a month until \$19.50, the special introductory price, is paid. Send 1931 edition.

Name _____
Address _____
Employer or Reference _____
Address _____

Play Piano Accordion



for dances and parties

NO wonder Piano Accordion players are so popular in orchestras, on the radio, at parties. They give their listeners something *different* in music—they are a whole orchestra in themselves.

PICK YOUR INSTRUMENT

Piano
Organ
Ukulele
Cornet
Trombone
Mandolin
Saxophone

Violin
Clarinet
Flute
Harp
Cello
Piccolo
Guitar

Banjo
Voice and Speech
Cultures
Drums and Traps
Piano Accordion
or any other instrument

Surprise yourself. Astound your friends. Learn to play this captivating instrument or any other instrument right at home in a few short months—even if you don't know one note from another now.

Nothing could be easier. No grinding practice. No trick music. You always play from actual notes. Little theory. Plenty of accomplishment. Best of all, no matter

which instrument you select, the cost of learning averages no more than a few cents a day. Mail coupon now for Free Book describing our print and picture method. Also ask for Free Demonstration Lesson. Instruments supplied when needed, cash or credit. **U. S. School of Music, 72-A Brunswick Bldg., New York City**

U. S. School of Music,
72-A Brunswick Bldg., New York City

Send me your amazing free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane; also FREE Demonstration Lesson. This does not put me under any obligation.

Name.....

Address.....

Instrument..... Have you this inst.....

PATENTS

Booklet Free Highest References
Promptness Assured Best Results

Send drawing or model.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

Listed Patent Lawyer in the latest editions of the Rand-McNally Directory of Bankers and Bank-Recommended Attorneys, published by Rand-McNally & Co., Chicago, Ill.; The Baggott & Ryall Directory of Guaranteed Attorneys, published by Legal Directory Corporation, Boston, Mass.; Flugel's Law List, published by Legal Directory Publishing Co., St. Louis, Mo.; American Lawyers Annual, published in Cleveland, Ohio; Bankers Service Legal Directory, published by Bankers Service Co., Boston, Mass.; Eyre's Law List, 9 Park Place, New York City; Walters Legal Directory, Omaha, Nebraska, and the National Directory of Attorneys, Baltimore, Maryland.

WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D.C.



Men! Extra Money Quick

Here's An Easy Way!

—to bring you a fine cash income! Without taking any time away from your job. Pleasant easy work at home. Decorate beautiful giftwares the Fireside way. You can do it — in spare moments. No previous training required. No special ability needed. No tedious study. No memorizing. With the Three Simple Steps sent you by Monsieur Petit the great artist — Director of Fireside Industries, it is just fun! We want men in every community. Be the first! Fireside Industries, Dept. 66-B, Adrian, Mich.

Begin Right Now!

Thousands are making Fireside decorations—making from hundreds to thousands of dollars and doing their own work besides. We supply you with everything you need. Big Generous Complete Kit WITHOUT EXTRA COST. It's a cinch! Your success is assured.

FREE!

Fill out and mail coupon at once. Without any obligation it brings you wonderful Fireside Book in colors. Explains everything. Act Now!



Fireside Industries, Dept. 66-B, Adrian, Mich.

Send me your wonderful Free Book in colors. This does not put me under any obligation.

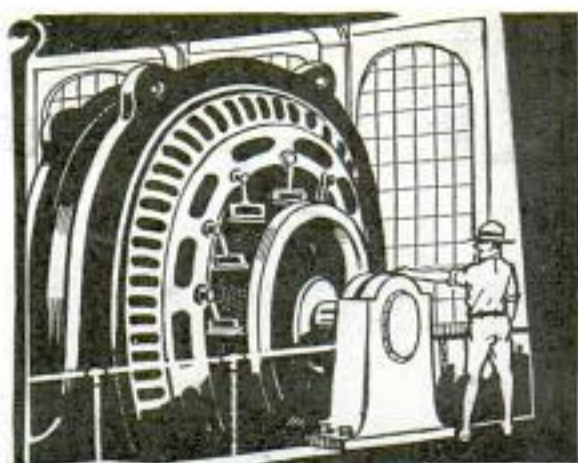
Name.....

Address.....

You Fellows Who Want

Steady Work and Good Pay

Get into



ELECTRICITY

THE whole world—everything—depends on Electricity. That's why you are always sure of a steady job at good pay when you are a trained Electrical Man. Radio—Aviation—Movies—Manufacturing—Life itself—depend on Electricity and the trained men who handle it. Get into Electricity now, where the work is steady—the pay is good—and a real future waits for every man who is trained for this big opportunity.

Learn at Home — in Spare Time

I'll train you at home,—in your spare time. You work just as you are working now—at your same job. My famous "Work-Sheet and Job-Ticket" method guarantees you simplified, practical training along work-shop lines. In a few short months you can step out of your old job into a new job—into electrical work where you can be sure always of a good job and good pay.

Earn Extra Money While You Learn

To learn Electricity my way you don't have to be a College man, or even a High School graduate. With me, you get experience as you go along and make extra money while learning. I'll show you how,—and I'll give you, without extra cost, tools and apparatus to work with—6 Big Outfits in all.

Your Money Back If Not Satisfied

That's the written agreement under which I accept your enrollment. There's nothing like "Cooke" Training anywhere. It's the Training that big Electrical men are praising; it's the Training that employers recommend; it's the Training that one of our greatest Engineering societies has endorsed 100 per cent. It's the Training for you.

If You're Earning Less Than \$70 A Week—Investigate

Don't wait a minute! Find out how "Cooke" Training will help you. Mail coupon right now for my Big FREE Book of Facts. See the Six Big Working-Outfits I give you without extra charge. See the hundreds of pictures, the proofs, the Big-Pay letters of other "Cooke" Trained Men. Get this great free Book.

Send for it today. Clip, sign, and mail coupon RIGHT NOW!

L. L. COOKE, Chief Instruction Engineer

L. L. COOKE SCHOOL OF ELECTRICITY

Dept. 12
2150 Lawrence Ave.
Chicago, Illinois

"DADDY"

OF ALL TRADES AND PROFESSIONS

GOOD JOBS AWAIT YOU

If you earn less than \$70 a week INVESTIGATE ACT NOW



I'll train you at home in a few short months.
L. L. COOKE

FREE BOOK COUPON

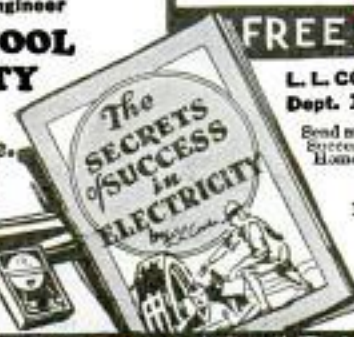
L. L. COOKE, Chief Instruction Engineer,
Dept. 12, 2150 Lawrence Ave., Chicago, Ill.

Send me FREE and prompt, your Big Book "Secrets of Success in Electricity," with all details about your Home Study Course in Electricity.

Name

Address

City State



The "Cooke" Trained Man is the "Big Pay" Man

Classified Advertisements

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 35 cents per word, each insertion, minimum 10 words, payable in advance
To be printed under proper classification in March issue, copy should be in our office January 19th

ADVERTISING AGENCIES

ADVERTISING: Classified 24 words 20 daily newspapers \$9.00. One inch display 50 country weekly newspapers \$5.00 Free list, magazines, farm, LeGrand Agency, 331 West 33rd Street, New York.

ADVERTISE—24 Leading Sunday newspapers, 24 words \$15.00. Excellent for obtaining help, salesmen, or business opportunities. Information 1,000 best paying dailies, mail-order weeklies, monthlies, mailing lists, everything. Free, Wade Agency, Great Northern Bldg., Chicago.

GET into advertising. Learn quickly at home. Experience unnecessary. New easy plan. No text books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 3431, 3661 Michigan, Chicago.

ADVERTISE—Newspapers, magazines. Lists free. Martin, 276B West 43rd, New York.

ADVERTISE in Southern Negro newspapers. Lists free. B. L. Stricklin, Jr., Box 661, Staunton, Va.

BEFORE advertising get our catalog. No charge. 25 years in business. The largest classified agency in the world. Ankrum Advertising Agency, 100 No. LaSalle St., Chicago, Ill.

FREE—New 1930 Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

INCH Display advertisement 50 magazines year \$24. Wood's Popular Services, Atlantic City, N. J.

ADVERTISE in rural weeklies. Lists free. Meyer Agency, 4112 Hartford, St. Louis, Mo.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

FOR ADVERTISERS

SELL. Buy, exchange, aircraft, brooms, anything through "Sales Bulletin." With your twenty word advertisement, three months 50c. Without ad 25c. Thousands businesslike subscribers. Graham Publications, 1310-15 So. 12th, Lincoln, Neb.

ADVERTISE 33 Magazines, old and reliable Syndicate; 3c word; \$2.00 inch. List free. Evans King Co., Box 672P, Wilmington, Delaware.

ADVERTISE in 250 country town newspapers 28 words, \$10. Lists free. All states. Keates, Hartford Bldg., Chicago.

ADVERTISING: 20 Words, 50 magazines 60c; three insertions, \$1.20. Mailing Bureau, Lawndale, Calif.

LAYOUTS Free advertising is a useful handbook of 700 layout suggestions used in magazines, newspapers, booklets, folders, broadsides, letterheads and posters. Will save immense amount of time of any advertising man. Delivered to your door C. O. D. Simply pay postman \$3 and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

SALES PROMOTION

ANYTHING can be sold by advertising. Let us help you! Banning, Times Building, Watertown, N. Y.

INFORMATION

A BILLION Ideas. This is the title of our remarkable catalog of books along practical lines. Arranged alphabetically by subjects for easy reference. If you have not received it, send for a copy. You will find hundreds of subjects you cannot usually locate in book stores or public libraries. Sent free upon request. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

MAILING LISTS

THE \$1,000 Secret never fails. Tells what sells by mail—how, when and where to advertise. Price 25c. Clayton Dawson, Box 392, Cynthiana, Ohio.

500 NAMES \$2. No bank failures or hard times. G. W. Green, Stockton, Ill.

AUTOMOBILES

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

CARBURETOR Information every auto service man needs will be found in special carburetor supplement to the famous Dyke Auto Encyclopedia. Deals with every make of carburetor. 166 pages. 246 illustrations. Price \$2. Sent C. O. D. if you prefer. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

AUTO SUPPLIES

ECONOMIZER Removes carbon in thirty minutes, saves fuel, eliminates vibration, quiets motor, takes moisture from radiator to combustion chamber. Recommended by Automotive Engineers. You can install in ten minutes. Money back guarantee. Retalls \$5.00. Send \$2.00 for your demonstrator, prepaid any address. For all four cylinder cars. Economizer Manufacturing Co., Rome, Ga.

"SPRINGS of Silence"—Inexpensive Sets—Ford Chevrolet, Hudson, Essex, all cars—Ask automobile dealer—"Safety" mirror—hinge attached—chromium, \$2.00. Seat springs \$1.50 set, guaranteed. Catalog sent on request. Universal Spring Co., 550 Bond Ave., Grand Rapids, Mich.

PROFITABLE Electric trouble shooting with new and reconditioned, attractively priced test benches. Easy terms, trial. Mitchell Company, Box M-212, Troy, Ohio.

WET Auto motors started two minutes. Dollar for instructions. Thomas Seaton, Merchantville, N. J.

ELECTRIC Arc soldering. Startling. Principle electric welding. Make big money. Send \$2.00, receive proposition and complete outfit including six feet heavily insulated connection cable. Harbert Mfg. Co., Glendale, Calif.

ELECTRIC Arc welding proving profitable automotive shops. Easy payments on gasoline or electric. Hobart Brothers Welding Division, Box M-213, Troy, Ohio.

GUARANTEED Tubular spark plug wrenches, forged jaws, levers attached. Set 4, 8", standard sizes \$2.00, prepaid. L. Wittenmyer, Rudolph, O.

HOTWATER Automobile heaters, \$5.00. Box 128, Cumberland, Maryland.

CHROMIUM Plating powder plates iron, steel, brass, copper and silver, without electricity or machinery. Guaranteed not to tarnish; 1/2 pint can \$1.50 prepaid. Gunmetal Co., Ave. J, Decatur, Ill.

SHOP Notes for 1931. Get your copy now. Only a limited edition. Contains all the articles published in the Shop Notes department of Popular Mechanics Magazine during 1930. Send 50 cents. If you want the entire set of Shop Note books consisting of 32 volumes including the 1931 number and 11 others issued previously we will send them C. O. D. at a special reduced price of \$3.75. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

FAMOUS Bailey Handbook—Prepares you to pass the examination for any grade of license for stationary, marine and Diesel engineers, firemen and boiler inspector in any state of the Union or any province of Canada. Flexible cover. Handy pocket size. Pay postman \$2.00 plus postage when he hands you the package. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

NEW Auto parts 25-50%. Motors, rear-ends, radiators, wheels, generators, carburetors, brakelining 50%. Used parts 40-80% off. Brightman, 2065 Main St., Hartford, Conn.

AUTO SERVICE EQUIPMENT

RECONDITIONED Bargains in car washers, battery chargers, compressors, test benches, many only used few months. Easy terms and trial, guaranteed. Mitchell Electric, Box M-213, Troy, Ohio.

COMPRESSORS, Twin automatic, 8 hour battery chargers, 20-minute car washers, test benches, paint sprays, \$20 monthly. Pays for itself without investment. Guaranteed. Write Ken's Service, Box M-214, Troy, Ohio.

"FIFTEEN Capacity battery charger, direct from factory; guaranteed; 110 volts; money maker for owner \$27.34. Adams Barr Corporation, Columbus, Ohio.

WELDING Encyclopedia. The latest, completely revised edition of this famous book contains every known fact regarding every kind of welding. Covers such up-to-date subjects as aircraft welding, 542 pages. Illustrated. Flexibly bound. Sent C. O. D. Pay postman price, \$5 and small amount of postage upon delivery. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

MOTORCYCLES, BICYCLES & SUPPLIES

REBUILT Motorcycles \$25 to \$100 easy. Tires, used tires \$2.50. New Firestones \$5. Engines for motorcycle ice sleds, airplanes, boats \$15 to \$75. New automobile tires \$2. Forks \$3, frames \$3, cylinder \$3, saddles \$3, chains \$1.50, handle bars \$2, belts \$5, wheels \$3, side cars \$35. Bicycles \$9.00. Save 100 dollar prices. Oldest house in U. S. Send 25c for catalogue. Price Cutter Deninger, Rochester, N. Y.

WINTER Clean-up sale—special offer! Free helmet, goggles, sweater, puttees, with every used Harley-Davidson. All models at new reduced prices. Send 4c in stamps for our catalog. Knuth's Harley-Davidson Agency, 2325 Fond du Lac Avenue, Milwaukee, Wis.

MOTORCYCLE Bargains, lowest prices, bargain sheets for stamp, special aviators supplies, motorcycle accessories largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

HENDERSON, Excelsior, Harley, Indian used parts, engines, cheap. Conversion parts. Catalogue 2c. Hallak, 100 N. 12th St. Louis, Mo.

SEND 15c Today for latest used motorcycle catalog. Large stock. Real Bargains. Indian Motorcycle Sales, Kansas City, Mo.

REPAIR With good used parts, save 1/2 or more, state parts needed, no lists. J. B. Dahl, 3661 Archer Ave., Chicago, Ill.

AVIATION

HEATH Planes—\$12 starts you building your favorite style sport plane—low wing, center wing or Parasol type. Parts sent in 11 convenient, progressive groups. Technical training unnecessary as plans are clear, easy to follow and accompanied by complete detailed instructions. Hundreds of satisfied Heath owners declare planes give performance comparable to larger planes. 10 cents in stamps or coin brings large illustrated booklet. Heath Aircraft Corp.—Dept. CL 17P, 1721-9 Sedgwick Street, Chicago.

"SKYWARD Ho!", wonder book on Aviation, sent free. Maps your road to fame and fortune—complete guide to aviation success. Fully describes and illustrates training in world's largest commercial flying school; describes aviation's future and shows how to find your place in it. Write today to Parks Air College, Section 2-PM, Parks Airport, East St. Louis, Ill.

NEW Heath B 4 Aircraft Engine—the new light plane motor that has brought new safety and pleasure to light planes everywhere. Delivers 30 horsepower and costs only \$300 fully equipped including propeller hub. Also rebuilt Heath Henderson Motors like new for as low as \$190. Fully guaranteed. 10 cents in stamps or coin brings large illustrated booklet. Heath Aircraft Corp.—Dept. CL 18P, 1721-9 Sedgwick St., Chicago.

BUILD Our new Aeroford—only glider easily converted into sporty two-passenger power plane by our patent conversion. \$79.00 buys Makit Kit containing all glider materials. \$10.00 installment starts you building. Send \$2.50 for set biggest blueprints including latest shoplinks. Aeroford Aircraft Corp., North American Bldg., Chicago.

STUNT Flying—A new book of flight instruction that is different. The author, Capt. Richard Duncan, has developed in this book a unique system of practicing and working out your flight maneuvers on the ground. Use it and learn as other great flyers have done. Will save you hours of costly flying practice. 185 pages, 32 illustrations, cloth. Sent C. O. D. Pay postman price \$2.50 and small amount of postage upon delivery. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

SENSATIONAL New steel tube fuselage fitting. Completely finished. Eliminates 95% fuselage work. No welding, bending, drilling, necessary. 30¢ each, one with circular 25¢. Build the Russell Monoplane. Book containing blueprints, drawings, complete plans etc. \$1.00. Russell Aircraft, Box 455, Toledo, Ohio.

HEATH Propellers—give your airplane, ice sled or wind buggy greatly increased performance because they are designed to fit each individual job. Yet they cost no more than ordinary stock propellers. 4 cents in stamps brings catalog. Heath Aircraft Corporation—Dept. CL 19P, 1721-9 Sedgwick Street, Chicago.

AVIATION—Every person interested in this subject should make full use of the opportunity to learn aerodynamics with Alexander Klemin as his instructor, through his timely new book, "Simplified Aerodynamics." Heretofore this subject has been rather difficult for the thousands who need it but Klemin's method enables all to master it. Every pilot, mechanic, student needs this book. Pay postman price, \$3.50, and few cents postage when he delivers it. Order from Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

SPORTPLANE Motors—50 hp., 4 cylinder, reasonably priced. Send dime for circulars. Frederick Lambrix, Hart, Michigan.

NEW 80 Horse airplane motors \$50—120 horse. Cost over \$1,000. Excellent for airplanes and snow sleds. Other motors, 25 to 200 horse. Propellers, all reduced. Smith, Box 1343, Houston, Texas.

TRAVELAIR, Waco 10, Lincoln PT, your choice, complete with OX5, \$695. Hi-Lift Also 2 place OX5 Biplane, complete, \$475. Air-cooled 80 horsepower motors, brand new, \$80. Other bargains. Allison Airplane Co., Lawrence, Kansas.

NEW Ideal "Eaglet" 20 in. Balsa Cabin Monoplane Construction set, 50¢ postpaid. Ideal Company, 19 West 18th St., New York.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

FLYING Simplified—Just out. Here is a remarkable non-technical book for beginners, prospective or advanced students that teaches in an easily understood manner all you can need to know to master the art of flying. Will save you many dollars when you learn to fly. Pay postman only \$1 and postage when book is delivered at your door C. O. D. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

"AERODRIVE" Sleds—blueprints, 4 types and 1 boat—set, \$1.00. Single prints, 25¢; propellers, 3', \$5.75; 4', \$8.75; 5', \$13.25. Engines: OX5s, \$145, Hall-Scotts, \$135. Hisses, \$195, LeRhone, \$65, Ostergaard Aircraft, Danning, Chicago.

BUILD Your glider with planes and materials that have proven their merit. 10 cents brings full information. Mead Gliders, Dept. B.7, 12 So. Market, Chicago.

GET Our new catalog on S. B. Henderson Aircraft motors, propellers and supplies for sport planes and sleds. Also write for motor bargain list. Send dime in stamps to cover cost. The Semanich Bros. Lititz, Penna.

MOTORS, Propellers, hubs, for Iceboats. Circulars 10¢. Storms Aviation, Spartanburg, S. C.

CONVERSION Parts for Ford and Chevrolet motors. Send 10¢ for circulars. Heino Motor Works, Orwigsburg, Pa.

BOYS. Girls, remarkable 10 weeks' simplified aviation course \$2.00 or 25¢ for first lesson. Increases knowledge of aviation 100%. Exams, pins, wings included. Guaranteed. Details free. National Young Flyers League, Box 40, Syracuse, N. Y.

PHOTOGRAPHS of airplanes; All makes, brilliant, 7x10 heavyweight, 3 for dollar sent C.O.D. Special pursuit group of ten, \$3.00. John Stiles; Stoughton, Mass.

BUYERS Directory, listing thousands bargains used airplanes, motors, jumping balloons, power gliders, equipment. 50¢. Midwest Company, 603-7 Security Mutual, Lincoln, Nebr.

PRACTICAL Flight Training is a splendid, thorough instruction book written by Lieut. Barrett Studley of the Naval Air Station at Pensacola. It is the official text book from which all U. S. naval flyers are trained. You can double the value of expensive instruction time in the air by a preliminary study of the subject from this book. Pay postman \$3 and postage when he delivers it to your door. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

HELIOS Motors; 35 hp. and 60 hp. radials, air cooled. Real, modern aviation motors, not made-over motorcycle or auto engines. Catalog, data etc. 10¢. Aviation Service, 926 Broadway, New York.

SEND 5¢ For bundle of balsa, reeds and price list on supplies. Aero Shop, 3050 Huribut Ave., Detroit, Mich.

HENDERSON And big V motors, metal tipped propellers \$9.95 each. Hibbs, Ft. Worth, Texas.

AIR Navigation and meteorology—A practical book for every flyer. Capt. R. Duncan, the author, has presented the subject in a simple, non-technical way. 243 pages, illustrated. Delivered to your door C. O. D. Simply pay postman \$3 and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

MODEL AIRPLANES

LOWEST Prices on model airplane supplies: Ambroid, 2 ounces, 20¢; Balsa, 1/16 x2x36, 7¢; Rubber, 1/4 Flat, 5 ft., 2¢; send for price list, get a useful item free. Madison Model Airplanes, Inc., 138 Livingston Street, Brooklyn, N. Y., Dept. P.

FAIRCHILD'S, Hawks, Lockheeds, Autogiros, supplies at ridiculous prices. Catalogue nickel. Reemer Model Aircraft, Hasbrouck Heights, N. J.

"IF You want to fly" let Alexander Klemin, brilliant engineer, teach you. With great skill whole course of training has been simplified and made crystal clear. Remarkable book teaches in most practical and easily understood fashion. Recommended by skilled flyers. Sent C. O. D. anywhere in U. S. Simply pay postman \$2.50 and postage when delivered. Sent postpaid to any address upon receipt of price. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

BOOKS AND PERIODICALS

ASTROLOGY Books—25¢ to \$8.60; free descriptive list. Bullock, Box 1286, Providence, R. I.

OIL Royalty Investor's Text-Book! "Oil and Gas Royalties". Samuel H. Glassmire, Attorney, Tulsa, Okla. \$3.00.

HYNOTISM Easily learned. Lessons guaranteed. Postpaid \$1.10. Smith Pub. Co., Dept. 3, Springfield, Mass.

TECHNICAL Books, great variety, unusual offering. Send for bargain list. Also agricultural books. Barnes & Noble, Inc., 75 Fifth Ave., New York City.

DISEASE, Its cause and prevention. Correct living and eating—valuable booklet with wonderful information. Price 25¢. Dr. Frank Hayes, 107-109 Stewart Street, Seattle, Washington.

PICTURES AND POSTCARDS

OLD Ironsides—beautiful 9x12 Art Print for 10¢. Super Art Service, 14114 Wabash Ave., Riverdale, Chicago, Ill.

GAMES, ENTERTAINMENTS AND PLAYS

PLAYS, Operettas, musical comedies and minstrels, comedy and talking songs, black-face skits, vaudeville acts, monologs, dialogues, recitations, juvenile plays and songs, musical readings, entertainments, make-up goods. Catalog free. T. S. Denton & Co., 623 So. Wabash, Dept. 11, Chicago.

PLAY Table golf. Circular free. Inadon Golf Company, Alta, Iowa.

CHALK TALKS

LAUGH Producing program, \$1.00. Catalog free. Balda, The Cartoonist, Oshkosh, Wis.

CHALK-TALK Your way to popularity. Audiences at your feet if you learn how to entertain with a few simple pictures. Little artistic ability needed. "How to Chalk Talk" tells what to say and what to draw. Profusely illustrated. Make money giving chalk talks. Just order on a postal. Pay postman \$1.00 and postage when delivered. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

MAGIC TRICKS, BOOKS AND JOKER NOVELTIES

MAGIC—Tricks, Books and Supplies. For amateurs as well as the great professionals. Anyone can learn through our instructions. Feature Acts in Mind-Reading, Spiritualism, Rope Ties, etc. Large illustrated professional catalog, 20¢. Chicago Magic Co., 116 So. Dearborn St., Dept. B, Chicago, Ill.

SEVEN Optimagical delusions. Four Magic catalogs 10¢. Gilmaglio, Morgan Park, Chicago.

FREE Magic catalog: Hundreds of mystifying tricks. Free with our Master System of 6 card tricks for only 10 cents. Name any card drawn from deck, etc. Wizard Magic Co., Dept. 15-T, Box 1055, Station "C", Los Angeles, Calif.

ONE OF our best puzzles with secret solution and illustrated folder 10¢. Western Puzzle Works, St. Paul, Minn.

LIKE To whitely! Make an East Indian kazoot stick. Mystify your friends. Instructions ten cents (coin). Roy Miller, Lowbanks, Ontario.

MAGIC Catalog 20¢. Lynn, 105 Beach, Dept. 3, Jersey City, N. J.

MAGIC Tricks, books on magic, hypnotism. Catalog free. Geo. Fenner, Louisville, Ky.

BECOME A mind-reader: perform without assistant, confederate or apparatus. \$1.00 tells all. Franck, 1700 Hanover, Baltimore, Md.

MAGICAL Tricks, puzzles, novelties. Catalogue 5¢. Mats Novelties, Reading, Pa.

TRICK Catalogue, 10¢; Firecracker, 30¢. Oaks Magical Co., 548, Oshkosh, Wis.

ELECTRIC Fun! 200 stunts, 110 volts, \$1. Kutting Sons, Campbell, Calif.

200 TRICKS You can do—Mystify your friends; have loads of fun. This collection of tricks has been selected by Thurston for the average person. Neither unusual skill nor elaborate apparatus are required. Send for this 200-page illustrated book. Pay postman \$1 plus postage when delivered. If outside U. S. remit when ordering. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

RADIO SETS AND SUPPLIES

NEW 300-Mile "pocket" radio, \$3.85. Complete with special loud receiver. No tubes or batteries required. Order direct. Spencer Laboratories, 116 Atlas, Akron, Ohio.

EARN More money servicing sets—selling receivers, let us train you. Radio Doctors, Inc., 130 Essex Street, Salem, Mass.

RADIO Fans. If you are interested in a real radio send, twenty-five cents coin, for postage and affidavits; Address box 931, Nacogdoches, Texas.

"WORLD" Receiver, \$1.25. Illustrated bargain catalogue, 10¢. Nedli Tasker, Shamokin, Pa.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

BEST Radio Book—Latest revised edition—Radio Theory and Operating by M. T. Loomis of the Loomis Radio College is America's Standard Radio Text-Book. Used by the various government departments and leading radio schools. 900 pages, 700 illus., flexible kraft leather binding. Sent C. O. D. Pay postman \$4.25 and the postage when package is delivered. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

STAMP COLLECTING

THE Biggest bargain ever offered: Two values of the beautiful and scarce flag stamps of Epirus. The complete set of 8 values of Latvia and two genuine classics over 50 years old, all for only 10c to approval applicants. If you are not yet on our mailing list you miss being served by the leading approval house of America. From one of the largest stamp stocks in the world. We always offer better stamps for less money. Thousands of our steady customers know that it pays to deal with Globus. Write us today and let's get acquainted. Globus Stamp Co., 214 3rd Avenue, New York City.

FREE! \$10 Set albums! Complete set Scott's "International Stamp Albums," 3 marvelous volumes providing spaces for every stamp issued; also many "Standard Postage Stamp Catalogs," 20,000 pages illustrating, describing every stamp and watermark, will be given periodically and often! Packets and sets better-grade stamps given with every order. Unquestionably the most amazing offer of genuine values ever made! Send 2c stamp for full particulars and approvals. Vogue Stamp Co., Dept. P, Port Chester, N. Y.

MYSTIC "Queer Country" Packet! Contains scarce stamps from the following strange lands: San Marino, Antioquia, Congo, Cyprus, Fiji Islands, Gwalior Hyderabad, Iceland, Jhilm, Kenya, Uganda, Lebanon, Monaco, North Borneo, Nyassa, St. Thomas Prince, Eastern Roumelia, Slam, Sierra Leone, Tanganyika, Trinidad Tobago, Ubangi, Upper Volta, Wallis Futuna, Alsulites. Get this wonderful packet of "freak countries" and make your friends envious! Price only 10c to approval applicants! Write today. Mystic Stamp Company, (Dept. 8), Camden, N. Y.

CANADA Airmail stamp free if you ask for approvals and send 15c for 25 different airmails or 30 different Canada and Newfoundland; both packets only 25c. We list 329 countries in our dime packets. Lists free. Special bargains, 500 different, 25c; 1,000 different, 75c; 2,000 different \$2.50. Victoria Stamp Co., London, 4, Canada.

A SNAP—300 Different foreign and 60 different U. S. stamps, including \$1 value, for only 25c. Free, with each order, our pamphlet telling "How To Make A Stamp Collection Properly," together with our price lists of albums, supplies and hundreds of bargains in sets, packets, etc. Queen City Stamp Co., Room 36, 604 Race St., Cincinnati, Ohio.

RARE Italy airmail—This beautiful Italian airmail stamp, also scarce Vatican City—the only stamps in the world ever issued by a Pope!—and a packet of 51 other fine stamps, including Spanish, Morocco (Oasis Scene), Venezuela, Nyassaland, etc. All for 5c to approval applicants. R. G. Howard, 245 Waverly Ave., Newton, Mass.

50 DIFFERENT African 10c. Michael, 942a So. 23rd, Bellwood, Ill.

FREE—Packet 52 different from Alsulites, Lebanon, Quillman, etc.; also watermark detector and rare old Hawaiian stamp—all free to approval applicants enclosing 4c postage. Highland Stamp Co., Newton Highlands, Mass.

BREAKING UP a \$50,000 general collection at 60-70% off Scott. References, Lux Stamp Co., 805 Fairmount Place, New York.

PENNY Approvals, 5,000 Sudan, Congo, Nyassa, Liberia, etc. Also 14,000 averaging 1 1/2c. Philatelic Exchange, Huntington, W. Va.

LARGEST Stamp in the world! Rare China Wild Geese special delivery stamp (value 75c) for only 5c to approval applicants. Supply limited. Positively only one to a customer. Western Philatelists, 4021 Harper, M22, Chicago.

TRIANGLES—Eight different triangle stamps including Guatemala (world's smallest), Latvia (air mail), Liberia, Nyassa, only 10c to approval applicants. Paul Revere Stamp Co., Box 49, Astor Station, Boston.

DANDY Premium—Ironcoast, Hautevolia, Daboney, Tehad, Nigercoast, Somalia, Guyane, Mauritanie, Cameroun, Oceania, Mikouon, Madagascar, Martinique, Morocco, with eleven other hard countries, all for 4c to collectors who apply for our approval sheets and promise quick returns. Kelgwin Stampco, Fernandina, Florida.

100 DIFFERENT And set 6 Spain Madrid Exposition 10c to approval applicants. A. W. Kenagy, Washington Court House, Ohio.

APPROVALS 1/2 and 1c. References, Premium, G. W. Engelter, 304 Bridge, Streator, Ill.

NEW Issue, Spain, Columbus' Ships, set of 5, 10c to approval applicants. Electra Co., Mayberry, W. Va.

100 DIFFERENT Stamps from 100 different countries, 25 different airmails, perforation gauge, all for 20c to approval applicants. Anchor Stamp Co., Rutherford, New Jersey.

FREE! Loose leaf postage stamp album at rate of 8 pages each month given with subscription to monthly journal. Send 2c stamp for prospectus. United Stamp Co., Marquette Bldg., Chicago, Ill.

CAYMAN Islands—Astounding packet from Cayman Islands, thirty other unique, interesting, beautiful distant land stamps (richly colored unusual designs). Hurry! Rush! Get yours now! Free for 5c postage. Empire Stamp, Toronto, Can.

1,000 FOREIGN Stamps 10c to approval applicants. Fulmen, Columbia, Missouri.

1,000 DIFFERENT Europe \$28.80 value, only 1 dollar. Splendid approvals! Josef Wendt, Neumarkt, Opf. Germany.

SIAM Five free to approval applicants. Bernard Karb, Middle River, Maryland.

DOMINICAN Republic: 15 var. 10c with approvals. Allion, Angola, Ind.

FAIR-A-WAY Land's packet. Including Zanzibar, San Marino, Orange River, Africa, Rhodesia, Hong Kong, Transvaal, Malay, Triangle, air mails, etc. Only 10c to approval applicants. McEwen, 755 Wilson, Columbus, Ohio.

FREE! Flume triangle and 50 others. Scotts 1931 catalogue, \$1.85. Tatham Stampco, DSC, West Springfield, Mass.

HUNDREDS Exchange stamps. True-Blue Book Co. Membership, 25c. Erlsson, Elroy, Wis.

TWO Pounds United States Mission gathered stamps, unpicked \$1.00. Claud Donney, Box 1825 Dallas, Texas.

PACKET Of fifty all different United States and foreign stamps, twenty-five cents. Roy L. Pierce, 401 So. Way, Valparaiso, Ind.

STAMPS! 100 Different 2c; 1,000 7c; Album (2,800 spaces) 20c; steel stamp tongs 3c. Tatham Stampco, West Springfield, Mass.

WORLD'S Tiniest triangle (rare Guatemala Quetzal-Bird), also scarce dead country triangle and big packet Eritrea, Vatican, Java, Natal, etc., 5c with lists and approvals. Seminole Company, Druid, Baltimore, Md.

PAPUA (Lakatoi boat), Lebanon (air-mail), Zanzibar, Mesopotamia, Georgia, Congo, Morocco, Sudan, etc., in wonder packet 60 different, 5c with approvals and lists. Monumental Stampco, Arlington, Baltimore Md.

LARGEST Lists published, thousands of stamps to select from. Every stamp guaranteed. Also approvals priced to 6 cents. Columbia Stamp Co., 7618 85th Road, Woodhaven, N. Y.

NEWFOUNDLAND Set of 5 Caribou 10c. Better grade approvals to applicants. DeLisle, 562 Harding, San Jose, Calif.

GENTINE Baden, Cileta, Kenya Uganda, French Guinea, cataloging 25c. Orange River Colony, Algeria, Shilling Revenue, Syria, Nyassaland, etc. In our extraordinary packet 60 different stamps. Only 5c, with excellent approvals. Viking Stamp Co., Sheepshead Bay Station, Brooklyn, N. Y.

UNITED States treasure packet 15 cents. John Cooley, Fishers Island, N. Y.

DEALERS Get cheapest stamp list Dollar. Stampco, Box 726, Chicago, Illinois.

STAMPS—100 Varieties, Africa, Brazil, Peru, Cuba, Mexico, etc., 10c; 25 different U. S. 25c; 1,000 mixed, 50c; 1,000 hinges, 15c. C. Stegman, 5941 Cote Brillante, St. Louis, Mo.

100 STAMPS And Hinges, free to approval applicants. Lambert, Box 156, Fort William, Ont., Canada.

U. S. Wholesale, free list and approvals. Hoyt, 108 Inland Street, Lowell, Mass.

FOUR Sets—Ecuador (arms), Turkey (scenes), Persia (shah's heads), Haiti (battle), 10c to approval applicants. Earl T. Tyler, Royal Oak, Mich.

50 DIFFERENT United States 10c to penny approval applicants. Welworth, Box 278, Indianapolis, Ind.

FREE—50 Stamps, all different to approval applicants. John F. Miller, 183 East 75th, New York City.

45 SCARCE Airmails, South America, and Canada stamps 5c to approval applicants. Glendale Stamp Co., 1342P Linden, Glendale, Calif.

NEWFOUNDLAND New airmail stamp, 25c. Rose, Box 1322P, St. Johns, Newfoundland.

PERFORATION Gauge and watermark detector only 5c to approval applicants. References, B. C. Stamp Exchange, Rutland, B. C., Canada.

203 DIFFERENT Catalog \$4.25 only 7c with approvals. L. W. Hudson, Plainfield, N. J.

HONDURAS Air-mails, 1929. Two values cataloging \$4. No. 418 and 417. Bargain at 90c. List free. Frederick Proessel, 7848 Montgomery Avenue, Elkins Park, Pa.

500 DIFFERENT, 25c. Pleasing approvals. R. Sherman, 2818 Heath Avenue, New York.

1,000 MIXED U. S. old and new, 25c. Weatherly, Lakewood, Ohio.

25 AIRMAILS In stock book, 20c. Burtiss Company, Saratoga, N. Y.

301 DIFFERENT 10c to approval applicants only. Free list of bargain packets. Kansas City Stamp Co., Lee Bldg., Kansas City, Mo.

50 FRENCH Colonies, Alsulites, Gabon, Caledonia, etc. with approvals 6c. Hollinbeck, 312 Marquette, Minneapolis.

25 AIRMAILS 10c; 1,000 Hinges 10c; animal packet 10c. Bargain packets, mixtures, approvals. Harvey Teeple, Decatur, Indiana.

PACKET Rare diamond shaped stamps, 10c to approval applicants. J. Pastlczek, Pine Island, N. Y.

COLONIAL Airmail free with approvals. Monjar, 1553 Knox, Cincinnati, Ohio.

FREE, 6 Different Luxembourg to approval applicants. E. D. Stamp Co., 3945 Forest Park Ave., Baltimore, Md.

FREE—100 Different stamps to approval applicants. John Cooley, Fishers Island, N. Y.

APPROVALS At 1c, (and what approvals!) Sets at all prices. Interested? You should be! Julius Goldin, 926 Southern Boulevard, New York.

FREE—Genuine confederate bill to approval applicants. DuBose Stamp Company, 233 Merritts, N. E., Atlanta, Ga.

1,000 DIFFERENT 60c with approvals. Hollinbeck, 312 Marquette, Minneapolis, Minn.

STAMPS—Wholesale—List free to dealers. C. J. Rose, Maywood, Ill.

UNITED States \$2 wines, catg. 40c and 50 diff. U. S. for 20c; 100 U. S. 37c; 20 Canada obsolete 12c. Robert Haynes, Point Place, Toledo, Ohio.

1,000 CHOICE Mixture, 30c. 1c approvals. C. Ritchie, Waterlooson, So. Dak.

200 DIFFERENT 10c, 20 Turkey 10c. 60% discount approvals. Corert Stamp, 39 State, Rochester, N. Y.

WHOLESALE Catalog for dealers; 4c postage. Grossman, 102 W. 42nd, New York.

10 DIFFERENT Lots 10c including Liberia, Corea, etc. to approval applicants. Utterback, Dahlgren, Va.

24 VARIETIES Cuban stamps, 10 cents. List of stamps free. Chambers Stamp Co., 111P, Nassau, New York City, N. Y.

CAMEROONS, Ubangi! 41 French Colonies 5c to approval applicants. Steelling, 367 S. Broadwar, Lexington, Ky.

27 LIECHTENSTEIN 4c to approval applicants. Hagen, Box 129, Sioux Falls, S. Dak.

UNITED States \$2 present issue (catalog 50c) for ten cents to approval buyers. State size of collection. United States price list free. Ledue, Redlion, Penna.

WRITE For our free illustrated price list. The illustrated Scott price list is the most complete offering of sets, packets, airmail and special packets, catalogs, albums, stock books and accessories ever made available to the stamp collector. It is beautifully illustrated throughout, and contains a wonderful range of offerings from 10c to hundreds of dollars. Free for the asking. Scott Stamp and Coin Co., 1 West 47th Street, New York, N. Y.

FREE Surprise packet with unlicked mission mixture 500 U. S. stamps. Drexel Stamp Shop, 5726 Drexel, Chicago.

BIG Parade—A packet of more than twenty all different better grade stamps showing exciting scenes and records of nations at war. Includes fire-pot hurler; the storming of a city; hand-to-hand bayonet struggle; bloody battle scenes; troop transport; red cross stamp; dying soldier; victory stamps; etc. Send for this thrilling "Big Parade" packet at once—limited supply. Only 10c to approval applicants. W. A. Rowell, 58 Cornhill, Boston, Mass.

110 DIFFERENT Stamps, many unused, high values, free to collectors requesting our net approvals. Postage 2 cents Christensen, Milwaukee, Wis.

ILLUSTRATED United States list, price 50 cents; large, complete United States price list, 1930, free. Stanley Gibbons, 38P Park Row, New York City.

150 GOOD Mixed foreign stamps, Jc. Stanton, East Lyme, Conn.

FREE 100 Different with 50% approvals. Send 2c postage. Evanston Stamp Shop, 2412 Noreas, Evanston, Ill.

33 1-5% COMMISSION. Sell our Stamps, sheet catalog value, \$4. Our price, \$2.00. Unsold stamps returnable. No investment required. References necessary. Lux Stamp Co., 895-C, Fairmont Place, Bronx, New York.

200 DIFFERENT 20c; 600, 50c; 1100 \$1; 2000 \$3. Fred Oaken, 630 79th St., Brooklyn, New York.

UNITED States stamps only on approval. Stamp House, 5 Franklin Gardens, Roxbury, Mass.

40 DIFFERENT United States 12c. 60% approvals. Seidenberg, Baroda, Mich.

FREE—\$1.00 U. S. postage Lincoln memorial free, if you write for our 5c page price-list of U. S. and foreign stamps. 2,000 illustrations and fine stamps on approval. Hussman Stamp Co., 620-3 Olive St., St. Louis, Mo.

BEST One cent approvals in America. F. Hand, 1117 So. 60th St., Phila. Pa.

ONLY 5c. 33 Different stamps including scarce Latvian triangular airmail stamps, 10 airmail, 12 United States (early issues, commemoratives, etc.) and 10 Canada. Approvals and illustrated price-list sent with each order. Curhan Stamp Company, Gloucester, Mass.

110 NEW Europe All Different, a wonderful collection cataloging several dollars, free to collectors requesting our Net Approvals. Postage 2 cents. Badger Stamp Co., Milwaukee, Wis.

FREE—Canada (15 Var.) for new applicant of my 1c, 2c and 3c approval, and also my 50% discount. Chas. W. Schmidt, P. O. Box No. 4832, Frankford Sta., Phila. Penna.

FREE! Triangles, airmail, Iceland and 50 others to approval applicants, including 3c postage. Hawkeye Stamp Co., Cedar Rapids, 39, Iowa.

PENNY Approvals that satisfy. Neil Gronberg, Box 5441, Philadelphia, Pa.

STAMPS Sent on approval at 70% discount. Reference required. Emory Renell, Hanover, Pa.

ATTRACTIVE Approvals at 50% discount and 25% discount. Notmus Stamp Co., 312 East 23rd St., New York.

SPECIAL—500 Different stamps 25c to approval applicants. Ohio Stamp Co., Box 249, Cleveland, Ohio.

STAMP Album—The Modern Album is unsurpassed in usefulness. Spaces for 12,000 illustrations, 320 pages. Large size 9 1/2 x 11 inches. Cloth bound. Price only \$1.50. Either pay postman when delivered or if outside U. S. remit when ordering. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

RARE COINS

30 OLD Coins all different \$1.00. 100 different coins \$3.00. All commemorative coins in stock. List free, Claud Denney, Box 1825, Dallas, Texas.

COMMEMORATIVE Half dollars un-circulated. Lincoln \$1.15; Main \$1.20; Pilgrim 89c; Grant \$1.15; Monroe \$1.00; Haguenot \$1.40; Lexington \$1.15; Stone Mountain 89c; California \$1.50; Oregon \$1.25; Sequel \$1.25; Bennington \$1.15; Trade Dollars \$1.15. Bargain price list and old coin 10c. Arty. Box 483, Muskogee, Okla.

COMMEMORATIVE Half dollars un-circulated. Pilgrim 90c; Stone Mountain 90c; Grant \$1.10; Bennington \$1.10; half cent 25c; large cent 9c; eagle cent 8c; 2c copper 7c; 3c nickel 8c; half dime 13c; bust type quarters 55c. Old Coin and price list 10c. Towns Davis, Box 1791, Huntington, West Virginia.

18 DIFFERENT Coins, 25c; 18 different coins and bills, 25c. Bishop, Box 7441, North Kansas City, Mo.

CALIFORNIA Gold quarter 27c, Half 52c, 1787 cent 50c, \$100.00 Confederate Negroes 40c. A. Wylie, 365 Wheaton, Ill.

\$2 TO \$500 Each paid for hundreds of old coins. Keep all old money, it may be very valuable. Send 10 cents for illustrated coin value book, 4x8. Prices guaranteed. Get posted. We buy and sell. Clarke's Coin Office, Box 5, Le Roy, N. Y.

OLD Money wanted. Will pay fifty dollars for nickel of 1913 with Liberty head. (no Buffalo). We pay cash premiums for all rare coins. Send 4c for large coin folder. May mean much profit to you. Numismatic Co., Dept. H, Ft. Worth, Texas.

BARGAINS in coins, 25 different 60c. 100 different \$3.00. Price list free. Troyer Stamp and Coin Co., La Fontaine, Ind.

CLASSIFIED Ancient Greek or Roman coin. Crisp Confederate \$10.00 note and catalog, 25c. Geo. Best, Box 283, Cedar Rapids, Iowa.

GET Profit and pleasure in collecting old coins. Send 10c for large illustrated coin catalog. You'll be delighted with it. Send for it right now. B. Max Mehl, Numismatist, Mehl Bldg., Dent, P. Fort Worth, Tex. Largest Rare Coin Firm in the U. S.

CALIFORNIA Gold—Quarter size, 27c; 3/8 size, 33c; 3/4 piece and catalog, 10c. Norman Schultz, Box 746, Salt Lake, Utah.

20 COINS 25c, 88 Coins \$1.00. Oddehon, Box 681, Kansas City, Mo.

RARE United States and foreign coins, war medals and decorations, Indian Cents and catalogues 30c. Alexis Mengelle, Colorado Springs, Colorado.

UNITED States. Large cent, two-cent bronze, three-cent nickel and bargain list, 25c. Thirteen dates large cents, \$1.00. George Coffin, Greenwood Mountain, Me.

OLD Coins, large full selling catalog of coins for sale, free to collectors only. Catalog quoting prices paid for coins, ten cents. William Hesslein, 101A Tremont St., Boston, Mass.

FOR BOYS

SIDELINE—Cartoon books, magazines. Samples 10c. Meyer, GPO, Box 471, New York.

OUTDOOR Sports for everyone—Enjoy them all year round with aid of great new book just published by Popular Mechanics. This veritable encyclopedia not only furnishes hundreds of ideas for new and popular sports for every season of the year, but also gives complete instruction for making the necessary equipment at very small cost. 350 pages and 650 illustrations. Send today as book is full of thrills and excitement for fall and winter sport enthusiasts. Mailed postpaid anywhere for \$2, or will be sent C. O. D. to any address in U. S. Simply pay postman when delivered. Popular Mechanics Press, Room 802, 200 East Ontario St., Chicago.

CAMERAS AND PHOTO SUPPLIES

FREE—Our latest bargain book listing hundreds of slightly used cameras, kodaks, lenses and accessories at great savings. Send for your copy now. Central Camera Co., Dept. PM-2E, 230 South Wabash Ave., Chicago, Ill.

FILMS Developed. Special trial offer. Any size kodak film developed 5c, prints 3c each. Trial 6x10 enlargement in handsome folder 40c. Overnight service. Roanoke Photo Finishing Co., 209 Bell Ave., Roanoke, Va.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

YOUR Favorite kodak picture enlarged, size 5x7, 10c. Three for quarter, coin. Send best negative (film) today. Address Danner Photo Lab., 221 Securities Bldg., Des Moines, Iowa.

HAVE You a camera? Write for free sample of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

MAKE Money in photography. Learn quickly at home, spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3432, 3601 Michigan Ave., Chicago.

BOLL Developed and 6 glossy prints 20c. 12 glossy reprints 35c. 1931 Photo calendar from negative 10c. Artistically mounted 8x10 enlargement 40c. Young Photo Service, 495 Bertha St., Albany, N. Y.

SAMPLE Enlargement—dime, and negative (returned). Trial roll, glossy prints, 25c silver. Brown, Warsaw, N. C.

PHOTO-FINISHING At home. Easy and interesting. Complete outfit, instructions, chemicals, \$1.50. Photocraft, 1067 1/2 Wabash, Detroit, Michigan.

MOTION PICTURES AND SOUND EQUIPMENT

JUST Out! Bass will mail postpaid Cine Amateur, Complete Handbook of motion picture photography for the amateur, \$1.00. Voice of the Films, a complete description of the process used in making sound motion pictures just out. Price postpaid, \$1.00. Motion Pictures With Sound by James Cameron, 400 pages crammed with information on all systems. \$5.00 postpaid. Bass Bargaingram No. 202 listing red hot bargains in standard and 16mm. motion picture cameras, projectors and accessories. 4c stamps. Fresh standard film, 3c per foot. Bass Camera Company, Motion Picture Headquarters, 179 West Madison St., Chicago, Illinois.

BACK On job! Let's go. Free cement with every reel. Chicago Film Dealer, 6801 So. Carpenter St., Chicago.

\$1,250 FOR Original photoplay story. Our sales department sold unknown author's first story for above amount. We revise, copyright and submit to studios stories for both silent and talking pictures. Being located in the heart of motion picture industry we know production requirements. Established 1917. Free booklet. Universal Scenario Company, 208 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

WORLD'S Greatest "Passion Play" 16 MM. (new) 5 reels. Rent or purchase. Write Hemenway Film Co., 37 Church Street, Boston, Mass.

TALKIE And movie producers are clamoring for new short story ideas, plots, etc. Perhaps you can write one that we can shape and sell for you. One writer (V. M.) received \$3,000. New York best market. Write for full particulars. Daniel O'Malley Company, Suite P, 1776 Broadway, New York.

FREE. Our latest bargain book listing hundreds of slightly used motion picture cameras and accessories at great savings. Send for your copy now. Central Camera Co., 230 South Wabash Ave., Dept. PM-2E, Chicago, Ill.

1,000 FOOT Reels film \$2.00. Wild animal reels \$3.00. New home projectors \$10.00. Theatre Equipment Co., Box 524, Cincinnati, Ohio.

1,000 FT. 90c. Silents-talkies-equipment, Stamp for list. C. V. Film Co., 76 Laurel St., Ridgefield Park, N. J.

MOVIE Cameras, projectors, film, accessories, professional and amateur. Catalog free. Universal Photographers, 10 W. 33rd St., New York.

500 FEET 90c. Half reels, \$1.35. Postpaid. Lovell Films, Allentown, Pa.

FILMS—16mm. And standard size. List free. Home Movies, Box 741, Minneapolis, Minn.

FILMS For toy machines, complete features. 45c. Established 1919. Alton Films, Box 810, Kansas City, Missouri.

ODD Reels \$1.75 plus postage. Hoffman Film Service, 57 Broad, Albany, N. Y.

100 SCENES, \$1.00 (35mm). Lists. Hollywood Still-Film Studio, Box 1410, Hollywood.

WESTERNS \$1.75. Half reel \$1.00. Jersey Film Co., Box 62, E. Rutherford, N. J.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

BIG List standard (and 16mm) film bargains and souvenir strips sound cartoons all for dime. Eastin Feature Films, Galesburg, Illinois.

MOVIE Supplies—reels \$1.00 each. Order direct. No-Wat-Ka, Southampton, Mass.

BE A Movie exhibitor—big opportunity—Only moderate capital required—Complete equipment at remarkably low prices. Write, Atlas Moving Picture Company, Dept. 7, 825 South Wabash Ave., Chicago, Ill.

FILMS, 200 Ft. \$1.00, reels \$1.95. List, Edgeworth Sales, Box 155, Blue Island, Ill.

EARN Big money. Operate your own movie theatre. Small capital needed. Complete equipment at low prices. Catalog free. Monarch Theatre Supply Co., Box 2042 Memphis, Tenn.

TRADE AND TECHNICAL SCHOOLS

LEARN Watchmaking at home course \$25. U. S. School of Watchmaking, 1107 N. Mayfield, Chicago, Ill.

LEARN "High-test" pipeline welding, \$77 weekly. Write quick. National Welding School, 719 Fairfax Airport, Kansas City, Kansas.

LEARN Watch repairing. Miles School, 5339 Mission St., San Francisco.

BE A blue print reader. Men in your trade have succeeded. Write for facts. What's your trade? Carroll Rumsay, Drexel Bldg., Philadelphia.

BEST Books for \$1. All formerly sold for \$2.50 to \$5 each. Select from the following list of guaranteed bargains. All brand new books: Woodcraft by Seton, Book of Letter Writing by Crowther, Etiquette by Eichler, Creative Chemistry by Stosson, Revolt in the Desert by Lawrence, Trader Horn, White Shadows in South Seas by O'Brien, Count Luckner (The Sea Devil) and Outline of History by Wells. Delivered at your door C. O. D. Simply pay postman \$1 each and postage. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

TELEGRAPHY

LEARN Wireless (Radio) and Morse telegraphy. School, oldest and largest; endorsed by telegraph, radio, railway and government officials. Expenses low—can earn part. Catalog free. Dodge's Institute, H Street, Valparaiso, Ind.

BUSINESS OPPORTUNITIES

AN Unusual business opportunity: men with good assets and \$1,000 or more capital, wanted to enter exceedingly profitable business. This is an investment, not a selling proposition. Unlimited opportunity for expansion and tremendous profits. Business consists in operating legitimate money-making equipment in high grade business places on percentage basis. Every good merchant wants this equipment; you handle your own money, all cash trade; practically no overhead; no bad accounts; income starts immediately. Great opportunity to establish business of your own. We are manufacturers with 41 years of established success, rated AAA-1. Call or write for full information. Mills Novelty Company, 4100 Fullerton Ave., Chicago, Ill.

BIG Profits—operate Miniature Basket Ball courts during your spare time. We furnish locations anywhere in the United States. Merchants want them. \$250.00 investment will make twenty-five dollars monthly; five hundred, fifty dollars; one thousand invested in Miniature Basket Ball courts pays one hundred monthly. Described fully page 987 December Popular Mechanics. Write Filmoscope Manufacturing Co., Pure Oil Bldg., Chicago, Ill.

DON'T Slave all your life. We will start you in business. Thousands are making their living ahead by doing knitting at home. Others get large flat machines adapted to make all kinds of knitted goods, such as stockings, from an infant's size to the largest lady's or man's, children's knitted suits, sweaters, scarfs, vests, caps, gloves, etc. Write for catalog. Ainslie Knitting Machine Co., Inc., 738-750 Grand Street, Brooklyn, N. Y.

SUCCEED With your own products. Make them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

LEARN Marbleizing—Concrete products all kind. Garden furniture statuary, novelties, lumber, metals, everything. Veined or solid colors. Resembles polished marble-wallboard. This finish can be cut, nailed, tiled, nixed. Flintlike hardness. Our composition floors are splendid. Also our mold making is practical. Dime brings samples. Cowell Institute, Grayling, Mich.

START Your own business. Buying discarded old gold, silver and platinum jewelry. Most secret and profitable in the world. Particulars free. F. Polcer, Box 81, Cicero, Ill.

FARMERS! Roadside signs sell produce. Send three dimes for sample. Signcraft Studio, Versailles, Ohio.

PROFITABLE Proposition. Particulars red stamp. Specialty Bureau, Box 259, Buffalo, N. Y.

ESTABLISHING A permanent sure profit "Fur-Craft Service" business in your own home. Men or women. Unlimited demand. Earnings start immediately. No investment, no soliciting. Need more money? Fur-Craft will bring it quickly. Investigate. Free book. Northwestern Fur Co., Box 5, Omaha, Nebr.

ONLY 10c Brings copy system Way to Mail Order Success. Leads to system and concentration of action. Save time, money and disappointment. Al. B. Werihof, 1520 Vine St., Philadelphia, Pa.

\$100.00 TO \$500.00 Profit spare time in back lot. Copyrighted booklet shows how. P. Hejke, Pontiac, Ill.

BOOKS Full of money-making ideas. Literature free. P. Dominik, 69 W. 48th St., New York.

ANY Handy man can start furniture refinishing, painting, handman shop on nearly nothing; mostly all profit. John Braceland, 1439 So. Ninth, Philadelphia, Pa.

CHARTERS: Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

LEARN The collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

BIG Steady profits operating chain of peanut, chewing gum, candy vending machines. Start small capital. Robbins Corp., Dedworth Street, Brooklyn, New York.

MIRRORS Restored at home cost near 5 cents per square foot; you charge 75 cents. Profitable business plating like new, brass worn-off auto parts, reflectors, tableware, stoves, etc. Outfits furnished. Details free. Sprinkle, Plater, 127, Marion, Indiana.

ILLUMINATED Signs—Patented process. Easily made. Particulars free. Merritttype Signs, So. Berkeley, California.

GOOD Returns from small investment in tropical Avocado, (perfect food). Pear Orchard Company, Texas Rio Grande Valley, P. O. Box 60, Mont Belvieu, Texas.

WE Start you in business, furnishing everything. Men and women, earn \$40 to \$100 weekly operating our original "New System Specialty Candy Factories." Begin home spare time. Unlimited opportunity. Valuable booklet free. W. Hillyer Ragsdale, Drawer 4, East Orange, N. J.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950 W. Broad, Richmond, Va.

CHARTERS: Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

\$150.00 MONTHLY Spare time home doughnuts. \$15.00 pays first 150 dozen and new patent equipment. Bunkell Products Co., 329 Tribune Annex, Minneapolis, Minn.

MANUFACTURE And sell clever novelties, toys, preparations, foods, beverages, molded goods. Easy, profitable sellers. Free list of plans, patterns, processes. Manufacturer's 3937B Tracer, Kansas City, Mo.

\$10,000 TO \$100,000 Corporation organized under Indiana corporation laws do business anywhere. Cost \$36.50. Incorporation Service Co., Box 124, Indianapolis, Ind.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

PARTNER. Small investment. Arden, Box 83, Detroit, Mich.

85 BUSINESS Plans. 425 Manufacturing formulas, all lines. \$1.00. Circular, Hayes, 60 East 18th, Chicago.

SELL By mail! Start your own small business anywhere. Free folder tells how. No personal selling. Everything furnished. B. Horton, 2048 Jefferson, St. Paul, Minn.

BIG Bunch mail. Year 15c. Money making opportunities. Pennell Standard, Covington, Kentucky.

I MADE \$30 A week home. French breadmaking. 15 years' experience; free booklet tells. Ashbrook 67, Marengo, Ohio.

TELOFLASH Spark plug. New invention. Reflects firing inside of engine. Saves gas. Increases speed. Agents wanted. Yale Mfg. Co., P-777 Phila. Pa.

ARTIFICIAL Marble sanitary flooring, instructions covering wood or cement flooring 1/2 inch thick, fireproof, all colors, low cost. Ornamental casting, concrete plaster papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mishler, Elmont, N. Y.

736 SECRETS Of odds and ends. Valuable information, interesting. Send one dollar. P. O. money order to Jos. Latkowski, Box 619 P.M., Providence, R. I.

SMALL Capital, large profits. Exceptional opportunity. Bryant, Box 583, Augusta, Ga.

\$100.00 WEEKLY in "fixit" service. Complete 43 lesson instruction course \$1.00. Houlgate's "Fixit" Service, 1305 N. El Molino, Pasadena, California.

SCHEMER. Alliance, Ohio, \$25 monthly, prints big \$-getters. Subscriber reports \$50,000 from one tip; another \$25,000 from three schemes; another \$10,000 from one formula. Get wise! Year, only \$1.00; 3 months, 25c.

SCIENTIFIC Cooking mushrooms, even poisonous—Vat coating resists strongest acids. Permanent brass polishing. 50 cents; 25c each. Box 644, Los Angeles.

BIG Money at home plating auto parts, reflectors, mirrors, chandeliers; by new method; experience unnecessary. Outfits furnished. Gunmetal Co., Ave. N. Decatur, Ill.

OPERATE Chain of vending and amusement machines. Be independent for life. Start small, grow big. P. Goodbody, 72 VanBerg, Rochester, N. Y.

AMATEUR Cartoonists—Earn \$25.00 week, spare time, copying cartoons for advertisers. 2-Em Syndicate, Argyle, Wis.

250,000 ARTICLES Wholesale—directory 10c. W. Patterson Co., 4111 University, Des Moines, Iowa.

50 SUCCESSFUL Mailorder propositions; details red stamp. K. Home, 3949 Metropolitan, Chicago.

THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

CLEARED \$4,000 two months, Gordon. Tested food-confection business. Men or women. Legitimate—pleasing. Experience unnecessary. Equipment furnished. Eakins, 2160 High St., Springfield, Ohio.

CHEMICAL Expert furnishes manufacturing formulas and processes with complete working directions. Reliable individual service only. No lists. Charges reasonable. Correspondence invited. Dr. Arthur Van-Heeden, 7051 Bennett, Chicago.

SIGNS And showcards easily patented. If you use Letter Patterns. Write for free samples. John Rahn, B2120 New Ave., Chicago.

AMATEUR Cartoonists: Sell your work. Write Smith's Service, PX1194, Wenatchee, Wash.

FREE Booklet describes 67 plans for making \$20-\$100 weekly in home or office business of your own. Elite Co., 84 Elizabeth St., New York.

15,000 PROFIT Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, murrages, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Just write for "Scientific American Encyclopedia of Formulas." When postman hands you book pay \$5.50 and postal charges. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

FREE Book. Start your own little business anywhere, selling novelties by mail. My beginner's outfit contains everything required, novelties, circulars, instructions, etc. Descriptive book free. Hadwell, 33A-74 Cortland St., New York.

SELL By mail. Books, novelties, bargains! Large profits. Particulars free. B. Eiffo, 525 S. Dearborn, Chicago.

A BUSINESS Of your own making—Sparkling Glass Name and Number plates, Checkersboards, signs. Big book and sample free. E. Palmer, 519, Wooster, Ohio.

UNUSUAL—Uncommon specialties always sell best. Make these yourself from Miller's guaranteed formulas. Why work for others when others can be working for you? Latest eye-opening literature brings you many specialty propositions for you an independent business. Miller Chemist, 704-K Chemical Bldg., Tampa, Fla.

DELAWARE Charters; fees small; free forms. Chas. G. Guyer, Wilmington, Del.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 228 Gordon Ave., Syracuse, N. Y.

CHEMISTRY

TWENTY Dollars per day introducing Mul-zol the new, wonderful external remedy. One hundred per cent profit. Pleasant, easy work. Fenway Laboratories, Box 2462, Boston, Mass.

YOUR Chemical problem solved and formula or process furnished for Five dollars. Write me. W. Stedman Richards, Industrial Chemist, Box 2462, Boston, Mass.

CHEMICAL Analysis, processes, technical information. Robert Henderson, Laboratory, Madison, Maine.

"HANDBOOK For Chemical Experimenters." Hundreds of interesting experiments; illustrated, 50c. Booklet of experiments, 15c. Price list, 5c. General Chemical Company, Box 397, Reading, Penna.

CATALOG listing 2,500 illustrations chemists' supplies, 5,000 chemical, 1,000 scientific books sent for 50c. Laboratory Materials Company, 643 E. 71st St., Chicago, Ill.

FORMULAS AND TRADE SECRETS

SUCCEED With your own products. Make them yourself. Formulas, Processes, Trade-Secrets. Expert analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W, Broad, Richmond, Va.

MAKE Big flashy gold-like nuggets that deceive experts: Old-timers baffled. Large profits—Unusual money-maker. Copyrighted directions (guaranteed) \$1.00. W-S Laboratory, 902 Hastings, Caser d'Alene, Idaho.

NEWEST Formulas. Tested, guaranteed. Catalog free. Imperial Laboratories, Edwardsville, Ill.

FREE Formula catalog. Latest money-makers. Western Chemical, Salem, Oregon.

SENSATIONAL Money-making formulas. Latest, best sellers 3/4c each. List free. Specialty Mfg. Service, 801 So. Farragut, Bay City, Mich.

SUPERIOR Formula, complete manufacturing information for automobile batteries, particulars free. "Molab", 4536 Sheridan Rd., Chicago.

SAWDUST Makes marble flooring. Directions \$1.00. Victor Stave, 777 Boulevard, Bayonne, N. J.

FORMULAS, Chemical analysis, catalogue free. Hertzstein, Chemist, 46 Grand Ave., Grand Rapids, Mich.

3,000 VALUABLE Formulas prepaid \$1.00 National Service, 3644 Tamarack, Cincinnati, Ohio.

FORMULAS All kinds. Catalog free. Clover Laboratories (P), Park Ridge, Ill.

FREE Formulas—Free materials making \$32.00 worth of guaranteed highest class specialty-necessities. Thirty-third unequalled anniversary offers explains all. Miller, Chemist, 1707-G Jetton, Tampa, Fla.

500 FORMULAS And big illustrated catalogue 25c. Ideal Book Shop, Park Ridge, Ill.

ANY Formula, 50c. List free. Industrial Institute, Dept. 206, 64 West Randolph, Chicago.

AGENTS WANTED

I START Men in a grocery business a new easy way. You use my money. Don't need to put up a penny of your own cash for stock. Expansion program now opens up many desirable opportunities also established trade. Hustlers make good money from the start increasing rapidly as they learn the business. Not a "chain" proposition but your own business. Buy on credit. Give credit if you wish. If honest and need more money write at once for application and details to McConnon & Company, Room L-6602, Winona, Minn.

NEW Adding machine fits vest pocket! Adds, subtracts like \$300 machine—yet costs only \$2.50. Weighs only 4 ounces. Not a toy—guaranteed for lifetime. Perfectly accurate, lightning fast. Sells on sight to business men, storekeepers, homes—all who use figures. Agents—Write at once for free sample offer and money-making plan. 100% profit. C. Cleary, Dept. 10, 303 W. Monroe, Chicago.

AUTOMATIC Window washing machine. Clever little invention. Cleans, polishes with same motion. Nothing like it. No felt pads or makeshifts. Spreads cleaning fluid. Uncanny rubber suction action picks up dirt. Selling outfit free. Big money. New plan. Write quick. Kristee Mfg. Co., 1432 Bar Street, Akron, Ohio.

AGENTS, Demonstrators, solicitors, sensational invention. Eliminates waste. Saves time, money. Tremendous demand. Simple demonstration quickly sells 3 for \$1.00, worth \$3.00, rest \$1.20 dozen. Also men's silk neckwear \$1.75 dozen and men's silk hosiery 75c dozen pair. Money back guaranteed. Goodrich Mfg. Co., 303 Fourth Ave., New York.

MAKE Good money this winter taking orders for Turn Signals operated by vacuum for closed automobiles. One representative selected for each district. Send nine dollars and shipping address. Sells for fifteen dollars. Ten day trial. Money back guarantee. Don't delay. Write, Filmoscope Manufacturing Company, Pure Oil Bldg., Chicago.

EARN More pay the Quaker way. Take easy orders, men's fine shirts, ties, underwear, hosiery. Remarkable values. Big commissions. Shirts to producers, ties, cash bonuses. We furnish everything, deliver and collect. Complete outfit free. Write, today. Dept. J2, Quaker, 1107 Broadway, New York.

MAKE \$4.00 Cash, every \$18.75 order, besides big monthly bonus. Sell Leroy's fine tailored suits and topcoats, including all wool fabrics. Satisfaction guaranteed. Many re-orders and recommendations. Expensive outfit free. Write, today telling experience, etc. Dept. J80, Leroy, 892 Broadway, New York.

FREE—Picture man Friedman's new cut price 56 page catalog, portraits and frames. Lowest in years. Friedman, 109 West Austin Ave., Chicago.

MIRRORS Resilvered at home. Costs near 5 cents per square foot; you charge 75 cents. Profitable business plating auto parts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details free, write. Sprinkle, Plaster, 128, Marion, Indiana.

MAKE Good weekly income selling cigars direct from factory. Write for proposition. Vetterlein Cigar Co., Pennsburg, Pa.

MEN, Women, something new in floor covering. Take orders from every home. Big profits. Address, Modern Rug Co., Akron, Ohio.

Here's the biggest money-maker in years. Just show samples, collect big cash commissions. Everyone buys Longwear's sensational values, work pants, dress pants, breeches, coveralls. Big selection. Free sales outfit. Write today. Dept. P2, Longwear Trousers Co., 489 Broome St., New York.

BUILD A permanent repeat order business with Roscliff's high grade shirts, ties, underwear, hosiery. Guaranteed one full year. Cash commissions, extra cash bonuses, shirts to producers. We pay postage. Prompt service. Free sales outfit. Write Dept. K2, Roscliff, 1237 Broadway, N. Y.

SELL Changeable signs to stores, size 14x22, cost 30c, sells for \$1.50. Particulars free. National Sign System, St. Louis, Mo.

MAKE \$4.00 Cash, every \$18.75 order, besides big monthly bonus. Sell Leroy's fine tailored suits and topcoats, including all wool fabrics. Satisfaction guaranteed. Many re-orders and recommendations. Expensive outfit free. Write today telling experience, etc. Dept. J-190 Leroy, 892 Broadway, New York.

FREE Trousers offer—\$15.00 daily writing orders for guaranteed tailored-to-fit trousers. Free outfit. Bigger commissions. World's greatest pants value at \$3.95. Dunlap Pants Company, Dept. 197, Cincinnati, Ohio.

FREE Trousers offer—free outfit \$15.00 daily writing orders. Guaranteed greatest tailored-to-fit pants value; bigger commission; wonderful sideline. Dept. 461, Hutchins Pants Co., Cincinnati, Ohio.

SALESMEN, Agents, Distributors wanted. To handle fast selling \$1.00 razor blade sharpener. 200% profit. Introductory kit of three sharpeners \$1.00 prepaid. Amalgamated Corp., 605 Washington Blvd., Chicago.

SIDELINE? Write Ellarbee, Box 35, Beverly, Mass. Samples (novelties) 20c.

AGENTS Buy direct guaranteed hosiery. Make 100% profit—Beat all competition. Men's latest fancy hose—doz. \$1.40-\$1.75. Ladies' silk hose, doz. \$3.50-\$6.00. Genuine full-fashioned hosiery—doz. \$8.50. Catalog free. Superior Knitting Company, Dept. 34, New Haven, Conn.

NEW, Profitable—Sell auto step mats. Quality rubber with owner's name molded white. Details free. Ebonite Products, Dept. G-10, 895 Main, Akron, Ohio.

AGENTS—Up to \$12 daily demonstrating men's, women's, children's finest hosiery. Definite-wear warranted or replaced. Amazingly low prices. 100 styles, colors. Auto and hosiery given producers. Write quick! Wilkitt Hosiery Co., Dept. C-373, Greenfield, Ohio.

500% PROFIT. Sign letters in gold and colors for store windows, offices, trucks, signs. Easily applied by anyone. Permanent business. Exclusive territory. Printa-sign, Akron, Ohio.

MAKE Big money selling food products, prize motor and tractor oils, paints. Sure repeat orders. Write for free sample case. Lovrin & Browne, 1602-J So. State, Chicago.

KITCHEN Necessity: The new "20-in-1" used as a mixer, heater, whipper, egg separator, ladle, strainer, etc. 3 color circulars furnished. Retail \$25c, costs you \$1 a dozen. Sample and sales plan 15c. Numethod Co., Desk PMM-2, Numethod Bldg., Bradford, Pa.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

\$15-\$50 DAILY. Special advertising package quality toiletries \$1.00. Bought separately would cost \$5.00. Big returns. Paris Laboratories, 2629 Olive, St. Louis.

AGENTS—Wonderful opportunity to make \$10 a day with our big new line of soaps. Highest quality. Beautiful packages. Large orders in every home. Steady repeat business. Big profits. Particulars free. Albert Mills, 8969 Monmouth, Cincinnati, O.

UNLIMITED Money-making opportunity supplying over 100 daily-used necessities. Free samples bring steady earnings, repeat profits. Big demand. Liberal commissions. Money-back guarantee. Choice territories open. Get free samples and details immediately. Secretary, Dept. B-69, 2117 Franklin Avenue, St. Louis, Mo.

SUCCEED With your own products. Make them yourself. Formulas, Processes, Trade-Secrets. Expert analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

STRANGE New ironing cord! Prevents scorching. Saves electricity. Cannot kink or snarl. For telephones also. Up to \$25 daily. Samples furnished. Neverknot, Dept. 2-A, 4563 Ravenswood, Chicago.

NEW Invention makes car washing a pleasure! Gy-ro Auto Brush works by water pressure. Tremendous possibilities for aggressive workers. 100% profit. Write today for new money-making selling plans. Gy-ro Brush, Dept. BC-14, Bloomfield, N. J.

AGENTS—Men, earn up to \$12 daily wearing felt hats and selling friends. Smartest styles. Latest shades. \$2 to \$5 saving on every hat. Outfit free. Taylor Hat and Cap Mfrs., Dept. LC-135, Cincinnati, Ohio.

MAKE UP to \$485.50 extra before Easter. Sell finest quality Cino neckwear and silk mufflers. Amazingly low prices. Newest, snappy patterns—rich materials—splendid workmanship. Free Spring samples. Write Cincinnati Neckwear Co., Dept. BC-8, Cincinnati, O.

EARN More pay the Quaker way. Take easy orders, men's fine shirts, ties, underwear, hosiery. Remarkable values. Big commissions. Shirts to producers, ties, cash bonuses. We furnish everything, deliver and collect. Complete outfit free. Write, today, Dept. H2, Quaker, 1107 Broadway, New York.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

TAILORING Firm, leading field has perfected new appeal; clinches 8 of 10 calls—defeats hard times. Stores licked. Suits, topcoats, union made, all \$19.95. Your commission \$5.00. Outfit free. Mastercraft, Dept. G-200, 873 Broadway, New York.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 104 Searle Bldg., Rochester, N. Y.

ELECTRIC Water heater—New. Heats water instantly. Pocket size—retails \$3.75. Two minute demonstration makes you \$1.95 profit. Lux-Vitel, Dept. 113, Elkhart, Ind.

\$2.95 AUTOSEAT Covers taking country by storm. Commission daily. Represent manufacturer. Outfit free. Quality, 1836-AE North Ave., Chicago.

LAS-STIK Half-Sole, outwears three pairs leather soles, comfortable, waterproof, write, sample 60c. Ernest Payette, 10 Reid Ave., Brooklyn, N. Y.

MAKE UP to \$2.00 every hour. Sell every home wonderful preparation; mends hosiery and clothing without sewing. Invisible. Send for free sample of work. Queen City Laboratories, PM-2, Cincinnati, Ohio.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

OLIVER Cleared \$700 in 30 days with our line of books and bibles. Outfit free! Exclusive territory! Nichols Co., Dept. B-43, Naperville, Illinois.

BEAUTIFUL Fountain pen offer. Send stamp. Mickey Roth, 187 Keap Street, Brooklyn, New York.

WONDER Hot pad; Heats itself. No hot water. No electricity. Stays hot 12 hours. Sells fast. Easily demonstrated. Outfit free to producers. Bestever Company, 805 Irving Park Station, Chicago.

FREE Formula catalogue. Heerstein, Chemist, 46 Grand Ave., Grand Rapids, Mich.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

SELL Pine cleaner. Every smoker wants one. Removes nicotine and deposits immediately. Send 15c for sample and particulars. Screw Machine Specialty Co., 1700 Susquehanna Street, Pittsburgh, Pa.

DON'T Choke Me! "Hot-Shot" new electrical wizard. Starts cars without choke. Saves gas, oil. Delivers 11,000 volts. \$1.50 seller. Pays for self immediately. Hustlers goldmine. Beardon Mfg., Peoria, Ill., Dept. FC2.

1,000% profit makes Selsel Floss the most attractive light manufacturing proposition. New, no competition. Particulars free. Waller Goodwin, Owen Sound, Ontario.

MARVELOUS New liquid graphite saves 20% gas, 50% oil, doubles motor life. Cars, trucks, tractors. Sensational demonstration. Money-back guarantee. Permanent, unlimited business. 100% profit. Proff Co., 152 Main, LaCrosse, Wis.

NEW Beautifully hand painted silk screen sign; retail stores; easy sales; 11"x14". Sample 20c; 8c retails 35c. Dept. 30, Lowy, 8 West Broadway, New York City.

\$60-200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

SELL Atlas household products. Outfit furnished free. Atlas, Brookfield, Ill.

BIG Money daily selling shirts, ties, underwear, Sox, pajamas, belts, professional uniforms, raincoats, coveralls, pants, children's playsets. Outfit free. Experience unnecessary. Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

GREATEST Opportunity; newest proposition. Build continuously paying business in your own name. Household, industrial, brushes, brooms, mops, dusters, fully guaranteed. New catalog, all net prices, no discount to bother with. Make as high as 300 per cent and over. Write today. Wire Grip Sanitary Brush Corp., 41 East 11th St., New York.

BIG Money selling Bleodor foot and body powder. Sample free. Bleodor Co., 113 Fremont St., Lowell, Mass.

POLMET Polishing cloth—Removes tarnish from metal without the use of liquid, paste or powder. Agents say it sells like "hot cakes." Retail 25c. Sample free. Gale Co., Inc., 15 Edinboro St., Boston, Mass.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 28.

100% PROFIT in new mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Sample and sales plan 25c. New Method Manufacturing Co., Box PM-2, Bradford, Pa.

ANOTHER Brand new Cruiser sensation. Panel portraits sell on sight. Everyone wants them. Set your own profit. Free sample offer and full particulars. Cruiser Mfg. Co., 2422S Jackson, Chicago.

PORTRAIT Men—Big new catalog guaranteed portraits, frames, medallions, photo pillows, household specialties, toilet preparations, food products. Wonderful proposition. Credit. James Bailey Co., Station C-2 Chicago.

RUN My oil agency. No investment required. I divide profits 50-50 every week. \$50 to \$200 weekly your share. Products nationally known. My partners made \$187,000 last year taking orders direct from farmers, auto owners, etc. All or spare time. Free selling equipment. Write quick. Central Petroleum Co., 645 Century Bldg., Cleveland, Ohio.

300% PROFIT Selling Mystery Gas Lighter. Retail 25c. Costs you \$1.00 doz. Sample free. Square Deal Mfg., Desk PM-16, Bradford, Pa.

\$15 TO \$25 Daily easy distributing utility paint spraying equipment. Real opportunity for right man. The Conoco Mfg. Co., 2630 Mayfield Rd., Cleveland, Ohio.

AGENTS Selling to houses and stores—several new articles. Send for free description. Handy Specialties, Irvington, N. Y.

MAKE Money—Your own business. Valuable formulas. Free information sent. Arthur Terry, 1964 W. I, Brooklyn, N. Y.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-323 Broadway, New York.

AGENTS—New fast seller. Every housewife wants Polishing Cloth. Big profits. Sample free. Whitney Co., 41 Bishop St., New Haven, Conn.

GOLD Sign letters pay 1000%. Instructions. Johnston Co., Quincy, Ill.

AGENTS Earn \$50 month. New method repairing leaky radiators. No labor. Engine does the work. Sell filling stations, garages. Details how to make \$21 a day free. American Accessories Co., R-231, Cincinnati, Ohio.

AGENTS Making money. New can opener, sample 25c. New razor blade sharpener, 50c. Allneeds Mfg. Co., Box B26, Oak Park, Ill.

300% INCREASE Solves business, health, wholesaler's prices, everyday problems. Complete 25c. Art-Craft's, Kossuth Ave., N. Y.

NEW—Different: "No-Tangle" ironing cord. Never kinks—saves electricity. Always out of way. Women amazed. Quick sales. Tremendous profit. "Outfit free to producers." Bestever Products Co., 700 Irving Park Station, Chicago.

MEN Wanted. Tenth successful season now starting. Thousands enjoying big incomes, full time or spare hours, selling fine shirts, ties, underwear, guaranteed full year. Shirts, ties, cash bonuses to producers. Beautiful self-selling outfit free. Write Dept. L2, Roscoff, 1237 Broadway, New York.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

MAKE \$28 Daily demonstrating automatic gaslighters, sample 25c. Gross \$8; doz. \$1. Rapid Mfg. 2772 Pitkin Ave., Brooklyn, N. Y.

SELL Men's neckwear—wonderful proposition. Astor-M. 29 East 28th, N. Y.

MAGIC Gas equals gas 3c gallon. Harmless, guaranteed product. Used by largest bus companies. Circulars, labels, letterheads with agent's name furnished. Particulars and proof free. P. A. Lefebvre & Co., Ltd., 31 Magic Gas Bldg., Alexandria, Ont.

SELL 3A Garage door holders, simple, automatic, quickly installed. Interests garage owners, builders, everybody. Exclusive territory proposition. Knowlson-Stevenson Co., Ann Arbor, Mich.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address. 25c. Stamping outfits, Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

GET Our free sample case. Toilet articles, flavorings and specialties. Wonderfully profitable. LaDerma Co., Dept. 80, St. Louis, Mo.

250,000 ARTICLES Wholesale. Directory 16c. W. Patterson, 4111 University, Des Moines, Iowa.

FLAVORING Extracts—bottle yourself. Concentrated. Labels furnished. 600% profits. Whirlwind money-makers. Steady repeaters. Free offer. Thomas Manufacturing Company, Indianapolis, Indiana.

BIGGEST Surprise offer ever made. Be sure to answer this ad. My line of soaps, coffee, tea, spices, toilet articles, household specialties, pays you bigger profits. M. G. Roth, President, 2708 Dodder, St. Louis, Mo.

AGENTS—Can openers, new improved hand, wall, table models. Safety Products Co., 315 American Bank, Kansas City, Mo.

NEW Automatic clothes washer. Washes quickly and thoroughly. No rubbing. No electricity. Retail \$9.75. Guaranteed. Write Storm Royalty Co., 3601 Enright, St. Louis, Mo.

THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

SELL. Housewives something they want. They are bound to be interested. A signed guarantee to reduce gas bills 25%. No competition. 400% profit. Station C, Box 25E, San Diego, Calif.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69-T West VanBuren, Chicago.

MANUFACTURER Wants distributor for new "Pocket Radio," only \$3.85. "Sells itself with music." Pays 100% profit. Spencer Radio, Akron, Ohio.

SELL. At once! 100 Blue Signs. Handy Container. \$3.50. Koshler's, 717 North Fourth, St. Louis, Mo.

AGENTS—Engraved name plates, signs, number plates etc., easily sold with large profits. Brett Bros., Winthrop, Mass.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. \$1.45 profit every \$1.50 job. Free samples. "Raco," X-1043 Washington, Boston, Mass.

AGENTS—New shirt proposition. No capital or experience needed. Commissions in advance. Samples free. Madison Company, 506 Broadway, New York.

OUR Luminous crucifix and new luminous St. Theresa statue shine brilliantly in the dark. Sell on first demonstration. Write for prices. W. G. Hannan Co., 2543 So. State, Chicago.

NO Dull times selling food! People must eat. Federal distributors make big money; up to \$3,000 yearly or more. No capital or experience needed; unsold goods may be returned. We furnish free sample case, license and free samples for customers—sure repeat orders. Exclusive territory. Ask now. Federal Pure Food Co., A2307 Archer, Chicago.

AGENTS—Mosco corn and calous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 504 Searle Bldg., Rochester, N. Y.

NEW Line Counter Displays, Aspirin, Flints, Chewing Laxative, Breath Gum, No-tartar, Silkone, etc. Steady Repeats. Over 100% Profit. Superba Co., W5, Baltimore, Md.

CHICAGO Expert valued \$5 stone at \$900. The diamond's only guaranteed rival. Great spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. Mexlan Gem Company, Dept. PM, Monterey, Calif.

FREE "Booklet of money making opportunities," new ideas, original plans, money making secrets and other valuable information. None require peddling or outfits. Elite Co., 81 Elizabeth St., New York.

SELL Stores 5c carded breathlets, etc. Lorac Products, Albany, N. Y.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

CALIFORNIA Perfumed beads selling like hot cakes. Agents coinng money. Big profits. Catalog free. Mission Factory P, 2228 W. Pico, Los Angeles, Calif.

A BUSINESS of your own—Making sparkling glass name and number plates, checkerboard signs. Big book and sample free. E. Palmer, 512, Worcester, Ohio.

WANTED: District manager to appoint agents. Unlimited opportunity. No canvassing. Mother Hubbard Products, 554U Congress, Chicago.

THIS advertisement may make you thousands of dollars. If you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes, money-making information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. Dr. Liscombe Miller, Chemist, Tampa, Fla.

PHOTO Medallion men and women. The largest line of photo novelties in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. Gibson Photo Jewelry Co., Inc., 833-837 Gravesend Ave., Brooklyn, N. Y.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 641, St. Louis, Mo.

AGENTS—Make a dollar an hour. Sell Mendels, a patented patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

HIGH-GRADE SALESMEN WANTED

NEW "Endless Chain" selling plan guarantees you amazing profits and many repeat sales with America's greatest printing line. 40%-55% profit on every order. 101-page catalog shows 1001 printing necessities for every business. Also line of personal stationery, pictorial parcel post and shipping stickers, collection sticker system, advertising tags, drugist labels, etc. All statements, letterheads, billheads, envelopes, etc., now furnished in white and 5 beautiful colors—a tremendous selling advantage. Thousands of free cuts. Lowest prices. Highest quality work. Main or sideline. Experience unnecessary. This is biggest profit-maker of the year. Write quick for big new 1931 outfit. Kneser-Blair, Inc., Dept. 265, Cincinnati, Ohio.

FREE Trousers offer—\$15.00 daily writing orders for guaranteed tailored-to-fit trousers. Free outfit. Bigger commissions. World's greatest pants value at \$3.95. Dimple Pants Co., Dept. 182, Cincinnati, Ohio.

STOP Working for small pay—own and operate a Raleigh Home Service business; good anywhere, anytime the year around; you supply 200 home necessities; guarantee satisfaction or no sale; over 42 million sold 1929; thousands doing \$4,000 to \$6,000 annual business in medicines, food, soaps, toilet preparations, stock-poultry supplies, all backed by \$17,000,000 industry; established 40 years; largest of its kind with 15 great factories and branches; selling experience unnecessary; practically no capital; credit if deserving; first send for full particulars—then decide. Raleigh Co., Dept. R-N-PPM, Freeport, Ill.

SALESMEN—Become independent. Own your business; experience unnecessary, selling our \$10,000 accidental death; \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited insurance department. Universal Policy, Dept. A, 716 Lefcourt Bldg., Newark, N. J.

\$18 TO \$25 Daily; biggest selling line of men's suits, \$11.95, \$14.50, \$16.95, \$19.95. Amazing values. Pure virgin wool overcoats, \$18.95. Also raincoats, slinkers, topcoats and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State age and selling experience. "Jim" Foster, Inc., Dept. 22, 2250 South Spaulding Ave., Chicago.

YOU Can sell nearly every cigar store an order for Tapered Duplex pipe cleaners. First improvement in 25 years! Real money for real salesmen. Write giving references. E. T. Gilbert Mfg. Co., 228 South Avenue, Rochester, N. Y.

SALESMANAGERS With house to house salesmen or those capable of organizing. All territories. International Sales, Inc., 185 N. Wabash, Chicago.

AUTO Accessory salesman. Profitable repeat business; exclusive territory; full or part time; new super tire patch; 5000 mile guarantee; 200% to dealers; 60% cash commission to salesmen. Mason-Ryckoff Rubber Co., 227 West 19th St., Chicago.

SALESMEN—At last! New feature sells punchboards everywhere—Dealers will with joy—prosperity bark again—profits enormous. Samples free. Puritan Co., 1407 Jackson Blvd., Chicago.

\$8.00 DAILY On two \$3.75 orders. Free kit. Sample watch to producers. New deal guarantees merchants results. Sales Stimulators, Dept. 7H, 341 Madison, Chicago.

NEW And plenty different—Fast selling 5c-10c merchandise on attractive counter cards. 100% commission for you and dealers. Advertised by radio. No capital required. Catalog free. World's Products (Estab. 1921), 124 Central, Spencer, Ind.

SELL Books, printing and magazines by mail. Prufft Publishers, Brookfield, Ill.

ALL Merchants buy! 5c carded nuts, aspirin, etc. Steady repeats. Also low priced vending machines. Robbin Products, 21 Dabourth St., Brooklyn, New York.

GRAPE Concentrate from California, all flavors, Port, Sherry, Burgundy, etc. 100% profit for salesmen, crew-organizers, distributors. Every home, hospital, church, club, etc., a prospect. Legality established. Government financing industry. Write: Vino Sano Co., Dept. 8-156, 393 9th St., San Francisco, Calif.

SALESMEN—Wonderful sideline. 40% commission paid daily. Sells all merchants. Pocket outfit free. David Lionel Press, 312 S. Hamilton, Dept. 193, Chicago.

BUSINESS Stationery—Largest line—Highest quality. Quickest delivery, biggest commissions, liberal bonuses, free copyrighted cuts, every business. Experience unnecessary. Instructions and outfit free. Wilens Co., Dept. 345, 2130 Gladys Ave., Chicago.

SALESMEN: Our men earning \$15-\$40 daily selling to stores. Sayers Systems, Est. 1895, 2813 Sheffield, Chicago.

YOU Make 300% profit selling changeable signs to stores for \$1.50 each. Particulars free, National Sign System, St. Louis, Mo.

VIRGIN Field! Super-quiet radio-motor generators. Play A.C. radios on farm lighting systems any voltage. Write for Bulletin 101-C, Rapco, 1447 East Anabeln, Wilmington, California.

PAY Day every day. Big printing line. Low prices, 40% commission. Blackhawk, 521 North Halsted, Chicago.

SELLING Like blazes. Beautiful toilet goods assortment at \$1.75 with 24 inch pearl necklace free to your customers. 100% profit. Davis Products Co., 228 North Ave., Dept. 930, Chicago.

ARE You old at forty? See our advertisement on page 69 of this issue. The Electro Thermal Co., 2138 Morris Ave., Steubenville, Ohio.

SALES Distributor. New fast selling ice massage (Pakkold). Wanted by every woman. Great gift item. Big profits for quick action. Le Barque Co., 1541 E. 67th Place, Chicago, Ill.

SALESMEN Handle Kolar-Neat, New, patented. Holds soft collars in place. 10c seller, all stores will buy. Big commission. M. M. Bear, 4625 N. Racine Ave., Dept. 531, Chicago, Ill.

FREE Trousers offer—Free outfit \$15.00 daily writing orders. Guaranteed greatest tailored-to-fit pants value; bigger commissions; wonderful sideline. Dept. 460, Hutchins Pants Co., Cincinnati, Ohio.

WONDERFUL Invention. Seals fifty envelopes minute. Sells on sight at \$2.25. Attractive trial offer. Square deal. Bank references. Kendall Sealer Co., Dept. C-27, East Jaffrey, N. H.

SALESBOARD Men; Whirlwind seller! \$15.00 profit every call. Repeat commissions. Best season. Hurry! Puritan Mfg. Co., 2637-F Charleston, Chicago.

STARTLING New punchboard plan! We furnish everything! No investment for you or your customer! Nothing to sell or carry! 50% profit! Unsaleable merchandise returnable! Full commissions on repeats. Write quick. AJ Novelty Co., 161 W. Washington, Chicago.

POOL Shooters, new fascinating vending machine. Merchants everywhere buy! Splendid sideline. Big profit maker! Free pocket outfit. Specialty Mfg. Co., W-617 W. Division, Chicago.

SELL Nothing! \$170 weekly empty handed. \$500,000 punchboard firm announces new plan. No investment for anyone. Season starting. Hurry! K&S Sales, 4316 Racewood, Chicago.

\$15. A DAY easily earned taking orders for our high-grade, made-to-measure all-wool suits. New low prices—\$21.50 and up. Biggest commissions paid daily. Ford car offer to hustlers. Steady repeat business. Large cloth samples furnished free. Write Spencer-Mead Company, Harrison and Throop, Dept. B817, Chicago.

BAD Debt service salesmen, sell service contracts. New original plan; liberal commission, extra bonus. Protected territory. National Credit Service, Columbian Bldg., Washington, D. C.

BIG Pay every day. Bonus every week. Adelle sells everywhere. New spectacular electric window display. Ever-changing colors, original posters, patented changeable letters defy imitation or competition. Special models for merchants, banks, etc. Instant seller. Big repeats, full commission. Write for thirty day demonstration offer. Display Products Co., 409A East 31st, Kansas City, Mo.

\$60-\$200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

SALESMEN—Easy selling Die-U-Rat thru jobbers. 20% commission. Kills nothing but rats and mice. Rick Drug Co., Gallon, Ohio.

SELL Goodyear raincoats, \$2.95 up. Good-year Rainwear, 482 Sixth Avenue, New York.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69-V West Van Buren, Chicago.

WANTED District managers. Oldest organization of its kind in accident and health insurance. Write today for information. Dept. 18, Inter-State Business Men's Accident Ass'n, Des Moines, Iowa.

SALESMEN Sell tires and auto accessories to garages, tire stores, filling stations, etc. Established line repeats everywhere. Liberal commission. Write for particulars. Economy Rubber Prod. Co., 606 Burkhardt, Dayton, Ohio.

SIDELINE SALESMEN WANTED

SIDE-LINE Or one line house to house salesmen who can stand prosperity and work hard. All territory. International Sales, Inc., 185 N. Wabash, Chicago.

40-55% PROFITS Business stationery. 1001 styles. Lowest prices. New "endless chain" plan builds permanent business. Ideal slide line. Experience unnecessary. Kaiser-Blair, Dept. 271, Cincinnati, Ohio.

HELP WANTED

SELL New unbreakable electric plugs. Pocket sample. Paramount Corporation, Northfield, N. J.

IF You want to get your groceries and household supplies at wholesale, and a wonderful chance to make \$15 cash profit a day besides, send me your name immediately. No experience necessary. Albert Mills, 8970 Monmouth, Cincinnati, O.

CASH Paid for butterflies, insects. See Sinclair Display advertisement on page 28.

EDUCATIONAL AND INSTRUCTION

MEN-Women, 18 up. Want a government job? \$165.00 to \$280.00 month. Steady work, short hours. Paid summer vacation. Common education sufficient. Experience usually unnecessary. We coach you without leaving home. 32-page book with full particulars and sample coaching free. Write immediately. Today. Franklin Institute, Dept. W3, Rochester, N. Y.

AMATEUR Cartoonists—Here is your chance to bring your work before the public and get paid for it, using your spare time. No canvassing. You do your drawing at home and deliver it by mail. Complete details free. Sinclair Studios, 12000 Kinsman Ave., Cleveland, Ohio.

GREGG Shorthand—Easily learned! Guaranteed; personal instruction; only 25c week; complete. Trial lesson 10c. National School, Hicksville, N. Y., Dept. B.

WANTED Immediately, men-women, 18-50, qualify for permanent government positions, \$105-250 month; no government experience required. Paid vacations. Common education. Many needed soon. Write Osmont Inst., 101, St. Louis, Mo.

FIREMEN, Brakemen, baggagemen; colored train or sleeping car porters, \$150-\$250 monthly. Experience not necessary. 810 Railway Instruction Bureau, East St. Louis, Ill.

THE Perfect singing voice by mail. Radio and morletone. Our simplified course brings amazing results. Satisfaction guaranteed. Perfect Voice Academy, 195 Yonge Street, Toronto, Canada.

BLUE Print reading simplified, for beginners in building work. Includes blue prints of residence all fully explained. \$1.85. Address Haynes, 5358 Ohmer Ave., Indianapolis, Indiana.

LEARN At home to make crowns, plates, bridgework, etc., for dentists. Uncrowded field. Big pay. Tools and materials included with course. Write McCarrie School, 1342 S. Michigan Ave., Chicago, Ill.

REAL Jobs open—Auto mechanics earn \$40 to \$100 per week. Learn in a few weeks. Write for big free book and tuition rates. McSweeney's, Dept. A-10, Cleveland, Ohio.

LEARN Rapid figuring from "Higher Arithmetic." Correspondence school now organized. Write for particulars. Frederick A. Smith, 608 South Dearborn St., Chicago.

DON'T Prepare for any civil service examination without seeing our catalog. Free. Columbia Correspondence College, Washington, D. C.

BECOME A landscape architect. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 29A Plymouth Bldg., Des Moines, Iowa.

THE Ace of Cartoon Courses for only \$2.98. Particulars free. Carl Anderson School, Madison, Wis.

PHOTOPLAY Talking picture and magazine stories wanted for revision, development and copyright. Sell on commission. Established 1917. Booklet free. Universal Scenario Company, 466 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

REAL Jobs open—Electricians earn \$30 to \$100 per week. Learn in a few weeks. Write for big free book and tuition rates. McSweeney's, Dept. E-10, Cleveland, Ohio.

DOUBLE Entry bookkeeping 60 hours with 8 keys guaranteed. (Diplomas.) International Bookkeeping Inst., 8 Springfield, Mo.

U. S. GOVERNMENT Wants men. \$1,700-\$1,900 and up at start. Railway mail clerk examination coming. Let our expert (former government examiner) prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

SHORT STORIES

SHORT Stories revised, typewritten and marketed. Details free. Hursh Service, Box P-1013, Harrisburg, Penna.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS—All makes, guaranteed, \$6 to \$31. Catalog free. Typewriter Exchange, Ada, Okla.

TYPEWRITERS—All standard makes \$10 up. Catalog free. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

"NEARGRAVUREMBOBO" Process embossed stationery, announcements, cards. Samples. Solidays, Knox, Indiana.

MIMEOGRAPHING: 1,000 8 1/2 x 11 \$2.75. Samples free. Tedjo Signs & Adv. Service, 3210 Meramec, St. Louis, Mo.

24-HOUR Service! Letterheads, envelopes, billheads, \$3.50 thousand, postpaid. Hammermill bond. Beacon Press, 1832 Monaco Place, Pittsburgh, Pa.

1,000 ATTRACTIVE Colored envelope slips, \$2.00; 5,000, \$5.00; 5,000 tinted enamel folders, \$13.75. Samples. Goodprint, Harrisonburg, Va.

CIRCULARS, \$2.50 1,000; Letterheads, \$3.25; Envelopes, \$2.95; postpaid. Amazing selection free cuts. Battlefield Press, Gettysburg, Penna.

300 LETTERHEADS, 100 Envelopes, prepaid \$1.00. Abbott Printery, Oswego, Kans.

500 WHITEBOND Letterheads and envelopes, \$1.00. Webster's Press, Farmland, Indiana.

MIMEOGRAPHING: 250 Letters \$1.50, postpaid. ZiesseCo, 1905 Vagedes, Fresno, California.

LETTERHEADS, Envelopes, 500, \$1.10 1,000, \$2.00; 5,000, \$8.00, plus postage. Samples. Coyle & Kimball, Newport, N. Y.

QUALITY Printing! Reasonable prices! Send for free standardized samples and prices. Folders, Circulars. Catalogs our specialty. Earnest Fantus, 325 South Dearborn, Chicago.

250 BOND Letterheads, envelopes, billheads, cards, \$1.35 each. Economic Press, Leonia, N. J.

200 LETTERHEADS And 100 envelopes, \$1.00; 200 letterheads, 8 1/2 x 11, 150 envelopes, \$2.00; 250 cards, \$1.00. Hoosier Print Shop, Portland, Ind.

THREE-COLOR Business cards, \$2.95 thousand, postpaid. 326 N. Ervay, Dallas, Texas.

1000 BUSINESS Cards \$2.75 postpaid. Samples. Miller, Printer, Narberth, Pa.

WE Print stationery, booklets, catalogs, circulars. Samples. Commercial Press, Batavia, Ohio.

PRINTING OUTFITS

COMPLETE Printing outfits, presses, type, ink, paper, supplies. Write for free catalog. Kelsey Co., B-11, Meriden, Conn.

PREUSED Printing presses and supplies. Lists 2c stamp. Popular Bargains, Richmond, Pa.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

GUMMED LABELS

PROFITABLE Business producer! Colorful, gummed stickers. Harvey Wolf, 6618P Quimby, Cleveland, Ohio.

1,000 PRINTED: Name, business, address 50c. JBS Company, Box 83, Holyoke, Mass.

DUPLICATORS AND DEVICES

PORTABLE Stencil duplicator. Make your own for \$1. Same quality work as high priced machines. Three thousand copies from each stencil. Results guaranteed. Building instruction \$1. Graphopress, Box 282, St. Paul, Minn.

"EXCELLOGRAPH" Rotary stencil duplicator \$39.00. "Two-Faced" film duplicator \$6.00. Booklet free. Pittsburgh Typewriter Supply, Dept. 601, Pittsburgh, Pa.

STENCIL Duplicator—Anyone can make. Particulars, samples free. Imperial Laboratories, Edwardsville, Ill.

RUBBER STAMPS

3 INCHES Long, 1/4 inch type, 30 cents line. Additional lines 20 cents. Circular on request. Blomquist, New Albany, Ind.

RUBBER Stamps, name, address 35c. Stamp Works, B22M, Auburn, Nebr.

FOR MEN

SIDELINE—Cartoon books, magazines. Samples 10c. Meyer G P O, Box 471, New York.

LOOSE Knitted imported, hand made woolen underwear for outdoor men. H. T. Berg, Ashton, Idaho.

FOR THE HOME

CEDAR Chests only \$11.65—"Red-1-Kut" complete with rich copper trim—you assemble and save half—send for pictures. Kuempel Furniture Company, Guttenburg Iowa.

FOR MECHANICS

BUILD Your own winddriven electric plant. Blueprints and building instructions \$2.00. Particulars 25c. Klingsick's Shop, Optima, Okla.

FIELD GLASSES, TELESCOPES AND MICROSCOPES

IMPORTED Eight mile binoculars, only \$7.50. Literature. M. Taras, 4732 Grieston, Philadelphia.

\$12.50 GOVERNMENT Used Binoculars, powerful with case, cost \$38.00. Send free list binoculars, field glasses, airplane cameras, lenses, musical instruments, and government radio sets and parts. Well's Curiosity Shop, 20 South Second St., Philadelphia, Pa.

RAZORS AND BLADES

GILLETTE Blades honed, stropped, 1c each. Pettef Westergquist, Rockford, Ill.

SHAVE With a keen edge razor every day by dressing your razor strip with Mueller's Keen Cutting Razor Strip Dressing. By mail for 10 cents silver. Mueller, 132-40 Sanford Avenue, Flushing, N. Y.

BOATS AND LAUNCHES

BOATS—Build your own pleasure or work boat using our Ready Cut semi-assembled materials. Commence now and have ready for early spring. Cruisers, runabouts, outboard motor, sail and row. Send 10c for catalog. Brooks Boat Co., Inc., Box YY, Saginaw, Michigan.

16' CANVAS Canoe. Easily made. Blueprint, 30c. Weesho-Uco, 31st Office, Detroit, Mich.

MAKE 12' Rowboat. Blueprint 30c. Weesho-Uco, 31st Office, Detroit, Mich.

DIAMONDS, WATCHES AND JEWELRY

14K WALDEMAR Chain and knife given free with each watch. Hamilton, Waltham, Elgin, Illinois. New cases. Bargain list free. Smith-1, Box 641, Pitman, N. J.

YOUR Name or initials engraved on beautiful pin, 50c. Cozry, 810 Broadway, New York.

PRECIOUS STONES

GEM Stones—pink, green, colorless, Tourmaline crystals, uncut \$1.00. Fascinating book for recognizing crude stones \$1.00. E. A. Rablman, Santa Ana, Calif.

ANTIQUES, WAR RELICS AND INDIAN GOODS

ARROWHEADS! 6 For \$1.00. Satisfaction guaranteed. Meyer, Box 94, Newnan Georgia.

10,000 PREHISTORIC. Stone relics: arrows, discoidal, tomahawks, pipes, spears, etc. Circular free. Helke, Pontiac, Ill.

SEND 5c For fine new list Indian relics, antique firearms. F. E. Ellis, Webster Groves, Missouri.

INDIAN Relics, Coins, Curios, Beadwork. Catalogue free. Vernon Lemley, Osborne, Kansas.

MUSIC AND MUSICAL INSTRUMENTS

SUBMIT Modern song poems. Valuable marketing assistance. Clifford Studios, 4562 Hollywood Blvd., Hollywood, Calif.

SONG Writers! Write for most legitimate offer. Eddie Boyden, Indianapolis.

"BANJOS" Should interest all musicians on account of the popularity of the banjo, as it easily increases a player's income. Illustration of 48 pages free. The Bacon Music Co., Inc., Groton, Conn., U. S. A.

SUCCESSFUL Songs earn fortunes. Submit yours. Robert L. Brennan, 1658 B'way, N. Y.

SONGWRITERS Free criticism. Edward Madden, 113 Michaels, Syracuse, N. Y.

COMPOSERS—Verse or music. Brilliant opportunity. Write VanBuren, 2269 McClurg Bldg., Chicago.

SONGWRITERS—Arranging, composing, copyrights. Information? Gladly. Tucker, 339 Wadsworth, New York.

SONGWRITERS Investigate, write French Farmer, NX9, Box 132, Cloverdale, Ind.

PLAY Piano by Ear. A sound system. Booklet free. Baucher's Harmony Studio, Ottawa, Can.

SONGWRITERS! Advance royalty payments, new talking picture song requirements, etc., fully explained in our free instructive booklet. Newcomer Associates, 1647-DB Broadway, New York.

DUO-Flex reeds for clarinets and saxophones eliminate your reed troubles. Write for circular, Duo-Flex Reeds, 1204 1st Ave., Evansville, Ind.

POEMS Wanted. Work guaranteed. We publish. Great Eastern Song Bureau, Dept. 27, Thomaston, Me.

SONG Writers. Send for our "Publishing Agreement." McKinley Music Printers, 1501 E. 55th St., Chicago.

WRITE Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 201 N. Hoyne Ave., Chicago.

"MUSIC Composed" to words. Bauer Bros. (formerly of Sousa's Band), Oshkosh, Wis.

CORNETISTS—Trombonists—Saxophonists—Clarinetists. Get "Free Printers." Name instrument. Virtuoso School, Buffalo, N. Y.

SEND Song poems, 50-50 plan. Indiana Song Bureau, (Brookside), Salem, Ind.

PATENT ATTORNEYS

PATENTS Obtained at low cost. Free booklet. See page 126. Write today. Harry W. Johnson, McGill Bldg., Washington, D. C.

CANADIAN Patent solicitors and consultants. Moderate fees. Glen & Glen, Ottawa, Canada.

PATENT Attorney. Moderate fees. G. C. Worthington, 1519 Thoenapple, Akron, Ohio.

REGISTERED Patent attorney-engineer. Expert in chemical and mechanical patent matters. Former patent examiner. Correspondence invited. A. Penack, 401 Homer Bldg., Washington, D. C.

PATENTS—Write for our free book, "How to Obtain a Patent" and Record of Invention Blank. Send model or sketch of invention for inspection and instructions free. Terms reasonable. See advertisement on pages 124 and 125. Victor J. Evans & Co., 934 Ninth, Washington, D. C.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

PATENTS Procured. Prompt, careful efficient service. Highest references. Moderate fees. Send sketch or model for actual search and advice. George P. Kimmel, Master of Patent Law, 54-B, Legal Bldg., Washington, D. C.

LACEY'S Patent Sense. Valuable book free. See ad page 126.

INVENTORS: Send for booklet telling how to patent and sell your inventions at lowest cost. Ralph Burch, Patent Lawyer, 909 F St., Washington, D. C.

PATENTS. Send sketch or model for advice. Free book, "How to Obtain a Patent." Established thirty years. Highest references. Prompt service. Reasonable charges. Chandless & Chandless, 908 F Street, Washington, D. C.

INVENTIONS Patented and Exploited: Former patent office examiner; Master patent law. Benj. Webster, Esq., No. 15 East 26 Street, New York.

INVENTORS—Write for our Guide Book, "How to Get Your Patent," and Evidence of Invention Blank. Send model or sketch of your invention for our prompt examination and instructions free. Randolph & Co., Dept. 439, Washington, D. C.

LANCASTER, Allowine & Rommel, 231 Ouray Bldg., Washington, D. C. "Originators of the Form Evidence of Conception." Before disclosing your invention to anyone send for blank form to be signed and witnessed. Form and patent information bulletin free.

"INVENTOR'S Guide," valuable information, free. Frank Ledermann, Registered Attorney-Engineer, 1712 Woolworth Bldg., New York.

PATENTS Procured: trade marks registered—preliminary advice furnished without charge. Booklet and form for disclosing idea free. Irving L. McCathran, 704 International Bldg., Washington, D. C.

PATENTS. Booklet free. Highest references. Best results. Promptness assured. Watson E. Coleman, Patent Lawyer, 724 Ninth St., Washington, D. C.

PERRY S. WEBSTER, 203 Sating and Loan Bldg., Stockton, Calif. Patent booklet free.

ESTABLISHED 1864. Milo B. Stevens Company. Free booklet. Patents. Trade marks. Copyrights. Offices. Monadnock Block, Chicago; Barrister Bldg., Washington, D. C.

FOR INVENTORS

WANTED Patented products—Established manufacturer desires to purchase patents or patentable ideas and all rights in new metal products of genuine merit which can be merchandised through hardware, mill, mine, electrical or oil field supply houses. Products that can be made with punch press equipment preferred. Room 31, % Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

SALES Articles and Ideas—Patented or unpatented. The International Sales Co. with more than 2,000 salesmen and the largest exclusive mail order coverage wants to hear about your profitable specialties. You may write freely for we have a reputation of 18 years fair dealing and successful selling. Address, Sales Manager, Suite 1001, 185 N. Wabash Ave., Chicago, Ill.

PRODUCTION, Manufacturing and assembling. We develop and market only items of merit. If you have any ideas, send them on to us. Send model or blue prints. A-C Metal Specialties, 1322 North Fourth St., Milwaukee, Wisconsin.

REVISED. Copyrighted forms for outright sale; also royalty license. Fully protective. Both for 30 cents (stamps). American Patents Corporation, Barrister Building, Washington, D. C.

INVENTIONS—Write for our free book "How to Obtain a Patent" and Record of Invention Blank. Send model or sketch of invention for inspection and instructions free. Terms reasonable. See advertisement on pages 124 and 125. Victor J. Evans & Co., 157 Ninth, Washington, D. C.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

LACEY'S Patent Sense. Valuable book free. See ad page 126.

MANUFACTURERS Now want worthwhile inventions to meet keen competition. Booklet free. Chartered Institute of American Inventors, Barrister Building, Washington, D. C.

WANTED: Inventions—Will manufacture on royalty. Urbano Company, Manufacturers, 561 Howard St., San Francisco, Calif.

NATION Wide search for best inventions now on. Write American Society of Inventors, Crosby Bldg., Buffalo.

LEARN Patent drafting \$1.00. Legal blanks. Wade Service, 2274-G Brooklyn Station, Cleveland, O.

INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., publishers, 602B Ouray Bldg., Washington, D. C.

WE Are interested in any new invention or improvement on locks, safes, electric protection or any device for the prevention of burglary daylight holdup or fire resisting protection of records or valuables. Do not send models unless asked for. Room "D", % Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

INVENTIONS Patented and Exploited. Former patent office examiner; Master patent law. Benj. Webster, Esq., No. 15 East 26 Street, New York.

LOW Cost manufacturing. Large plant completely equipped for blanking, drawing, stamping and wire forming in any finish. Can save you money on your product. Our figures will convince. Eastern States Products, Box 721, New Haven, Conn.

PATENTS FOR SALE

FOR Sale—Fountain pen, that writes 3 colors with one pen. Patent allowed. Noack, 16409 126th Ave., Jamaica Park, Long Island.

PATENT For sale—Folding nonsinkable swimming machine. Weigh about 2-3 pounds. P. Galens, 105 Graham Ave., Brooklyn, N. Y.

OUTRIGHT Or royalty. My patented device for saving the heat that is wasted by your heating plant up the chimney. I. G. Smith, 909 Van St., Elgin, Ill.

OUTRIGHT Or royalty. U. S. patent No. 1661499. Sports submerged. New swimming model, fascinating, healthful, exciting exercise. Develops all muscles. Life saving device. Inventor, 1147 Nelson Street, Vancouver, Canada.

OUTRIGHT Or royalty—Large trap. Sell to 10c stores; sample free. S. Tallman, San Bernardino, California.

MANUFACTURERS Looking for new inventions should write W. T. Greene, 935 Barrister Building, Washington, D. C.

PATENT No. 1771434 improved bread slicer. Will consider any reasonable offer. Write W. T. Greene, 935 Barrister Building, Washington, D. C.

FOR Sale. Closure plug, U. S. and Canadian patent. Best offer. Wm. Hauser, 429 Elgin Ave., Forest Park, Ill.

FINANCE My invention on half interest. D. J. DeGrasse, 1322 Trist Place, Far Rockaway, N. Y.

PATENT On grocery shelving. Very attractive. Nothing like it. Chas. Sturdavant, 2312 Holliday, Wichita Falls, Texas.

ABSOLUTELY New, practical folding step-ladder. Can be conveniently carried or stored anywhere. Cannot collapse. Victor Francois, 226 W. 150th St., New York.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

IMPROVED Airship. Safer, faster. H. J. Ross, P. O. Box 61, Farming Dale, N. Y.

MANUFACTURERS—Get our complete list of inventions for sale. American Society of Inventors, Crosby Bldg., Buffalo.

OUTRIGHT Or royalty basis. Improvement in front collar buttons. Fully protected. Curiosity seekers save your stamps. Geo. Krasney, 2255 So. Central Park Ave., Chicago, Ill.

MODELS AND MODEL SUPPLIES

INVENTORS: Send us sketch or crude model of your idea. Crescent craftsmen will develop it into a practical working model. 30 years of successful experience and thousands of satisfied clients. Confidential service guaranteed. Bank references furnished. Free illustrated book: "Making Inventions Pay." Crescent Tool Co., Dept. 8-2, Cincinnati, Ohio.

THE Shipmodeler. Magazine of the ship model maker's club. Sample copy 20 cents. 53 A. Middagh St., Brooklyn, N. Y.

WE Make working models for inventors and do experimental work and carry a complete stock of brass gears and model supplies. Send for catalog. The Pierre Model Works, Tintler Park, Ill.

MODEL Steam engines and boilers for model power boats. Boat and boiler fittings. New catalog 15c. Model Machine Shop, 212 Price St., Rahway, New Jersey.

FAMOUS Enterprise (boat) blue prints. 6 full size drawings \$1.50. DO-X blue prints. 7 full size drawings \$1.50. Hawk Model Co., 4944 Irving Park Blvd., Chicago.

POWER Models. Steam and gasoline engines, accessories, supplies, metals for model-makers. Catalog 35c. Chas. Cole, 1355 Church St., Ventura, Calif.

SHIP And yacht model fittings. Send dime for illustrated catalog No. 6. A. J. Fisher, 1002 Etowah Ave., Royal Oak, Mich.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

LEARN Lacquer system of sign painting. Valuable new book gives complete description of methods, materials and equipment with hints and helps for sign shops. Covers latest in electric, neon tube, and daylight reflector signs, etc. Delivered to your door C. O. D. Simply pay postman \$3 and postage. Popular Mechanics Press, Room 802, 200 East Ontario St., Chicago.

MANUFACTURING

SPECIALIZE Complete manufacture, dies, tools, special machinery and patterns. Models made. Atlas Indicator Works, 821 W. Washington, Chicago, Ill.

SPECIAL Machinery or parts, dies, tools, metal specialties, models, special gears, stock gears and model supplies. Send for catalog. The Pierce Model Works, Tinley Park, Ill.

LOW Cost manufacturing. Large plant completely equipped for blanking, drawing, stamping and wire forming in any finish. Can save you money on your product. Our figures will convince. Eastern States Products, Box 721, New Haven, Conn.

MANUFACTURING, Models, dies, stampings, brasswork, mechanical rubber moulds, vulcanizing. Circular free. Baum's Metal Specialties, Kansas City, Mo.

WIRE Goods made to order. Cooley Mfg. Co., 536 N. Western Ave., Chicago.

ECONOMICAL Manufacturing from sheet, bar, wire or tubing. Models, dies, special machinery. Swanberg, 5124 N. Kildare Ave., Chicago.

METAL Articles developed and manufactured. Model making. Reasonable prices and first class workmanship. W. P. Meyers Company, Bedford, Indiana.

PATTERNS—Wood and metal; models, tools, dies, metal stampings; brass, aluminum and white metal castings; general manufacturing. Modern Machine & Pattern Co., Terre Haute, Ind.

WOODTURNING For amateurs. Excellent new instruction book just published for the amateur and home work shop owner. Contains all the needed information and is well illustrated yet published to sell at the low price of 25 cents postpaid. Send for your copy today. Mail remittance with your order. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

MACHINERY, TOOLS & SUPPLIES

15"x6" SEBASTIAN Lathe \$150.00. No. 6 Cincinnati plain miller \$225.00. No. 60 Head grinder \$500.00. 15" Steptoe shaper \$200.00. 36"x18" Fifield lathe \$750.00. Baldwin saw table \$100.00. Parks cabinet shop special, six machines in one \$165.00. 10" new drill press \$21.00. Air compressor, complete tank, motor, \$100.00. Write for catalog. Terms to suit. Cincinnati Machinery & Supply Co., 27 West Second St., Cincinnati, O.

START Business of your own, small investment required, doing nickel, copper and silver plating. This work in big demand. Information free. Electro Platers Supply Co., 28 W. Second St., Cincinnati, Ohio.

CASTINGS, Lathes, 4 sizes, drilling machines, bench grinders, lathe grinders various castings. Kennipp & Son, Mt. Carmel, Ill.

CONCRETE Building block machines and molds. Easy payments. Catalog free. Concrete Machine Co., 5 North Main St., St. Louis, Mo.

BARGAINS New and reconditioned equipment. Chromium platers, grinders, compressors, all ball bearing. Payment terms. Write Hobart Platers, Box M-215, Troy, Ohio.

BEARINGS, Hangers, pulleys, gears, supplies. Kirk Hardware, Box 365, Madison Sq. Sta., New York City.

ENGINES, MOTORS AND DYNAMOS

FOR Sale—Slightly used electric motors, Sixty cycle, 110 volt A.C. One-sixth hp., \$1.50. One-fourth hp., \$5.00. Cash with order. Maytag Chicago Co., 160 E. Illinois St., Chicago.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

AUTO Engines for power plants. We make necessary attachments. Candee-Smith Governor Co., 215 N. Los Angeles St., Los Angeles.

NEW 1/4 Horse, 110 volt alternating motors, \$8.50; some used, \$4.50. New 1-12 horse, 110 volt universal, \$2.75. New 1/2 horse, 110 volt 3,450 speed alternating, \$16.50. Other bargains. Electrical Surplus Company, Dept. 12, 1911 Chicago Ave., Chicago.

CONVERTERS, Brand new, 32v. or 110v. d.c. to 110v. a.c. for radio \$45.00. 1/2 hp. a.c. motors \$6.50; 1/2 hp, 110v. d.c. motors \$16.00. 1/2 hp. 32v. motors \$12.50. Also other sizes. Queen City Electric, 1736 Grand Avenue, Chicago.

BARGAINS 1/2 hp. Gasoline engines \$17. T. A. Eberhardt, 702 34th St., Milwaukee, Wis.

ELECTRICAL

ELECTRICAL, Trouble shooting on the motor car and airplane. Don't trust to luck or guess work. Learn to make every motion count in testing and repairing. Send for our standard 493-page book for electricians and mechanics, 300 diagrams. Hundreds of practical tests. Pay postman \$1.00 plus postage when delivered. If outside U. S. remit when ordering. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

RADIO Trouble Shooting—Covers all electric sets and television. Greatest book ever published from the point of view of assisting the repairman as well as showing how the radio owner can do his own repairing. 328 pages. Over 300 illustrations. Flexible. Pay postman price \$3 and postage when he delivers it. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

BENDING MACHINES

THE Famous Hossfeld "Wrenchless" Universal Iron Bender is the last word in bending machines. Bends metal, cold or hot, into most any conceivable shape. Including Eye Bolts and Automobile Spring Eyes. Bends up to 1" bars or 1 1/2" pipe cold. Also bends "Angle Iron." Thousands in use by all classes of trade, from the smallest shops to the largest railway systems. Write for circular and prices. Hossfeld Mfg. Co., Winona, Minn.

REFRIGERATING Machine, homemade. Inexpensive to build. Gives better service than ice. This and 328 other practical articles in our book "Home Mechanics." Just ask for this and "Handbook for Women," containing 394 valuable household helps and pay postman 98 cents and postage for the two books. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

WELDING AND SOLDERING

ELECTRIC Arc welders—new and used. Terms and trial. Tell needs to Hobart Welders, Box M-216, Troy, Ohio.

YOU Need a better grip on mathematics? Ask us to send you a copy of "Mathematics for the Practical Man," only \$1.50. By common sense methods it removes the mystery and difficulties so algebra and calculus are made simple. Assuming your knowledge is limited to arithmetic you quickly and easily gain a working knowledge of algebra, geometry, Trigonometry and calculus. Simply pay postman when he hands you the package. Address Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

SURVEYING INSTRUMENTS

GREAT Savings in rebuilt transits and levels. All makes, any type. Your money's worth or your money back. Cash or easy terms. All instruments sold subject to field test. Write today for list M-52. Warren-Knight Co., (Makers of "Sterling" Instruments), 136 N. 12th St., Philadelphia, Penna.

INVENTIONS—Have you conceived one? There is a long, winding road to travel before your vision of rewards can be realized. Send for the new book "Inventions and Patents, Their Development and Promotion" by an eminent authority. It is designed to guide the inventor on his way and help him avoid pitfalls. Will be sent C. O. D. Pay postman \$2.50 plus postage when he hands you the package. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

FARMS AND FARM LANDS

CANADIAN Tax sale lands for a dollar an acre and up; small monthly payments. Farms, timber, hunting and fishing camps, minerals. Limited number of properties. Write at once for free illustrated booklet. Tax Sale Service, Room 613, 72 Queen St. West, Toronto, Canada.

LAND Openings along the Great Northern Railway. Fertile productive improved farms, new land or good outover land. Opportunities in many kinds of farming; grain, livestock, dairying, fruit, poultry, small tracts or general farms in Minnesota, North Dakota, Montana, Idaho, Washington, and Oregon. Renters and owners get benefit of low prices, low interest, low taxes. We have free books on each state, can give accurate detailed information and help to find kind of location desired. Write E. C. Leedy, Dept. 537, Great Northern Railway, St. Paul, Minnesota. Low Home-seekers' rates.

STROUTS New farm catalog just out! Over 1,000 live bargains, nearly 1,000 pictures. Equipped money-making farms, all kinds and sizes. Auto inns, gas stations, etc. Lowest prices, easiest terms. Save money. Get this free catalog before buying. Write today. Strout Agency, 255-P Fourth Ave., N. Y. City.

MONEY Made in Michigan potatoes. \$10 down now and easy terms buys land near markets, lakes, streams. Write today. Swigart & Co., P-601, 32 N. State St. Bldg., Chicago, Ill.

JUST Out—First book on all-electric radio sets-clear, interesting and non-technical. Covers dynamic speakers, also. Written by Kenneth A. Hathaway, Tech. Advisor, Chicago Daily News. 120 pages, cloth, illustrated. Pay postman \$1.50 plus postage upon delivery. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

OZARKS—20 Acres, timbered, \$100. \$5 monthly. Poultry, hogs, fruit; fishing, hunting, trapping. Hubbard, 216 Grossman Bldg., Kansas City, Kansas.

OWN A Farm in Minnesota, Dakota, Montana, Idaho, Washington or Oregon. Crop payment or easy terms. Free literature; mention state. H. W. Byerly, 119 Northern Pacific Railway, St. Paul, Minn.

TEN Dollars monthly acquires five acres pecans, tungs, figs, oranges. Guaranteed care. Big returns. Suburban Orchards, Dept. M, Biloxi, Miss.

SELL Your property quickly for cash, no matter where located. Don't pay big commission. Particulars free. Real Estate Salesmen Co., Desk B, Lincoln, Nebr.

861 PRACTICAL Ways to Reduce Farm Labor and Expense and Increase Income. One farmer writes he would not part with this information for \$100, if he could not duplicate it. Nothing experimental. These ideas have all been put to test and proven practical. Send today for a copy of our Handbook for Farmers and get ready to put these ideas into operation for your own benefit. Pay postman only 98 cents and the postage when he hands you the package Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

RABBITS

RABBIT Supplies—America's oldest Rabbit supply house. Free catalogue. Desk 11, National Rabbit Supply Company, 1126 North Dearborn Street, Indianapolis, Ind.

RAISE Rabbits, chickens. I buy all you raise. Particulars, 10c. Weysham, 2470 N. Rampart St., New Orleans, La.

RAISE Chinchilla and New Zealand White Fur Rabbits. Make big money—We supply stock and contract for all you raise paying up to \$6.50 each. Large illustrated book, catalog and contract, also copy of Fur Farming Magazine, all for 10 cents. Stahl's Outdoor Enterprise Co., Box 169A, Holmes Park, Mo.

HIGH Grade Chinchillas, New Zealand Whites, Pedigreed. Allen Miller, Wilburton, Penna.

RABBITS And supplies. Complete literature. Albert Facy, Jr., Inc., 115-X, Valley Stream, N. Y.

MUSKRATS

TRAPPERS—"Elevan Box Traps." Complete blueprints, 30c. Weesho-Uco, 31st Office, Detroit, Mich.

MUSKRAT Farming—The greatest book on one of the greatest opportunities today. Tells of the opportunity in this business and how to do everything in connection with the raising and marketing of muskrats. Pay postman only \$2.25 and postage when delivered or, if outside U. S., remit when ordering. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.

MINK

BIG Money made raising mink. Free information. Pennell Fur Farm, Dalkena, Wash.

DOGS AND PETS

FOR SALE—20 choice select coonhounds cheap on trial. Kevill Kentucky Kennel, Kevill, Ky.

DOG Lovers—Every fact regarding every phase of dog training (all breeds) including psychology, obedience, guarding, swimming, rescue work, hunting, herding flocks, teaching tricks, finding lost articles, racing, war service, police dogs, sled dogs, etc., will be found in "Training the Dog," by Will Judy. Price only \$1.50. Pay postman when delivered or, if outside U. S., remit when ordering. Popular Mechanics Press, Room 302, 200 E. Ontario St., Chicago, Ill.

WANTED—MISCELLANEOUS

MAIL Us your discarded jewelry, gold crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 71, Chicago.

FOR SALE—MISCELLANEOUS

WATCHMAKERS Lathes for sale at a bargain. R. Jaegermann, 5815 Easton Ave., St. Louis, Mo.

ADDRESSGRAPHS, Letter folders, multi-graphs, envelope sealers, duplicators, less than half price. Guaranteed. Prall Co., Suite 108, 190 N. LaSalle St., Chicago.

ANOTHER Famous \$5 book now \$1. The Story of Philosophy, by Will Durant, is the latest popular book of modern times to be placed within the reach of everyone. You will want to add this to your library. The author has the knack of making the lives and opinions of great philosophers as interesting as dramas. 592 pages. Illustrated. Cloth. Sent C. O. D. Pay postman price \$1 and small amount of postage upon delivery. Popular Mechanics Press, Room 302, 200 E. Ontario St., Chicago, Ill.

PERSONAL

PARISIAN Perfume powder (formula) Invisible Ink; 15 Funny love letters (read two ways.) All for 25c. Economy Sales Co., Manchester, Iowa.

ASTROLOGY Will reveal your future, special 12-page astrological forecast gives predictions—month by month—with exact days, dates and happenings for 1931 based on your sign of the Zodiac. Consult it before making any change in home or business affairs, signing papers, love, marriage, employment, travel, speculation, lucky days, etc. Know what to expect. Send exact birthdate with \$1.00. Franklin Publishing Company, 800 No. Clark St., Dept. 101, Chicago.

CHILBLAINS Or ingrowing nails corrected. Refund guarantee. Descriptive circulars free. Eugene Eaton, Bandon, Oregon.

CALIFORNIA Mail address: Information, beautiful postcard, 10c. Letters mailed 10c. ZiesseCo, 1905 Vagedes, Fresno, Calif.

LETTERS Mailed from Denver for 15c coin. Box 94, Englewood, Colorado.

TATTOO Marks removed painlessly by mail. Vestrod, Box 76, Essington, Pa.

CASH'S Woven names. For marking men's, women's, children's clothing. Sample free. Outmettie's Mail-Order House, 81 Holly, Dept. 26, New Bedford, Mass.

ASTROLOGER Can read your life. Test predictions for one year 25c. dimes or stamps. Send year and birthdate. G. Niemeier, Box 228, Mays Landing, N. J.

TOBACCO Habit overcome or no pay. 500,000 used Superba to help stop cigarettes, cigars, chewing, pipe, snuff. Treatment sent on trial. Costs \$2.00 if successful. Superba Co., L84, Baltimore, Md.

FREE! Herbalist almanac. Over 500 herb medicine recipes for home use. Write for details. Botanicals, 145 West 112th St., Chicago.

MISCELLANEOUS

BILLS Collected everywhere—Ace Collection Syndicate, 824 Park Avenue, Weehawken, N. J.

MIRRORS Resilvered at home. Costs near 5 cents per square foot; you charge 75 cents. Profitable business plating auto parts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details free. Write, Sprinkle, Plater, 288, Marion, Indiana.

ARE You old at forty? See our advertisement on page 69 of this issue. The Electro Thermal Co., 2138 Morris Ave., Steubenville, Ohio.

355 AUCTIONEERS Sayings \$1. Leather bound \$1. American Auction College, Kansas City, Missouri.

PRINT Signs, pictures without press, type or machinery. Samples 10c. Straley, 13½ W. Main, Springfield, Ohio.

TIME Counts in applying for patents. See pages 122 and 123. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

CASH Paid for butterflies, insects. See Sinclair display advertisement on page 28.

HOMEOPATHIC And biochemic preparations sent postpaid to all parts of the world. Booklets free. Halsey Bros. Co., 5547 Ravenswood Ave., Chicago. Established 1855.

LEARN Drafting, tracing, blueprint reading, patent drafting, chart method \$1.00. Wade Service, 2274-H Brooklyn Station, Cleveland, O.

TATTOOING Outfits. Illustrated catalogue, dime. Miller, V431 Main, Norfolk, Va.

AMATEUR Cartoonists—Earn \$25.00 week, spare time, copying cartoons for advertisers. J-M Syndicate, Argyle, Wis.

TATTOOING Outfits, supplies. Illustrated list free. "Waters," 945 Putnam, Detroit.

AMATEUR Cartoonists—Sell your work. Write Smith's Service, PW1194, Wenatchee, Wash.

HOMEOPATHIC And biochemic preparations sent postpaid to all parts of the world. Booklets free. Halsey Bros. Co., 5547 Ravenswood Ave., Chicago. Established 1855.

TELL An army of 3,000,000 live readers all about your offer! If you have anything to sell, buy or exchange, or if you have any reasonable proposition, tell our readers all about it—they'll respond quickly. Our booklet "How to Create More Business" contains some very interesting, helpful facts. Write today for your copy—it's free. M. L. Rund, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

LEARN CARTOONING

AT HOME DURING SPARE TIME

with the course that has trained HUNDREDS of beginners successfully. The Landon Picture Chart Method of teaching ORIGINAL drawing by mail makes cartooning easy to learn. This school is a Member of The National Home Study Council. Write today for sample picture chart to TEST YOUR ABILITY and examples of the work of successful students now earning from \$50 to \$200 and more per week. Enclose 6c in stamps and STATE YOUR AGE.

THE LANDON SCHOOL, 2838 National Bldg., Cleveland, Ohio



Here Men! I'll Send You This NEW MAGIC SHAVING INVENTION



Up to \$66 Profit a Day

Now you can say goodbye to whisker-pulling, raw, smarting, burning, patchy shaves and the inevitable, resulting grouch that spoils your day. Think of getting over 300 perfect shaves from a single blade, of making new blades 100 percent sharper! That's what this device does. Just take a soft, downy feather and draw it over your face and you have the feel of this new kind of shave. Velvety smooth—shaves such as you never dreamed were possible! The toughest whiskers just seem to melt away. And how soothing! Makes your face feel like a million dollars. I want you to try this amazing invention for 30 days at my risk. Simply mail coupon. **I. L. RHODES, Dept. B-3715, 1418 Pendleton Ave., St. Louis, Mo.**

Here's a clean-up for agents! You don't have to do any selling with my sensational, new Guaranteed sales plan. Just leave this device on Free Trial with shavers everywhere. Sells itself! Jesse Davis, Mo., made \$66 in one day—R. VanDerhof \$54 in 8½ hours and hundreds more are making big money fast. Place an X at the bottom of coupon and mail AT ONCE!

I. L. RHODES, Dept. B-3715,
1418 Pendleton Ave., St. Louis, Mo.
Send full details without obligation.

Name.....
Address.....
City.....
 Place X in square if you want to make Big Money.

Mystery "TWIN-RAY" Light Makes Night Driving Safe



OVER ONE-FIFTH OF MILE
OF LIGHT

67,000
CANDLE POWER
NO GLARE

AGENTS Cleaning Huge Profits With This Instant Seller!

A GENTS and distributors all over are getting set for the biggest money of their lives with a brand-new road light that ends all the dangers of night driving. 24,000,000 motorists want this protection which guards lives against the dangers of glaring lights—yet lights up the road as clear as day. Hundreds of men have made big fortunes out of makeshift spot lights that only did half the job; hundreds more have pulled huge salaries out of lights that couldn't approach this new protection, in efficiency.

So judge for yourself what you can do with a light like this—a light that throws a 67,000 candle-power beam for over 1,000 feet—yet which absolutely CAN'T glare in the eyes of approaching drivers! A light which costs 30 per cent less than the prices charged for some of the best sellers in the market! A light that not only can't glare itself, but which kills the glare of the other fellow's oncoming "brights!" No wonder this light was awarded the Grand Prize and two gold medals at the Paris International Exposition—and no wonder that the very earliest agents are already cleaning up big—cleaning up like Kinney, who sold 12 lights in a day—and made \$96 for just a few hours' work. No wonder new car distributors are



You can attach and adjust the Speedlight in fifteen minutes. Once fixed, it can't get out of alignment—it keeps a steady 1000-foot beam of glareless light between you and every danger.

equipping cars like Packard, Nash, Cadillac and Chevrolet with it.

There's no light like it in the world. It's not a spot. It embodies an absolutely new principle in headlighting, discovered by a famous lighting engineer. With this amazing Speedlight you can drive at 50—60—even 70 miles an hour, with perfect safety, on a road as brilliantly lit at midnight as at mid-day. Lights up the road in spite of driving rain and snow—defies even thick fog.

MAIL THE COUPON NOW and find out how we're putting the chance of a lifetime into your hands, with an amazing introductory offer. Find out how you can use this great device to build up a crew of your own—and double your earnings—earnings which by themselves will be bigger than you ever saw before. Do it now, before you turn this page!

**OZARK STAVE CO., Dept. B-10,
1731 Belmont Avenue, Chicago, Ill.**

**OZARK STAVE CO., Dept. B-10,
1731 Belmont Avenue, Chicago, Ill.**

Without obligation to me, please send me full details of the Speedlight and the wonderful Introductory Offer.

Name

Address

City State

The Truth about Voice

New Voice Book Discloses
Startling Voice Facts

Sent Post-Paid for
30 Days
FREE Reading
No Money Down



KNOW The TRUTH about YOUR VOICE



Eugene Feuchtinger
A. M.
Master of Voice
European Maestro

Send today—for 30 days free reading—for the most remarkable voice book ever written. This book has startled the whole voice world. Written by a man recognized the world over as a voice authority—a man with the courage to tell the TRUTH about voice, about the vocal organ and the real basic, fundamental truths about voice training. Advances astounding new method. Discloses startling facts that may save hundreds of dollars to every man and woman seeking a strong, rich, compelling singing or speaking voice. Send for this most remarkable voice book today.

FREE 30 Days Reading

Certainly I could not afford to make you this liberal 30 days free reading offer if I did not KNOW what "The Truth About Voice" will do for YOU. Send for this book today. KNOW the truth about YOUR voice—a truth just as SIMPLE as it is astounding! Know WHY I actually guarantee to improve every man or woman's voice at least 100%. 30 days free reading to prove this! Then, if convinced, send only \$1.00—although you'll gladly admit that the book may be worth thousands to you. If not—return it—that's all! Mail coupon NOW—before the demand exceeds the supply!

Prof. Eugene Feuchtinger, Studio 13-52
Suite 29, 1810 Wilson Ave., Chicago, Ill.

Send me at once—for 30 days free reading—with no obligation to buy, your "The Truth About Voice" Book. If after the free reading period I desire to keep the book I am to send you \$1.00. Otherwise, I have the liberty to return it with no further obligation.

Name

Address

34 Lesson Drawing Course \$2.98

The biggest value you ever saw
advertised anywhere



Haven't you often wished that you could draw cartoons, illustrate some idea, sketch some pretty face, etc.? You can do all of these things. One of America's most famous Cartoonists and Illustrators has developed a great, simple system for success in all branches of Commercial Art. This system has revolutionized the entire theory of drawing. It means that drawing can be as easy for you as writing—much simpler than learning shorthand, bookkeeping or typewriting. We are now placing this original system for learning Drawing, Art and Cartooning, consisting of 34 lessons with over 500 illustrations, within reach of every one. If you will devote a few hours each week to the Course WE ABSOLUTELY GUARANTEE that you will learn to draw and draw well before you have finished the Course. If we fail to make this claim good, we will refund every cent paid us. By eliminating a large office force for answering correspondence, expensive catalogs, etc., we are enabled to make a price of \$2.98, the cheapest price ever known for a high-grade, home study course. Learn to draw. It is a big asset, no matter what field you are in.

Send No Money

Just order the course
and on arrival \$2.98
pay postman

plus a few cents postage, payment in full for the entire Course and Drawing Outfit. If not entirely satisfied, return within five days and we will Refund Money. Address: LEDERER SCHOOL of DRAWING, Dept. 612-A, Chattanooga, Tenn. Orders from outside the U. S. A. are payable \$3.28 cash with order.

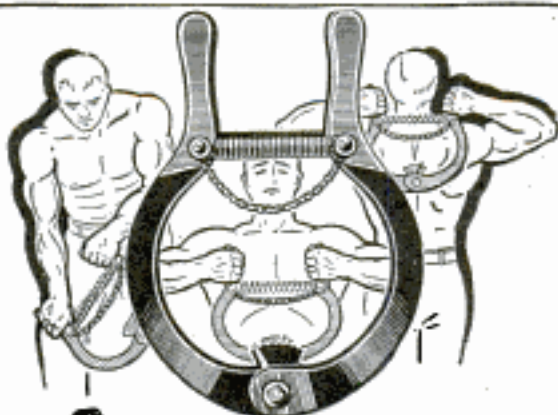
If you order the course at once, we will include a drawing outfit, consisting of artist's pencils, pens, paper, erasers, thumb tacks, etc., enabling you to go to work without any additional cost.



Why STAMMER?

I overcame my own stammering. Let me help you. My new, free book tells how. You can, and overcome your stammer and speak with a normal, happy and successful life. Write today. ROBT. E. CARD, 12900 Woodward Ave., Detroit, Mich.

Free Book



Build Muscles & Strength With This Iron Shoe

The Germans invented the Iron Shoe. They realized it enabled them to achieve physical perfection. We brought it to America and improved it. Every strong man uses one to build back muscles, tremendous chest and powerful giant like arms. We show how to develop abdomen and legs so you will be a top notcher in 30 days. We don't just ship apparatus and let you work out your muscle building problems. We include with our

Free Special Offer,

the IRON MAN'S FAMOUS 60 DAY ILLUSTRATED PICTURE COURSE of exercise instruction. SPECIAL STRENGTH RECORDER and STRENGTH RESISTER thereby making this the greatest body building offer presented. Follow the choice of champions and get that grip of steel. Ring in now on our special offer for the lowest priced and biggest result getting exercise under the sun. Write Today.

American Athletic Appliance Co.
4324 Paul St.,
Dept. PM-2, Philadelphia, Pa.

Without obligation and without cost, send particulars about your Iron Shoe Strength Builder and Special Offer.

Name

Address

ACCOUNTING



**New Revised Home-Study
Course Now Ready**

The uncrowded, highly paid profession of Accountancy offers marvelous opportunities. Send for "The Accountant—Who he is, What he does, How to become one," and first lesson. Both sent free. State age and position.

INTERNATIONAL ACCOUNTANTS SOCIETY, Inc.
A Division of the
Alexander Hamilton Institute
Dept. 183, 3111 South Michigan Ave., Chicago, Ill.

LAW Free Book

Write today for FREE 44-page book, "THE LAW-TRAINED MAN", which shows how to learn law in spare time through the Blackstone home-study course prepared by 20 prominent legal authorities, including law school deans, and U. S. Supreme Court Justices. Combination text and case method of instruction used. All material necessary furnished with the course, including elaborate 26-volume law library, delivered immediately upon enrollment. Many successful attorneys among our graduates. LL. B. degree conferred. Moderate tuition, low monthly terms. Money-Back Agreement.

Write for free book today.

BLACKSTONE INSTITUTE, 207 N. Michigan Ave., Dept. 52 Chicago



\$40 to \$65 PER WEEK

Learn silver mirroring from inventor of secret processes used by largest manufacturers. Easily learned at home. Good trade. Earn money whole or spare time. Get started. Details free. Write today.

PHILA. INSTITUTE OF MIRROR SILVERING, 445 Bourse Bldg., Philadelphia, Pa.



EVERY BOY HIS OWN TOYMAKER

Make your own boats, kites, airplanes, traps, sleds, stilt, diving boards, bird houses, etc. 64 pages illustrated, 10c. Amateur electrician's book, 64 pages illustrated, 10c. 200 kinds of iron, wood, and wire puzzles; catalog with pictures of all, and one of our best 25c puzzles with secret solution 10c.

WESTERN PUZZLE WORKS, ST. PAUL, MINN.

Don't PEEL POTATOES

Agents!

This is brand new! Going like wild-fire! Offers a real chance for \$100 a week. Spare-time and full-time sales plans offered. Jump in on the ground floor! Write quick for big-money plans and Free Outfit offer.



An amazing new automatic invention now makes potatoes peel themselves! No more paring knives! No cut fingers! No mess, muss or waste! Here's something every woman understands and wants the instant she even hears about it! A mechanical marvel,

almost incredibly small and simple, yet does more than ten pairs of hands! Peels the biggest potato in only a few seconds at the mere turn of a crank! Costs little more than a couple of good paring knives. Pays for itself many times over in saving on potatoes. Test it yourself at once. Write now. Ask quick for Introductory Offer.

GUARANTY PRODUCTS CO.

Dept. B-80, Francis Bldg.
Washington at 16th St., St. Louis, Mo.

How To Secure A Government Position

Why worry about strikes, layoffs, hard times? Get a Government job! Increased salaries, steady work, travel, good pay. I'll help you become a Custom House Clerk, Railway Postal Clerk, Post Office Clerk, City Mail Carrier, Rural Carrier—or get into any other Government job you want. I was a Secretary Examiner of Civil Service Commission for 8 years. Have helped thousands. **Railway Postal Clerk examination coming.**

Now FREE My 32-page book tells about the jobs open—and how I can help you get one. Send the coupon for your copy TODAY.

A. R. Patterson, Civil Service Expert,
PATTERSON SCHOOL, 82 Wisner Bldg., Rochester, N. Y.
Please send me, without obligation, your free book "How to Secure a Government Position."

Name.....
Address.....



"The Happiest Day of My Life!"

"OUR WEDDING DAY! A year ago it seemed like a dream that would never come true, for my salary then was barely enough for one to live on. I faced the facts. Unless I could make more money I had no right to keep Ruth waiting. What I had to do was find some way to make myself worth more.

"It was Ruth herself who showed me the way. She clipped a coupon out of a magazine and we sent it to the International Correspondence Schools for information about their courses. Within a week I had enrolled. The training I got from studying at home showed up almost at once in my office work. They gave me more responsibilities. Inside of six months I was promoted, with a substantial raise. Now I'm getting double what I was a year ago—and we're married!"

I. C. S. Courses have given thousands the special knowledge they need to win better jobs and bigger pay. Why not you?

One hour of spare time a day, spent in I. C. S. study, will prepare you for the position you want, in the work you like best. Find out how. It won't obligate you in the least to ask for full particulars. Do it now—for HER!

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

Box 5529-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> B. B. Locomotives |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> B. B. Section Foreman |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> B. B. Bridge and Building Foreman |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Pipefitter <input type="checkbox"/> Tinsmith | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Marine Engineer |

BUSINESS TRAINING COURSES

- | | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Personnel Management | <input type="checkbox"/> Complete Commercial |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> Lumber Dealer |

Name.....Age.....

Address.....

City.....State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools, Canadian, Limited, Montreal, Canada

NOW FIX ANY MAKE OF

AUTO**SIX BIG AUTO BOOKS ALL SHIPPED FREE**

on approval; whether you want to qualify as garage owner, auto repair expert or merely wish to know how to keep your own car 100% efficient, look at these books—they are sent to you for free examination. This brand

new 1931 edition has been prepared by a large group of America's greatest automotive engineers. Anybody who can read will understand them, for this great automobile encyclopedia is a veritable gold mine of valuable facts. Take advantage of this great opportunity now; send in the coupon for FREE examination. You don't pay us a penny, you don't obligate yourself to pay anything unless you decide to keep the books. Just tell us you want to see them and the full set of 6 great volumes, just off the press, will be sent to you. Read them, look them over and prove to your own satisfaction that one fact alone, which you will find in them, may save you an expensive repair, or help you to a better job.

Aviation Motors

In addition to being a complete encyclopedia of automobile engineering, these books contain over 100 pages on Aviation Motors, and as they are just off the press they bring to you the newest and latest information obtainable. This alone makes these books invaluable to anyone.

New 1931 Edition

Imagine books which are so new that every page is right up to date—wiring diagrams, construction details, service problems—are all right up to the minute. Nowhere else that we know of can you get as complete and up to date information. Over a million dollars of resources have enabled us to give you the most up to date books on the subject ever published. You will find nearly 20 pages on front wheel drives alone. Everybody interested in automobiles in any way will welcome these books, especially on our no money offer.

**CAN YOU FIX IT?**

Can you take out "play" in differential? Can you kill the "shimmy" in steering? Can you reset TIMING? Can you put your finger on engine trouble without guessing or tinkering? Can you pull the starter off and fix it? Can you adjust and repair transmission, engine, rear axle, bearing?

These Books Tell How

and they tell you how to do any and every auto job right, the first time.

6 Big Volumes

Nearly 3,000 pages, over 2,000 illustrations, wiring diagrams, equipment charts, etc. The latest edition with gold-stamped flexible binding. Sent FREE for 10 days' use. If not wanted return express collect. If kept, send only \$2.00 after 10 days, then \$3 a month until special advertising price, \$24.80, is paid.

A Year's Consulting Membership FREE!

Privilege of consulting engineers of million-dollar American Technical Society on any automotive problem for one year without charge, if you mail coupon immediately.

SEND NO MONEY

American Technical Society, Dept. A-219,
Drexel Ave. at 58th St.,
Chicago, Illinois

I would like to see the new 6-volume 1931 edition of your automobile books but without any obligation to buy. I will pay the few cents delivery charges only and will examine the books and return them at your expense in 10 days unless I like them, in which case I will send you \$2.00 then and only \$3.00 per month until the special price of only \$24.80 is paid. You are to include free consulting membership certificate in the American Technical Society. Send brand new 1931 edition.

Name.....
Street.....
City..... State.....
Employer's Name.....
Employer's Address.....

OPPORTUNITIES IN Traffic Management
Become a Traffic Expert

The opportunities in traffic management are limited only by the boundaries of the business world. The trained traffic man is in demand by transportation systems and by industrial organizations.

Three Detroit Firms Pay Their Traffic Managers Over \$20,000 a Year

Prepare for this growing, profitable profession at home in your spare time under supervision of traffic experts. Low cost; easy terms. Thru the LaSalle Problem Method you learn by doing. Valuable 64-page booklet free. Send for it Now.

LaSalle Extension University, Dept. 254-T, Chicago

This Book FREE!**FRENCH BY EAR**

Learn 400 common French words with marvelous 10" phonograph disc & French-English book. Electrically recorded by Prof. Etienne of Paris. See and hear. Pay only \$1.98 and postage on arrival for disc and book. Limited supply. Order now. Money back guarantee. Spanish disc \$1.98; English disc \$1.98.

AUTOMATIC RECORD INSTITUTE
1928-CF, Tribune Bldg., 154 Nassau St., New York, N. Y.

Wireless (Radio)

and Morse telegraphy taught thoroughly. School, oldest and largest; sponsored by Telegraph, Radio, Railway and Government officials. Unusual opportunities. Expenses low—can earn part. Catalog free.

DODGE INSTITUTE, Jones St., Valparaiso, Indiana.

We Will Train You in a Few Months

Day and Night
Schools in
Chicago, Detroit
Cleveland,
Boston, Phila.

No Books—
No Classes—

Wonderful
Future in this
Uncrowded
Field

Experts Earn Up To \$125 a Week as Mechanical Dentists

We teach you to make rubber plates, crowns, bridge work, metal base dentures, etc., for dentists. After graduating you are ready for a job or can open your own laboratory. We assist you.

Big Demand for Men

Thousands of dentists everywhere send work to mechanical dentists. We train you quickly in day or night school for this uncrowded field. No classes—no books—no mechanical experience necessary.

Work your way thru school. We help you find a job to meet your expenses while taking our training.

FREE BOOK Send at once for interesting free book telling all about this thriving profession. Also details of our liberal offers. Write today!

McCARRIE SCHOOL OF MECHANICAL DENTISTRY,
1338 S. Michigan Ave., Dept. 442, Chicago.

Without cost or obligation, send me your illustrated book on Mechanical Dentistry, and complete information as to my opportunities in dental laboratory work.

Name.....
Address.....

RELIEVES PAIN QUICKLY

Have You a Troublesome Ailment?

INFRA-RED RAY LAMP




Send for Our Free Book

giving full information on Infra-Red Ray treatments in your own home, for relieving neuralgia, sore throat, bronchial trouble, neuritis, sinus trouble, catarrh, eczema, rheumatism, toothache, hemorrhoids, and other ailments due to congestion. Infra-Red Rays penetrate deeply and restore active blood circulation. Quickly remove congestion. May be used safely by anyone. Attach to any light socket. Sent on approval 30 days' trial. Write for catalog WM. CAMPBELL CO., Inc., Dept. 1040, Alliance, O.

QUIT TOBACCO

No man or woman can escape the harmful effects of tobacco. Don't try to banish unaided the hold tobacco has upon you. Join the thousands of inveterate tobacco users that have found it easy to quit with the aid of the Keeley Treatment.



KEELEY Treatment For Tobacco Habit Successful For Over 50 Years

Quickly banishes all craving for tobacco. Write today for Free Book telling how to quickly free yourself from the tobacco habit and our Money Back Guarantee.

Home of the famous Keeley Treatment for Liquor and Drugs. Booklet Sent on Request. Correspondence Strictly Confidential.

THE KEELEY INSTITUTE Dept. A-942 Dwight, Illinois

BOW LEGS?

THIS GARTER (Pat'd) Makes Trousers Hang Straight If Legs Bend In or Out

Free Booklet—Plain Sealed Envelope

THE T. GARTER CO., Dept. E South Bend, Ind.



BUCHSTEIN'S FIBRE LIMB

is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities.

D. BUCHSTEIN CO., 610 3rd Ave., So., MINNEAPOLIS, MINN.

Send for Catalog Today



TRUSS USERS

STUART'S ADHESIF PLAPAO-PADS are patentably different—being mechanico-chemico applicators—made self-adhesive purposely to keep the muscle-tonic called "PLAPAO" continuously applied to the affected parts, and to minimize danger of slipping and painful friction. The fabric is soft as velvet, and being adhesive—

—clings closely to the body—



—without straps, buckles or springs.

Easy to apply, comparatively inexpensive and comfortable

For almost a quarter century stacks of sworn testimonials from many different countries report success, without delay from work. Process of recovery natural, after which no further use for a mechanical support. Test of the remedial herbal factor "PLAPAO" sent you No charge for it now or ever. Write name on coupon **NOW**, and mail **TODAY**.

Plapao Co., 2621 Stuart Bldg., St. Louis, Mo.

Name.....
Address.....

FREE—Trial Plapao—FREE



New Easy Way to Learn Drawing

How you can earn big money in Commercial Art, Illustrating, Designing, or Cartooning, without being a "genius," and regardless of your present ability.

NEVER was there such a need for artists as today! Business needs thousands. Illustrated catalogs, advertisements, posters, circulars, trademark designs—countless pieces of art work are needed by the busy business world. 48,868 periodicals are published in America—every one of them needs the services of at least two artists for each issue. You can't begin to realize the gigantic amount of art work that must be done—and the demand is increasing daily. Big money is gladly paid—and big money is waiting for anyone with foresight enough to prepare for this pleasant profession. **Regardless of your present ability**, our easy method of teaching offers an opportunity to earn \$50 to \$200 a week.

Learn in Spare Time

This new method is like a fascinating game. No matter how little you may know about drawing, no matter whether people tell you, "you have no talent," no matter what your present ability may be—we can train you. The new method simplifies everything—all the red-tape, "art for art's sake" teaching, and superfluous theory is taken out and in its place is put definite, practical instruction so that you may make money in the art game. The course is the work of men who have made practical successes in this field themselves. They know how Success and Progress are made in this Profession, and then guide you along these lines.

Write for Big Free Book

An interesting and handsomely illustrated booklet, "Art for Pleasure and Profit," has been prepared and will be sent to you without cost if you mail the coupon below. Mail coupon NOW for this attractive free book and full details about our **NEW ARTIST'S OUTFIT OFFER**. No obligation whatever. Address, **Washington School of Art, Dept. 5-M, 1115—15th St., N. W., Washington, D. C.**

WASHINGTON SCHOOL OF ART,
Dept. 5-M, 1115—15th St., N. W., Washington, D. C.
Send me, without obligation, free book "Art for Pleasure and Profit." Also full particulars of Artist's Outfit Offer.

Name.....
Address.....

*Yours
Without
Cash*



Lone Eagle
\$3750

*Miss
America*
\$3750

Buy Direct —at lowest cash prices on easy payments. You wear while paying. Watch sent for you to see and examine without one penny down.

RAILROAD WATCHES

Let us send you our beautiful watch catalogue showing the Famous Santa Fe Mogul Railroad Watch, and the 21-jewel Santa Fe Special in both 16 and 12 sizes. Buy Direct and save $\frac{1}{4}$ to $\frac{1}{2}$ your money. Also the new 60 hour Bunn Special. Catalogue sent FREE!

DIAMOND RINGS

Write for our New Diamond Ring of Romance and Bulova Wrist Watch Catalogue showing marvelous new designs. Never have we been able to offer such beautiful diamond rings and artistic dependable watches at such low prices. The catalogue is sent FREE!

Ask for our Special Spot Cash Offer. Good for 30 days only.

SANTA FE WATCH COMPANY

Dept. 26, Thomas Bldg. TOPEKA, KANSAS

To SANTA FE WATCH CO.,
Dept. 26, Thomas Bldg., Topeka, Kansas

Please send me catalogue I have checked:

- Railroad and dress pocket watches
Ladies' and men's wrist watches
Ladies' and men's Diamond Rings

Name.....

Address.....City.....

YOUR CHOICE OF 3 GREAT HEATH PLANES



\$12 STARTS YOU BUILDING!

LOW wing—center wing—or Parasol type plane—take your choice. And now regardless of which you choose—assure yourself of unexcelled performance by building with the famous Heath construction set, designed to give equally fine results with all 3 type planes.

You need no technical training. Heath plans are clear and easy to follow. And the planes are so completely dependable and easy to fly that experienced pilots declare them the ideal sport plane for even the beginner.

Consider their unexcelled low flying cost—less than 1 cent a mile, including gas, oil, storage, etc. Consider also that the complete parts cost only \$199. And that the complete plane, already built, costs only \$975. Then you'll understand the popularity of America's most popular sport plane.

Remember—\$12 brings the first shipment and starts you building. Balance of the parts can be shipped in 10 convenient progressive groups. Write today for complete information. 10 cents in stamps or coin brings large illustrated booklet. HEATH AIRCRAFT CORP., Dept. P-2, 1721-9 Sedgwick St., Chicago.

HEATH

AIRCRAFT CORP. CHICAGO

AN INCOME BUILDER

Two distinct lines in one. For either salesmen or those mechanically inclined.
\$50.00 Value for \$6.00

with profits accordingly large.
We can provide you with unlimited quantities of all leading makes of electric vacuum cleaners at sensationally low prices; each guaranteed perfect in action and appearance. Such extreme value and profit offers any man of average intelligence a splendid income even for spare time.

FREE VAC COURSE

To our associates we give in bound book form, free expert advice and seldom disclosed instructions in building and servicing all vacs. Through this free training you may readily develop a permanent, well-paying business all your own. From our immense resources we supply all needs. At trifling cost and no risk you can prosper with us, the originators. Oldest and largest in the line. Literature tells all.

URON ASSOCIATED INDUSTRIES

1392 ENGINEERS BUILDING, CLEVELAND, OHIO

What Do You Do When You Cannot Find the Book You Want ?

Don't give up in despair. Send for a copy of the unique catalog published by Popular Mechanics Press. It contains 5000 books listed alphabetically under 2000 main subjects and sub-headings—literally from A to Z—Abrasives Manufacture to Zoologist and everything in between.

FREE UPON REQUEST

Send for your copy today

POPULAR MECHANICS PRESS

200 E. Ontario Street, CHICAGO

A WONDERFUL OPPORTUNITY

The great Radio industry, because of its amazingly rapid growth, is today badly in need of hundreds of "trained" men to fill its more responsible jobs in Radio, Talking Pictures, and Television work.

To qualify for these jobs men must know Radio as they know their A B Cs. They must know the theory as well as the practice, and be able to teach other men some of the things they know.

To such men the great Radio industry offers a wonderful opportunity for steady work at exceptionally good pay, now, and early advancement to still better jobs as a future. It is, in fact, the chance of a life-time for ambitious men.

But first these men must be trained, for no ordinary knowledge of Radio will do.

The Radio Industry, itself, has no time to train these men. It is growing so fast, and changing so fast, that its manufacturers and jobbers have all they can do to keep up with the trend of the times, by improving their methods of manufacture and distribution.

So the training of men for these jobs has become the task of the Radio and Television Institute, of Chicago.

As few men can afford to quit their work and get this Training at some University or Technical School, the Radio and Television Institute has been organized to train such men at home—no matter where they live—



in their spare time, and at a very nominal cost, for these better paying jobs in Radio, Talking Pictures and Television.

The Institute's Course of home-training was planned, written, and is actually supervised by an Advisory Board made up of prominent and highly paid engineers and executives, each of whom is actively connected with some big Radio concern.

This means that your training will be right, because these men, working with big Radio concerns, know exactly what the industry needs in the way of "trained" men, and exactly how you should be trained to meet that need. And this Advisory Board will have complete supervision over your training from the day that you become a student of this Institution.

For this reason, prominent Radio men, everywhere—and our country's largest and most important Radio Trades Associations—are unqualifiedly endorsing this home training, and recommending it to men whom they want to see make good in Radio work.

So if you are ambitious—if you are making a cent less than \$75 a week—investigate.

Find out for yourself all about this amazingly easy Course of home-training, and also all about the wonderful opportunities for "trained" men in this, the world's fastest growing industry. Everything is fully explained in the Radio and Television Institute's "Opportunity" book. Send today for your copy. It's free.

RADIO AND TELEVISION INSTITUTE, Dept. 12

2130 Lawrence Ave., Chicago

Without obligation of any kind please send me a copy of the Radio Opportunity Book. I am interested in your home-training and the opportunities, you say exist in the great field of Radio, for "trained" men.

NAME _____

ADDRESS _____



See How Easy You Can Learn HYPNOTISM TRY FREE 5 DAYS!

SEE for yourself how easy it is to master the great science of Hypnotism—how quickly you can learn to bend people to your will—banish fear, worry and opposition—increase your earnings—and force others to give you the recognition, power, and admiration you deserve. I'll show you how to use this great force to help you master every situation or **The Five Day Trial is FREE!**

In just a few hours I'll teach you the hidden secrets of Hypnotism—the methods used by the great operators—the amazing things you can accomplish once you understand this mighty power. You can use it to overcome obstacles, achieve your fondest ambitions and become MASTER of yourself, friends and acquaintances—either sex. Now you can quit being just one of the crowd—now you need not be unpopular, lonesome or unhappy a minute longer. Through this strange power you can learn how to stand out—dominate—to make your life what you want it to be!

In his startling NEW book, *The Science of Hypnotism*, the world famous hypnotist—Prof. L. E. Young—reveals the most carefully guarded secrets of this fascinating subject. He not only explains the methods of noted hypnotists, step by step—but tells clearly all about the nine stages of Hypnotism, The Hypnotic Mirror, Mental Telepathy, how to select your subjects, magnetic healing, methods of hypnotizing, how to wake the subject, how to make money out of hypnotism!

**Try 5 Days FREE—
Send No Money**

No confidant are we that Prof. Young and his great book will quickly teach you the science of Hypnotism, that we will send you a copy without one cent in advance! Simply clip and mail the coupon below. When the book arrives pay the postman the special low price of \$2.50 plus few cents postage. Then test the powers of Hypnotism 5 days! If not amazed and delighted, return the book and money will be refunded at once.

**FRANKLIN PUBLISHING CO.,
Dept. B-70, 800 No. Clark Street, Chicago, Illinois**

Mysteries of Hypnotism Revealed

How to Hypnotize at a Glance
Susceptible Subjects
How to Hypnotize by Telephone
How to Give an Entertainment
How to Make Others Obey You
Overcoming Bad Habits
How to Do Dozens of Hypnotic Feats
Use of Hypnotism in Operations



Franklin Publishing Co., Dept. B-70,
800 No. Clark St., Chicago, Ill.

Please send me your amazing new book—*The Science of Hypnotism*—by Prof. Young. When book arrives, I'll pay the postman only \$2.50 plus postage. If I am not satisfied after 5 days' trial, I may return the book and you are to refund my money.

Name

Street and No.

Town State

If you are likely to be out when postman calls, send \$2.50 with coupon and we'll pay delivery charges. Customers outside U. S. must send cash with order.



DO YOU LIKE TO DRAW?

It's Easy To Learn When Shown In The Right Way

Some of the cleverest cartoonists and comic artists in America today learned how to draw quickly—by following CARTOONIST EVANS' SIMPLE AND EASY METHOD. This school has over twenty years of successful teaching to its credit. If you like to draw, send 6c in stamps for portfolio of cartoons and full details. The course is NOT EXPENSIVE.

The W. L. Evans School of Cartooning
521 Leader Building CLEVELAND, OHIO

DEAF? READ THIS

Don't be handicapped by deafness. VIBRAPHONES, small silver devices that fit snugly in the ears, are helping thousands. VIBRAPHONES have no wires, head bands, or batteries to annoy you. They are so inconspicuous that even your friends will seldom know you are wearing them. Nothing to get out of order and no additional expense. This is what the hard of hearing have long been looking for. Write for our booklet. The Vibraphone Company, Station 787, Central National Bank Building, St. Louis, Mo.

LUCKY TIGER

FOR HAIR AND SCALP!



A single application stops that miserable itching. A single bottle corrects scalp irritations. A Proven Germicide, delicately perfumed, safe for adults and children. World's largest seller at Druggists, Barbers, Beauty Parlors.

GUARANTEED



AN EASY WAY TO

SHAPE your NOSE

Anita Nose Adjuster shapes flesh and cartilage—quickly, safely, painlessly, while you sleep or work. Lasting results. Gold Medal Winner. Doctors praise it. 78,000 users. Write today for **FREE BOOKLET.**

ANITA INSTITUTE, B-12 Anita Bldg., Newark, N. J.

Save Your Feet

When all else fails end your suffering with the flexible "no metal" ARCH Heelner SUPPORT



HEELNER ARCH SUPPORT CO., 878 M. E. Taylor Building, LOUISVILLE, KY.

Photography

for

PLEASURE or PROFIT



A fascinating hobby or a profitable business can now be yours. Prepare quickly at home under the personal guidance of leading experts in the fine art of photography. No experience necessary. Full of spare time. Many earn while learning. Our thorough studio method also qualifies you to fill a well paying position upon graduation. Send coupon now for FREE booklet, *Opportunities in Modern Photography.*

AMERICAN SCHOOL OF PHOTOGRAPHY
3601 Michigan Avenue Dept. 1352 Chicago, Ill.

Send FREE booklet, *Opportunities in Modern Photography*, and full information.

Name

Address

City State

When I Learned Millions of Men Suffer with This Gland Disorder

I Determined to Bring Every Man The News of This Great Discovery

FOR many years I was a directing executive of one of the larger steel concerns in the Pittsburgh district.

For some time I had been consulting a scientist with regard to certain manufacturing formulas. One day, after such a discussion in my office, this man said, "Have you ever noticed how many men seem to suddenly grow old, go all to pieces in less than a year's time when they reach a certain middle age?" I told him I had noticed this in many cases. Further, I said I was very much interested, as I was nearing 40 myself.

"Prostate trouble is the answer," he said.

"That hardly seems possible," I replied. "Why, I know of very few men who ever had that disorder."

"Yes, most men are like you—they know little about the prostate gland—yet highest medical authorities definitely say that nearly 7 men out of every 10 have prostate disorder after a certain age. Some confuse their trouble with kidney or bladder derangement. Others think that they are aging prematurely, that weakness, pains in feet, legs, back, and head are merely the result of advancing years and so do nothing about it."

Then he told me of his discovery, a simple, easy way to stimulate the prostate gland—and how he had placed it in the hands of physicians and afflicted men for conclusive trial. The results had been even more satisfactory than expected.

He ended by saying, "Money and business experience is necessary to bring this discovery to the millions of men who need it, at a cost everyone can afford."

My decision was made within a few days. Today I see that decision rewarded a thousand times over. Some tell how they have been saved from operation. Others tell of relief after all other methods have failed. Many say they feel 20 years younger.

**\$10.00 PER MONTH BUYS
Fibre-Life Limbs**



NEXT TO NATURE. BRACES MADE TO ORDER. AGENTS
WANTED. FREE FIGURE SAMPLE **WORMAN CO.** 252-P HENNEPIN AVE.,
MINNEAPOLIS, MINN.

Are you aging too soon . . . getting up 5 to 10 times at night? Are you on the down grade, half-living, blue, depressed, subject to chronic constipation, chronic fatigue, back-ache, and weakness? Then it would give me great pleasure to tell you, too, how this scientist's discovery can be used in your own home. Unless you feel its amazing benefits within a week's time, it costs you nothing.

You owe it to yourself to act at once. Send no money. Simply mail the coupon at once. **W. J. KIRK, President,** 2138 Morris Ave., Steubenville, O.



If you live West of the Rockies, address The Electro Thermal Co., 303 Van Nuys Building, Dept. 21-R, Los Angeles, Calif. In Canada, address The Electro Thermal Co., Desk 21-R, 53 Yonge St., Toronto, Can.

W. J. KIRK, Pres.,
2138 Morris Ave., Steubenville, O.

Please mail at once a free copy of the booklet, "The Destroyer of Male Health," and all details about the new treatment. I'm not obligated in any way.

Name

Address

City.....State.....

CODE RADIO and MORSE
AUTOMATIC OMNIGRAPH will
teach you easily and quickly for jobs
on Land, Sea and Air. Catalogue.
The Omnigraph Mfg. Co., 810 E. 39th Street, P18, Brooklyn, N. Y.



WANT A STEADY JOB?

**RAILWAY POSTAL CLERKS
MAIL CARRIERS—POSTOFFICE CLERKS
GENERAL CLERKS—CUSTOMS INSPECTORS**
\$1700 to \$3400 a Year for Life

No "lay-offs" because of strikes, poor business, etc.—sure pay—rapid advancement. Many other U. S. Government Jobs. City and country residents stand same chance. Common sense education usually sufficient.

Many Spring Examinations Expected

**MEN—BOYS
18 to 45**

Use Coupon Before You Lose It

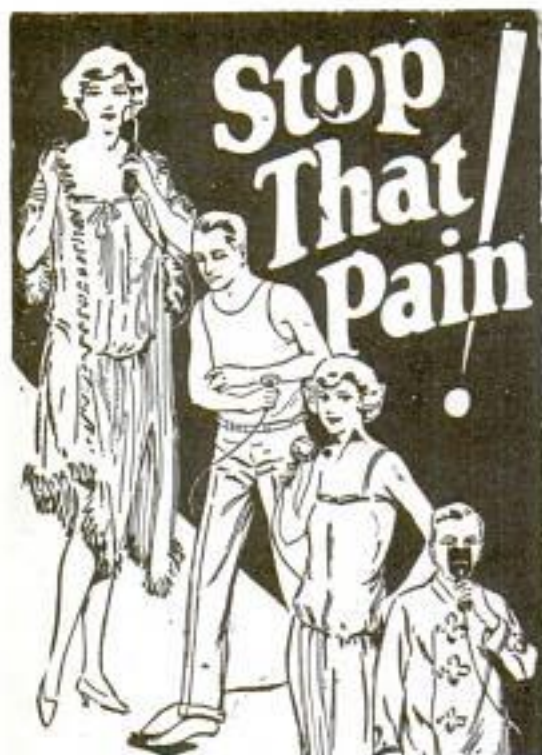
COUPON

FRANKLIN INSTITUTE, Dept. W172, Rochester, N. Y.
Rush to me, free of charge, (1) A full description of the position checked below; (2) 32-page book, with list of positions obtainable; (3) Tell me how to get the position checked.

Railway Postal Clerk (\$1900 to \$2700) General Clerk (\$1250 to \$2100)
 Postoffice Clerk (\$1700 to \$2300) Customs Inspector (\$2100 up)
 City Mail Carrier (\$1700 to \$2100) Rural Mail Carrier (\$2100 to \$3300)

Name

Address



Stop That Pain!

With Violet Ray Vibration Ozone Medical Electricity

The Four Greatest Curative Powers
Generated by This

Great New Invention!



Elco Health Generators at last are ready for you! If you want more health—greater power to enjoy the pleasures and delights about you, or if more beauty is your desire—write! Ask for the book on these inventions which has just been prepared. It will be sent to you without cost. It tells you how Elco Health Generators aid you in leaving the lethargy and hopelessness of bad health and weakness behind forever. Re-ignite yourself. Bring back energy. Be wholly alive. Write today!

Here's What Elco Users Say—

"Wouldn't take \$1000 for it."
"Has done me more good in 2 weeks than doctors did in 13 yrs."

Elco
Electric Health
Generators

years. "Cured my Rheumatism." "My Eczema gone." "Cured my stomach trouble." "Cured my weakness." "Now I sleep soundly all night." "Thanks to Elco my strength and vigor are back." "No more pain." "Colds never bother me now." "Chronic Constipation banished."
These great new inventions generate Violet Ray, Vibration, Electricity and Ozone—combined or separate. They operate on the electric light in your home or on their own motive power at less than 50 cents per year. Elco Health Generators are positively the only instruments which can give you in one outfit Electricity, Violet Ray—Vibration and Ozone—the four greatest curative agents. Send the coupon below. Get the Free Book NOW!

MAIL COUPON for FREE BOOK

Do not put this paper down without sending the coupon. Don't go on as you are with pains and with almost no life and energy. You owe it to yourself to be a better man or woman. You were put here to enjoy life—not just to drag through it. So do not rest another day until you have put your name on the coupon here. That will bring the whole story of these great new inventions. Do it today—now.

Lindstrom & Company
2322 Indiana Ave. Dept. 13-52 Chicago
Please send me your free book, "Health—Power—Beauty" and full information of your 10-day Free Trial Offer.

Name.....
Address.....



Chicago TECH College

FOUNDED 1904

Degree Courses in Engineering, Electricity and Architecture. Enter any time. Day and Evening Classes. Many students earn expenses while learning. Free employment service for students and graduates. 28th year. Send for 80 page "Blue Book." Mailed Free. Address the President, Charles W. Morey, B. S., M. E.

CHICAGO TECHNICAL COLLEGE
Dept. B-73, Chicago Tech. Building, 115 E. 25th Street, Chicago, Ill.

Prepare now for increasing opportunities in these fields. Save time here. Special short course (4 months) in Drafting. 1, 2 and 3 year diploma and B. S.

DRAFTING Engineering Electricity Architecture

FREE Radio Handbook

Write today for your copy of the new Radio Association handbook. Shows you easy ways to make money in Radio. Tells you how our members are clearing up \$1.00 an hour spare time. Write for Membership Plus which need not cost you a cent and FREE RADIO HANDBOOK.
RADIO TRAINING ASSOCIATION OF AMERICA
Dept. PM-2 4513 Ravenswood Ave., Chicago

Learn to PAINT SIGNS and SHOW CARDS

We quickly teach you by mail, at school, in spare time. Four-hour detour. Big future. Interesting work. Oldest and foremost school.
EARN \$50 TO \$200 WEEKLY
Otto Wiegand, M.A., home-study graduate, made \$12,000 from his business in one year. John Vason, N.Y., gave \$50 for a show card. Crawford, E. C., wrote: "Earned \$200 while taking course." Write for complete information.
DETROIT SCHOOL OF LETTERING
154 Stinson Ave. Est. 1879 Detroit, Mich.

New Orange Juicer

Clever new machine ends squeezing, straining, seeding, necessary with old-type juicers. Simply turn handle, gives up 20% more juice. Priced amazingly low. Home-ware-articles, restaurants, etc., buy on sight. Big cost—minimum—up to \$5 an hour (full time, spare time). Write quick for BIG MONEY offer!
KWIKWAY PRODUCTS, Inc.
Dpt. B-120, 1415 Pine St., St. Louis, Mo.

NO JOKE TO BE DEAF

—EVERY DEAF PERSON KNOWS THAT
George P. Way made himself hear, after being deaf for 25 years, with Artificial Ear Drums—his own invention. He wore them day and night. They stopped head noises and ringing ears. They are invisible and perfectly comfortable. No one sees them. Write for his true story. "How I Got Deaf and Made Myself Hear." Also booklet on deafness. Address
George P. Way, Inc., 402 Hoffman Building, Detroit, Michigan



NEW MEDICATED SILK ADHESIVE ENDS CALLOUSES

Thin, glove-like Comfil-like Comfil-tape stops pain instantly, gently absorbs corns, callouses, reduces bunions. Safe; cannot harm flesh. Binding money-back guarantee. Send \$1 for large spool to try at our risk, Comfil-tape Lab., Dept. 20, Burlington, Vermont.



Quit Tobacco the easy, natural way



White Cross Anti-Tobacco Treatment is scientifically prepared to aid men and women banish quickly all desire for Smoking, Chewing or Snuff. Pleasant. Harmless. Endorsed by thousands. Established 1912. Write today for free booklet and trial offer. If it helps you, tell your friends. Address:

WHITE CROSS, Inc. Guardian Trust Bldg. DENVER, COLO.
Branch Offices: Kansas City—Los Angeles

HEALTH for YOU

Suffering Relieved—Work Made Easy!

Men everywhere are finding new joy of living, are relieving pain and strain with The Natural Body Brace!

Overcomes weakness and organic ailments; develops lungs, chest; erect, strong figure. Replaces and supports misplaced organs. Supports enlarged abdomen. Strengthens and straightens the back. Corrects stooping shoulders, relieves backache, curvature, nervousness, constipation, after effects of the Flu. Enables you to be active, do things, feel fit always!

THE NATURAL BODY BRACE

Made to fit individual measures. Comfortable, easy to wear. Over 300,000 satisfied users.

A PROVED AID FOR RUPTURE—Overcomes painful, boring pressure of the ordinary Truss. Brings wearer many general body benefits while holding rupture easily and comfortably.

COSTS YOU NOTHING TO TRY

If Not Satisfactory After 30 Days Trial! Be fit, strong, active. Conserve your health and efficiency. Save your body. Save money!

MAIL COUPON now for free illustrated booklet, "Health, Strength and Perfect Figure," with details of our liberal trial proposition and the Free Howard C. Rash Individual Health Service.

THE NATURAL BODY BRACE CO.
205 Rash Building, Howard C. Rash, Pres., Salina, Kansas



The Natural Body Brace Company, 205 Rash Building, Salina, Kansas.

Please send me your free booklet, "Health, Strength and Perfect Figure," and full details of your liberal Trial Proposition and free Individual Health Service.

Name.....

Address.....

City..... State.....

MAIL THE COUPON



How to Obtain A Better Looking Nose

Improve your personal appearance. My free book tells you how I guarantee to improve the shape of your nose by remodeling the cartilage and fleshy parts, quickly, safely, and painlessly, or refund your money. The very fine, precise adjustments which only my new patented Model 25 Shaper possesses, make results satisfactory and lasting. Worn night or day. Over 100,000 users. Send for free book to **M. TRILETY, Pioneer Nose Shaping Specialist** Dept. 197 BINGHAMTON, N. Y.

MOLES and WARTS

REMOVED PERMANENTLY



Rid your face, neck, arms and body of all unsightly moles and warts with "ANTI-MOLE." One application does it. Safe—easy to use—painless—leaves no scar. Used successfully by physicians, skin specialists and beauty experts for 28 years. Write for FREE booklet on treating all kinds of moles and warts. **Miller Co., 2445 South St., Lincoln, Nebr.**

RUPTURES

now held securely without heavy, steel trusses



Rupture sufferers everywhere report amazing results with the Brooks Automatic Air-Cushion Appliance. Weighs but a few ounces. Over 3 million sold. No heavy pads, gouging steel girdles, leather straps or metal parts. Holds with marvelous comfort and security. Wear one ten days on trial. Try it without a penny's risk. You'll say it's perfect too. Send for free book on Rupture, 10-day trial offer and full particulars—all sent postpaid in plain sealed envelope.

BROOKS APPLIANCE COMPANY

107F State Street

MARSHALL, MICH.

LEARN IN A FEW SHORT WEEKS A REAL TRADE

LEARN IN A FEW SHORT WEEKS A real trade. Work with real tools on real equipment. Learn all about **GENERAL ELECTRICITY, AUTO MECHANICS** or **RADIO**. NO BOOKS, NO LESSONS. My training **GUARANTEED**. Learn how to get and hold a big pay job.



ORA WAGGONER

Six Students from One Family

Grayson, Kentucky, family makes good. I have had six students in ten years from the Waggoner family, and they are all following their trade, or are in business for themselves. Ellis and Bill Waggoner are in business, and employ their cousin, Wayne Dameron, Lewis Waggoner is working in Ashland, Kentucky. O. C.

runs his own business in Grayson, and Ora has a place awaiting him in Olive Hill, Kentucky. Most of these young fellows were originally miners. It shows that grit, determination, and proper training will put you over the top.



McSWEENEY SCHOOLS

CLEVELAND, OHIO

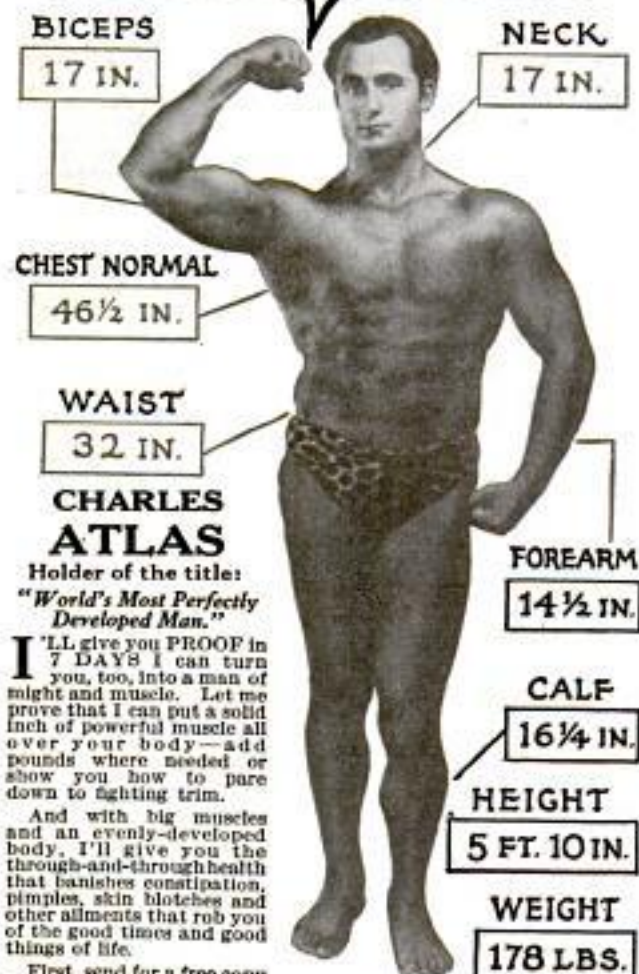
Write for FREE Book

J. H. McSweeney, Pres., McSWEENEY SCHOOLS, Dept. C-10-P, Chester at 30th St., Cleveland, O.

Please send me your big FREE book and full details of your special tuition offer. (Check school interested in.) I am writing my name and address in the margin of this page.

ELECTRICAL AUTOMOTIVE RADIO

"Give me your measure
and I'll **PROVE**
that you can have
a body like mine"



CHARLES ATLAS

Holder of the title:
"World's Most Perfectly
Developed Man."

I'LL give you PROOF in 7 DAYS I can turn you, too, into a man of might and muscle. Let me prove that I can put a solid inch of powerful muscle all over your body—add pounds where needed or show you how to pare down to fighting trim.

And with big muscles and an evenly-developed body, I'll give you the through-and-through health that banishes constipation, pimples, skin blotches and other ailments that rob you of the good times and good things of life.

First, send for a free copy of my large illustrated book—"Everlasting Health and Strength." Then let me prove—in only 7 days—what my secret of **Dynamic-Tension** will do for YOU—in your own home—spending 15 minutes a day doing what I tell you—without apparatus—without special foods, pills, or baths—without any fussy contrivances!

Remember, it's easy my way—**Dynamic-Tension** does the work. Find out what my secret will do for you—mail the coupon NOW for a free copy of my valuable book, **CHARLES ATLAS** (Dept. 8B), 133 East 23rd St., New York City.

CHARLES ATLAS (Dept. 8B)
133 East 23rd St., New York City.

I want proof **Dynamic-Tension** will give me, too, a healthy, husky body and big muscle development. Send free book at once.

Name.....
Address.....
City and State.....
(Please print or write plainly.)

CONDON'S GIANT TOMATO



"QUEEN OF THE MARKET." Big Money Maker. Large, solid fruit; excellent canner. To introduce to you our Northern Grown Live Seeds and Plants, we will mail you 125 seeds of Condon's Giant Everbearing Tomatoes and our Big 1931 Catalog of Seeds, Plants, Shrubs, 192-Page Book **FREE** tells how, and when to plant. Send 2c stamp to cover postage. 1931 Prices Lower Than Ever.
CONDON BROS., Seedsmen
Rock River Valley Seed Farms
Box 187 ROCKFORD, ILLINOIS

Read MILLER'S Daring Offer!



BROODERS GIVEN AWAY WITH BABY CHICKS, which are sold ON **EASY PAYMENTS**—the best guarantee that chicks are pure bred, healthy, vigorous and come 100% alive. Read offer in Miller's 1931 Wonder Bargain Book—64 pages of **SURPRISE OFFERS** in Baby Chicks, Brooders, Broilers, Scapions, 100 articles for Home, Family, and Farm. Many items less than cost. Write for book today and get picture ready for framing. Get advance copy. Address
J. W. MILLER CO., DEPT. 12 ROCKFORD, ILL.

INCREASE YOUR POULTRY PROFITS!



By proper Breeding, Feeding, Housing, Culling and Marketing **AMERICAN POULTRY JOURNAL** tells how to do it, and in addition a series of **COLOR PICTURES**

with explanatory text tell and show many things you should know. They are not just colored pictures of birds but pictures of an educational nature, something never before shown by a poultry paper. 12 issues of **American Poultry Journal** contain about 1000 pages—

Price 25c a year—5 years \$1.
AMERICAN POULTRY JOURNAL, 14-536 S. Clark St., CHICAGO

RAISE CHINCHILLA

AND NEW ZEALAND WHITE FUR RABBITS **Make Big Money** AND CONTRACT FOR ALL YOU RAISE paying up to \$6.50 each. Large illustrated book, coloring and contract, also copy of *Fur Farming Magazine*, all for 10c. **STAHL'S OUTDOOR ENTERPRISE CO., Box 141A, Holmes Park, Missouri**



SQUAB BOOK FREE

Breed PR squabs for rich trade. Sold by millions at higher prices than chickens. Send free-stamp for postage on latest free 48-p. book how to breed and profit by new fast sales method.

Plymouth Rock Squab Co., 634 H St., Melrose, Mass.



ACCREDITED PURE BRED POULTRY

Big, two-colored **FREE** book tells all about Famous **SUNFLOWER STRAINS** of Poultry, Hatching Eggs, **BABY CHICKS**, Brooders, Houses, Supplies, **LOW PRICES** for Accredited and Exhibition Matrons. Beautiful book sent **FREE**. Write **BERRY BROTHERS, Box 40, Atchison, Kans.**



RAISE PIGEONS and RABBITS FOR PLEASURE AND PROFIT

Over 20 varieties of Pigeons. Also Bantams. Send 10c for illustrated catalog and full information.
W. V. MOORE, BOX A, STERLING, ILL.



70 BREEDS Chickens, geese, turkeys,

and ducks. Pure-bred, hardy, high quality and most profitable. **Fowls, Eggs, Baby Chicks and incubators at reduced prices.** America's great plant—since 1893. Valuable 100 page Poultry book and catalog **FREE**.
R. F. NEUBERT Co., Box 878, Mankato, Minn.



10 FREE CHICKS

With each 100 ordered before Mar. 1st. Chicks delivered any time. \$1.00 down rest C.O.D. Write for catalog and attractive prices.

Kentucky Hatchery, 398 West 4th St., Lexington, Ky.



WONDERFUL NEW BOOK FREE

Nation's Great Poultry Manual. Tells how you can make money with **BERRY'S CERTIFIED CHICKS**, Hatched Fowls and Supplies. Also facts about Housing, Feeding, Diseases, Remedies, etc. **NEW LOW PRICES** and **VERY BEST QUALITY**. Write today for free Catalog.
BERRY'S POULTRY FARM Box 29, Clarinda, Iowa



80 BREEDS Chickens, ducks, geese

and turkeys. Pure bred hardy northern raised Gold Seal stock **Fowls, eggs, baby chicks, lowest prices.** 49 years experience and my Valuable 100 page Catalog and Breeders' Guide **Free**
W. A. Weber Co. Box 28, Mankato, Minn

Inventor Produces Amazing "Gas Bug"

*That Will Save
Gasoline*
and make many other
Engine Improvements

Here's a creation so surprising in its action and results that it sounds almost like fiction. Yet it exists as a scientific fact—already tested on hundreds of cars. It has been called "the strangest acting motoring improvement under the sun." A secret called "Gas Bug"—a "miracle" fluid that "crawls" as though filled with invisible life. Not a gasoline dope, carburetor device, electrical apparatus or other mechanical "contraption". No wonder agents are offered such a big money making possibility through our plan of giving car owners Sample Demonstrations that quickly do a vital engine job absolutely Free—a job that, if done by a mechanic, would cost real money.

Gives New and Old Cars More Power and Pep

Vital engine improvements that motor-dom has always striven for may be actually realized—increased gas mileage, reduction of many engine evils that cost motorists millions, increased engine efficiency and increased mileage of engine service. Saves money in gas, engine repairs, upkeep, wear and tear, valve grinding, carbon removing and other ways. In 3 minutes you see amazing results—More power, more speed, more pep, smoother running engine—Loosens carbon—Valves operate snappier, faster, more accurately—Winter starting is easier—Missing, bucking, carbon knocks and spark plug troubles diminish—Makes those and many other vital improvements. And it costs almost nothing to use.

AGENTS—Your Dream Has Come True

This queer creation has proved so sensational in results and offers agents such big, quick money possibilities that no one less than the United States Motor Industries itself has taken it over and backs it with its own warranties. Now, at last, the dream of nearly every agent has come true—a plan to make big money without personal "cold-turkey" canvassing. Stay at home and let the mails get the prospects for you—yes, without even leaving your house. The newest, liveliest plan we have heard of in years. On our daring new plan you actually start in a "Mail Order Business" of your own, at home, in full or spare time. With your supply of "Gas Bug," we furnish—without extra charge—samples, powerful circulars, return post cards, envelopes, order blanks—all the mail order literature you need to start this sensational plan at once. You mail them with Free Demonstration Sample offer to car owners in your territory—and then watch your profits commence to roll in. So wonderful are the results of



"Gas Bug" that we let agents place it with car owners on 30 days' trial at our risk. No wonder "Gas Bug" offers such big money opportunities.

If You Don't Get A Single Order WE PAY YOU FOR TRYING

On another daring offer, we actually pay you cash on each outfit you don't sell and return to us for any reason. Thus you get cash whether you make sales or not. But that's not all—we even pay you an additional cash penalty if you don't satisfy yourself that "Gas Bug" offers \$20 a day possibilities for you.

\$100.00 REWARD

We do as we promise. We will pay \$100.00 cash reward to any worthy charity if anyone can show that we do not fulfill every promise we make to our agents.

SAMPLE OFFER \$1.00 Cash Bonus for Testing It

So that you can test the astounding merits of this amazing creation and to start you quick as a money-making agent, we will send you our offer of a complete "Gas Bug" outfit for your own car. Rush coupon. Send no money. Nothing will be sent C.O.D. In addition, if it doesn't do everything we claim, send the merchandise back, and we will actually pay you a \$1.00 cash bonus for testing it. We expect this sensational announcement to bring thousands of applications for these big money openings. So Rush Coupon to United States Motor Industries, Inc., Accessory Division, 311 N. Desplaines Street, Dept. 62, Chicago, Illinois.

United States Motor Industries, Inc.,
Accessory Division,
311 N. Desplaines Street, Dept. 62,
Chicago, Illinois.

Without cost or obligation to me, rush Sample Offer of "Gas Bug"; offer of \$1.00 Cash Bonus for testing it; plan that lets me start in Mail Order Business of my own at home; Warrantee of Cash even if I don't make sales; and details of Cash Bonus if your plan doesn't show me \$20.00 a day possibilities. This is not an order. Send nothing C.O.D.

Name.....

Address.....

City..... State.....

Master The Trade That Pays Best

Thoroughly and Practically Trained
Aircraft and Automotive Mechanics

EARN \$50 TO \$200 A WEEK

—learn the facts

DO you want a position where you can make more money—have unlimited opportunities—advance surely and swiftly? Then get into the **AUTOMOBILE OR AVIATION INDUSTRIES!**

Today the largest manufacturing industry in the world is the Automobile Industry. There are more than 26,000,000 vehicles registered in the United States alone. And every one of them must be serviced regularly.

The Aviation Industry is a close second, being one of the fastest growing businesses in the country. The outlook for 1931 and after is most promising.

Think of the unlimited opportunities the future holds in either of these industries for the man who has the technical and practical knowledge to service these machines and ships.

A 21 Year Record

For more than 21 years the Stewart Tech has been training men to fill good-paying positions in these industries. All you need is a liking for mechanics and a willingness to learn. There are no more completely equipped workshops to be found anywhere. Our skilled instructors are the best obtainable and hold government licenses.

You'll learn to locate trouble, take down, repair, rebuild and "tune-up" standard makes of automobiles or airplanes, by doing actual work with proper tools on up-to-date equipment and real live motors.

Let us show you how we can start you on the road to a successful career. A thorough training is the starting point.

Executive positions and opportunities to get in business for yourself will naturally follow.

Visit our school as soon as possible. See our thoroughly equipped shops. Let us tell you how you can master a complete shop within 6 to 12 months and "Pay-as-you-go." Call at once or mail the coupon below. It costs nothing to investigate and may mean thousands of dollars a year to you later.

Your opportunity is here

STEWART TECHNICAL TRADE SCHOOL

202 Stewart Tech Building, 253-5-7 W. 64th St., New York, N.Y.

I am interested in knowing more about your courses on Auto and Aero Mechanics. Without obligation on my part please mail me further information.

Name.....

Street.....

City & State.....Age.....

Check your preference:
 Aero Mechanics Auto Mechanics



"Live Engine" Testing

FREE THE Gibson BOOK

Shows you the way to popularity, pleasure, bigger income with an easy playing Gibson banjo, guitar, mandolin or ukulele. If no teacher in your town ask about Reser's Correspondence Course.

Harry Roser, Chief of the Cicquet Club Eskimo, premier banjo soloist and teacher.

FREE TRIAL; EASY PAYMENTS on any Gibson. Send for your book now.

Gibson Inc.
203 PARSONS STREET, KALAMAZOO, MICH.

LEARN TO EARN \$50 TO \$150 PER WEEK
Write for Free Booklet
SWEENEY Automotive Electrical Aviation **SCHOOL**
1615K Grand Ave. KANSAS CITY MO.,

Amazing Mechanical Doorman Closes Doors Gently



Imagine a home, store or office, in which doors swing shut swiftly, securely but noiselessly as if operated by invisible doorman. No annoying racket—no broken glass or damaged woodwork—no try thoughts to cause colds, sickness, and wasted fuel. Sounds like magic, yet Close-A-Door does it all! The invention millions have long waited for—a automatic door closer check combined—the any door—amazingly low in price.

An Amazing Money Maker
Acquire simply costing money just showing up—rooms miniature door demonstrator. Write at once for full description of this hot selling little wonder worker and details of liberal starting plans.

THE CLOSE-A-DOOR COMPANY
1531 Washington Ave.
Dept. B-10 St. Louis, Mo.



RUBY GIVEN

To introduce our Imported Mexican Blue-Flash Gem, the only low-priced gem exactly matching genuine diamonds with same blue-white brilliancy and rainbow

fire, guaranteed for life, we'll send this beautiful, flashing, fiery, red Mexican Ruby. Just clip out this ad, mail with your name, address, and 10c to partly cover handling cost and we'll mail with (catalog of gems and special half price offer. Write today.

MEXICAN GEM IMPORTING CO., Dept. 106, MONTEREY, CALIF.

\$6240 MADE BY CHAI SELLING OUR PENS
No. 10, 3 in fountain pen-pencil with compass.

"I can honestly say that I have earned \$60 weekly for the last two years selling these pens."
—Jas. Chot, Illinois.

SELLS FOR \$1.25
SEND ONLY 39¢ GUARANTEED TWO YEARS
Writes like \$7 pen
FREE: Wholesale catalog showing over 500 fast sellers.
SPORS IMPORTING CO.
1230 Main St. Lesueur Center, Minn.

New Adding Machine Fits Vest Pocket!

Adds, subtracts, multiplies, and divides like \$300 machine—yet it costs only \$2.50. Weighs only 4 ounces. Not a toy—guaranteed for lifetime. Perfectly accurate, lightning fast. Sells on sight to business men, storekeepers, homes—all who use figures. Write at once for **Free AGENTS** Sample Offer and Money-Making Plan, 100% Profit!
C. M. CLEARY, Dept. 262 303 W. Monroe St., Chicago

Learn **SIGN** **and** **SHOW-CARD** **WRITING**

In spare time a few hours weekly

FREE "Book of Facts" — Write For It



Fascinating profession. Big opportunity in this fast-growing trade. Earn while you learn the sign arts. No talent or experience required. Be your own boss or obtain a good position. Learn show cards, posters, bulletins, signs, advertising layouts and allied subjects. We teach by mail or at our school. Quick results—easy to learn.

EARN \$50 TO \$200 WEEKLY

Otto C. Wiegand, Md., home-study graduate, made \$12,000 from his business in one year. Many successful graduates. Oldest and foremost school. Don't delay. Write for complete information.

DETROIT SCHOOL OF LETTERING

193 Stimson Ave. Est. 1899 DETROIT, MICH.

Government Positions

Clerk Carriers, Rural Carriers, Railway Mail Clerks, Postmasters, Department Clerks, and many others. Splendid salaries, easy work, vacation with pay. Only common school education required. Examinations often. 44,817 appointed last year. Send for our Civil Service Catalog No. 6. **COLUMBIAN CORRESPONDENCE COLLEGE, Washington, D. C.**

DENISON'S PLAYS Musical Comedies, Operettas, Vaudeville Acts, Minstrels, Comedy Songs, Make-up Goods. **55 YEARS OF HITS** Catalog Free

T.S. Denison & Co. 623 S. Wabash, Dept. 9, Chicago

Make Money in PHOTOGRAPHY

MOTION pictures and photographic field offers opportunity to ambitious men and women. Previous experience unnecessary. We train you. Motion picture camera or projector, "still" camera or photo-finishing outfit **FREE** of extra charge.

Good Pay for Movie Cameramen
Learn motion picture photography! Be your own boss or train for an interesting, worthwhile position in industrial and newsreel companies, for scientific work and on exploring expeditions as well as in large studios. Instruction in sound photography included **free** of extra charge.

Be A Motion Picture Projectionist
Good pay, steady employment and fascinating work amidst congenial surroundings await you. You can qualify right at home, in your spare time. We train you in every phase of "sound" projection free of extra cost.

Splendid Opportunities Await Trained "Still" Photographers
"Still" photographers and photo-finishers in demand. Splendid positions open, or go into business for yourself. Free Book gives full details. Mail coupon for your copy—today—**NOW!**

New York Institute of Photography,
10 West 33rd Street, Dept. AB-1450, New York City.

Please send me your **FREE** book and details about:

Motion Picture Photography Projection Photo-Finishing

"Still" Photography

Name.....
Address.....
City.....State.....



There is a very definite Opportunity for You in Aviation

THIS young giant of an industry is expanding rapidly. Opportunity after opportunity is being created. New planes are rapidly being put into operation. New transport lines are starting. Old ones are expanding. More good men are consequently needed. These men demand and receive good pay. They advance rapidly. But they must be trained men—prepared and equipped.

One of the leading schools for training and equipping men is the School of Von Hoffmann. It has the personnel, the equipment, the location, and the long record for graduating successful men. Von Hoffmann trained men are recognized throughout the industry. They, too, are leaders. The training we give exceeds Government requirements. It is thorough and complete. Proper training takes less time than you think and it is not expensive. If you will send in the coupon below, we shall be pleased to send you full particulars about the school, the courses we teach, the length of time each one takes, the cost, and any other special information you might desire.



A practical method of easy payments is available for those who desire it.

Located on the famous \$2,000,000 Lambert-St. Louis Airport.



U. S. Department of Commerce approved School for Transport. Limited Commercial and Private—Ground and Flying.

Von Hoffmann Aircraft School

138 Lambert-St. Louis Flying Field, St. Louis, Mo.

Von Hoffmann Aircraft School
138 Lambert-St. Louis Flying Field
St. Louis, Missouri. MAIL TODAY.

Name.....
Address.....
City.....State.....
Age..... I am interested in
 FLYING COURSE MECHANICS COURSE
 WELDING COURSE HOME STUDY



General view of one section of our Service Department, showing students doing actual work on various Radio Receivers

LEARN RADIO~TELEVISION

Not By Books or Correspondence — By

Don't spend your life slaving away in some dull, hopeless job! Don't be satisfied to work for a mere \$20 or \$30 a week. Let me show you how to make REAL MONEY in RADIO—the Fastest-Growing, Biggest MONEY-MAKING GAME ON EARTH!

Thousands of Jobs Open Paying \$60, \$70 to \$200 a Week

Jobs as Designer, Inspector and Tester paying \$3,000 to \$10,000 a year—as Radio Salesman and in Service and Installation Work, at \$45 to \$100 a week—as Operator or Manager of a Broadcasting Station at \$1,800 to \$5,000 a year—as Wireless Operator on a Ship or Airplane, as a Talking Picture or Sound Expert—THOUSANDS of JOBS PAYING \$60, \$70 and on up to \$200 A WEEK!

No Books — No Lessons All Practical Work

Coyne is NOT a Correspondence School. We don't attempt to teach you from books or lessons. We train you on the finest outlay of Radio, Television and Sound equipment in any school — on scores of modern Radio Receivers, huge Broadcasting equipment, the very latest Television apparatus, Talking Picture

and Sound Reproduction equipment, Code Practice equipment, etc. You don't need advanced education or previous experience. We give you—right here in the Coyne Shops—all the actual practice and experience you'll need. And because we cut out all useless theory, you graduate as a Practical Radio Man in 8 weeks' time.

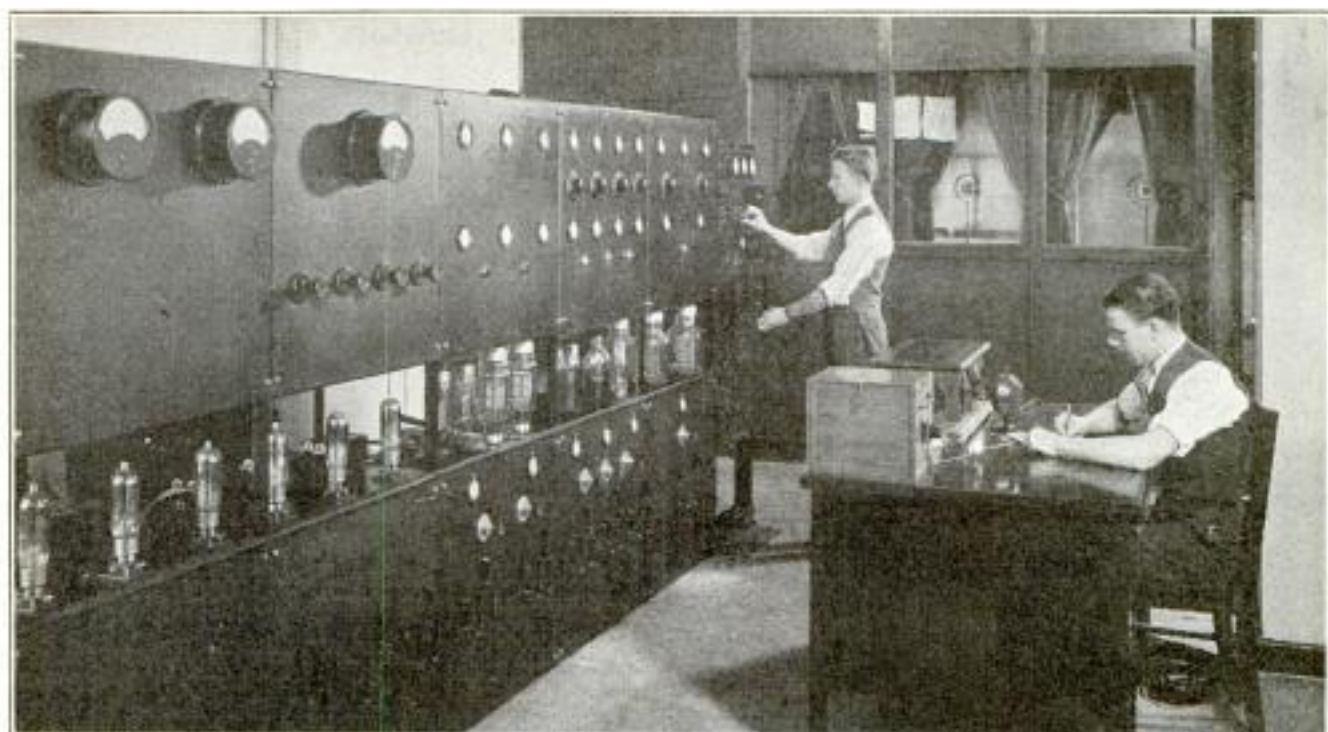
Television is on the Way!

And now Television is on the way! Soon there'll be a demand for THOUSANDS of TELEVISION EXPERTS! The man who learns Television NOW



Instructor explaining principles and operation of a Talking Picture Machine

MAIL COUPON ON OPPOSITE PAGE



Students operating our modern Broadcasting equipment. In the rear you can see our Sound Proof Studio Room

TALKING PICTURES in 8 WEEKS

Actual Work... In the Great Shops of Coyne

can make a FORTUNE in this great new field. Get in on the ground floor of this amazing new Radio development! Come to COYNE and learn Television on the very latest Television equipment.

Talking Pictures A Great Field

Talking Pictures and Public Address Systems offer thousands of golden opportunities to the Trained Radio Man. Here is a great new field of Radio work that has just started to grow! Prepare NOW for these marvelous opportunities! Learn Radio Sound

work at Coyne on actual Talking Picture and Sound Reproduction equipment.

EARN AS YOU LEARN

Don't worry about a job! Coyne Training settles the job question for life. We often have more calls for Coyne Graduates than we can supply. You Get Free Employment Service For Life. And don't let lack of money stop you. If you need part-time work while at school to help pay living expenses, we will gladly help you get it. Many of our students pay nearly all of their expenses that way.

Coyne is 32 Years Old

Coyne Training is tested, proven beyond all doubt. You can find out everything absolutely free. How you can get a good Radio job or how you can go into business for yourself and earn from \$3,000 to \$15,000 a year. It costs nothing to investigate! Just mail the coupon for your copy of my big Free book!

H. C. Lewis, Pres. RADIO DIVISION Founded 1899

COYNE ELECTRICAL SCHOOL

Dept. 21-3H.

500 S. Paulina Street CHICAGO, ILL.

H. C. LEWIS, President

Radio Division, Coyne Electrical School

500 S. Paulina St., Dept. 21-3H, Chicago, Ill.

Send me your Big Free Radio Book and all details of your Special Introductory Offer. This does not obligate me in any way.

Name.....

Address.....

City.....State.....



Students operating and adjusting our modern Television Transmitting equipment

FOR BIG FREE BOOK

FREE PLAN

Starts You
In Your Own
Cash Business

This tried and proven plan has started many men on the road to success and independent incomes. They now have their own steady, year 'round business and are making **BIG PROFITS** filing saws on the Foley Automatic Saw Filer. E. C. Winters writes, "... average about 20 saws a day and make from \$12 to \$15 a day. . . ."



FOLEY AUTO MATIC SAW FILER

FILES ALL KINDS OF SAWS

This one machine files all kinds of saws better than the most expert hand filer, and evens all teeth at the same time, *automatically*. Foley-filed saws cut better, faster, cleaner, truer and stay sharp longer because *every tooth cuts*. Saw users prefer Foley-filed saws.

START IN SPARE TIME AT HOME

You can build up a fine paying cash business right at home. **NO CANVASSING**. No stock to carry and practically no overhead expense. **NO EXPERIENCE NECESSARY**—easy work and no eye strain. You can get plenty of business with the Foley.

Big Profits— This is the kind of a business you have been looking for. It is a **REAL OPPORTUNITY**—become independent. Get started **NOW!**

Mail Coupon for FREE PLAN

Foley Manufacturing Co.

210 Foley Bldg., 11 Main St. N. E., Minneapolis, Minn.

Please send me your **FREE PLAN** telling how I can get started in my own business filing saws on the Foley Automatic Saw Filer.

Name

Address

LAME BACK?

—Lumbago?



HE: *I'll never be able to work today with this pain in my back.*

SHE: *Here, pat on Sloan's Liniment. It eases backache for me in 5 minutes.*

... IF you want to relieve lame back *quickly*, pat on Sloan's Liniment. Sloan's brings a rush of fresh blood to the sore spot. Drives out that terrible pain. You don't need to rub. Sloan's *warms like sunshine* when just patted on. Used in 13 million homes. Get a *fresh* bottle from your druggist today. Only 35¢.

SLOAN'S Liniment



Wins second place 1930 National Air Races. Build it yourself in groups starting for \$11.75. Send 10c for complete illustrations.

CHURCH MID-WING

CHURCH AIRPLANE & MFG. CO., 4844 Nevada St., Chicago



GIANT TELESCOPE \$1.75
5 SECTIONS—3 FT. LONG
See Miles Away! Distant people and objects seem close. Over 3 ft. long, brass bound. Made in Europe. Bbls. of fun. Thousands pleased.
Send No Money! On arrival pay Postman special price, only \$1.75, plus postage. Two for \$3.25. (Or send price and we pay postage.) Satisfaction guaranteed or money back. Send today.
BargainHouse, 545 Washington St., Dept. 11, Chicago

FREE With Order
Strong leatherette Carrying Case and Solar Eye Piece to view the sun.

FREE TOOL BOOK "The Disston Saw, Tool and File Book"

tells how to choose, use, and care for tools, file and set saws, etc. Every tool user needs it. Henry Disston & Sons, Inc., Dept. M, Philadelphia. Canadian Factory, Toronto

AGENTS—BIG MONEY IN NEW

FLASHER SIGN

Retails \$7.50—Looks Like \$100.00 Write for Details
WILLIAMS SIGN CO. 30 N. LaSalle - Chicago

AGENTS 500% PROFIT

GENUINE GOLD LEAF LETTERS

S guaranteed to never tarnish. Anyone can put them on stores and office windows. Enormous demand, large profits. Paul Clark says: Smallest day \$28.70. R. L. Reel made \$920 in two months. Write today for free sample and liberal offer to general agents.
METALLIC LETTER CO. 433-B N. Clark St., CHICAGO

Turning on water faucets pours Money into your hands

Why drink
dirty, germ
laden water?

Here, at last, is an amazing water filter that attaches to the faucet and removes instantly the germ laden dirt from drinking water. Housewives everywhere want this Filter the minute they see it. It is a health protection that is needed and should be in every home.

Scientists have proven that water filtration prevents such diseases as Erysipelas, Septicaemia and Diarrhea and actually lowers the death rate from Typhoid Fever. It is a proven fact that in many communities the water that comes from the drinking faucet is laden with disease germs.

Why continue to take chances with disease and death—why be subjected to danger and possible sickness by drinking raw, unfiltered water?

Dirty drinking water is a thing of the past the minute an Automatic Water Filter is installed. Saves buying expensive spring water. Now clear, clean water is within the reach of all.

Sample Free to Workers

We have arranged a plan that makes it possible for agents to start immediately making big money with the Automatic Water Filter. Good paying territory is open. Our plan enables those who are really interested to obtain their sample for nothing. Mail coupon today for Free Offer Plan.



New invention
purifies water
instantly... at the
faucet!

Just imagine a device that purifies water instantly at the faucet and yet can be attached in a few seconds! Think of it—You can put on an Automatic Filter, let the water run for ten minutes, remove the filter and find enough dirt and filth to fill the bottom of a glass. When you see what this Filter does you will not want to be without it. It delivers pure, sparkling water, clear as crystal and free from germ laden filth.

FILTERS LIKE NATURE

It is just like bringing a bubbling spring into your kitchen. The principle of the Automatic Filter is just like nature. It forces the water thru crystal silica sand. The dirt and germs cannot pass thru the sand so the water that comes out of the faucet is clean, free from impurities, pleasing to the taste, and healthful to the body. Crystal Spring Water could be no more pure or healthful than the water that comes out of the Automatic Water Filter. It also prevents splashing.

Guarantee

It makes no difference where you live, or what kind of drinking water you have, the Automatic Water Filter will remove dirt and filth from it. We guarantee it to purify water, remove dirt and filth, protect against contamination and deliver pure crystal clear, sparkling water, or the trial costs you nothing.

AGENTS

If you are earning less than \$3.00 an hour and would like to make up to \$100 a week and even more, clip and mail the coupon today. The Automatic Water Filter offers quick sales and big profits. Every housewife in your territory is waiting for this health protector.

MAIL THIS COUPON TODAY

Automatic Water Filter Co.,
Dept. 142, 2621 N. 3rd St., Milwaukee, Wis.
Gentlemen:—You may send me full particulars of your free offer and big money-making proposition.

Name.....

Address.....

City.....State.....

**AUTOMATIC
WATER FILTER CO.**
MILWAUKEE, WISCONSIN

Q/57



An Aerial View of the Downtown Section of New York City a Few Minutes after Airplanes, Engaged in Mimic Warfare, Have Laid Down a Gas Attack; the Vapor through Which the Towers Peep Represents the Gas Which, if Deadly, Might Destroy Thousands in a Few Minutes

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

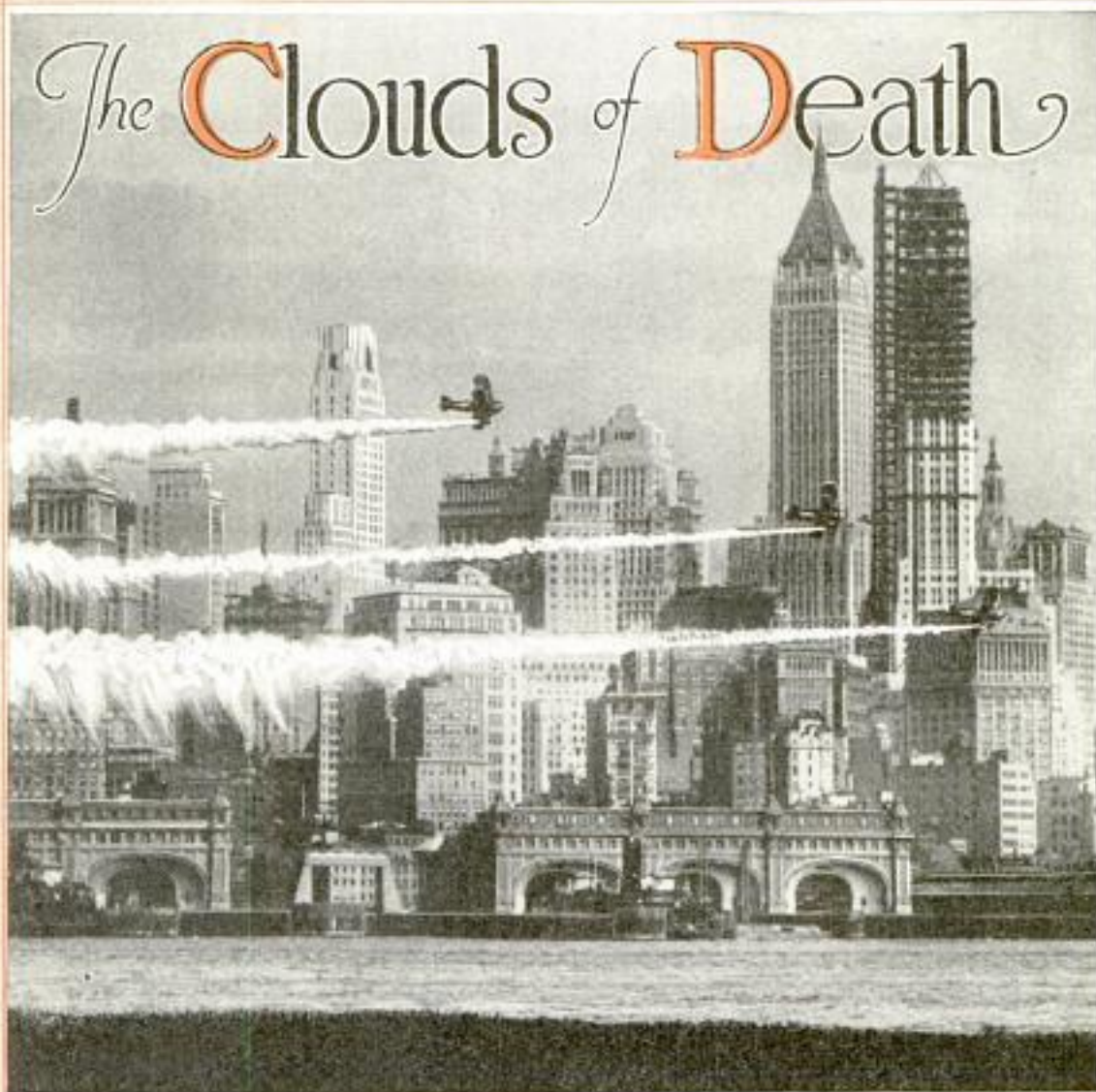
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 55

FEBRUARY, 1931

No. 2

The Clouds of Death



Bombing Planes Beginning a Mimic Gas Attack on New York City; These Big Ships Are Just Starting the Smoke Curtain over the Water, Preparatory to Flying over the City Itself

Dr. By CORLEY McDARMENT, Langley Field, Hampton Va

UNHERALDED and in silence, military men of all the civilized countries are closely watching the chemical laboratories for new agents of destruction.

At all peace conventions, the diplomats decry the use of gas in future warfare, but everybody in position to know about these matters realizes that gas will un-

doubtedly be employed in the next war. Some experts go so far as to assert that the next war will be nearly all gas.

The first use of gas in modern times, which was during the World War, was looked upon with horror. But all new weapons have survived because they were effective.



Gas is certainly effective. It makes soldiers fight in masks. It puts a vast number of men out of battle for weeks or months, and yet it kills very few when defensive measures are used.

It has been predicted that the next war may be won by the side that develops the use of a gas which will penetrate the masks worn by the troops in the field. This does not mean a gas to eat holes in the masks, but one that will pass through the filters which neutralize the known gases. There are many gases now which will penetrate the masks used during the last war.

One of the recent developments in this gas warfare is the use of a gas which will seep under a mask and cause sneezing, or vomiting and force the soldier to remove the mask in the presence of other gas which strangles or paralyzes.

A new gas developed since the war has the long chemical name of "chlorovinyldichloroarsine." But it is commonly called "Dew

of Death." Three drops of this gas in liquid form on the skin of a rat will cause death within one to three hours. An amount of the liquid of this gas as small as a half inch in diameter splashed upon the bare skin of a man will kill him.

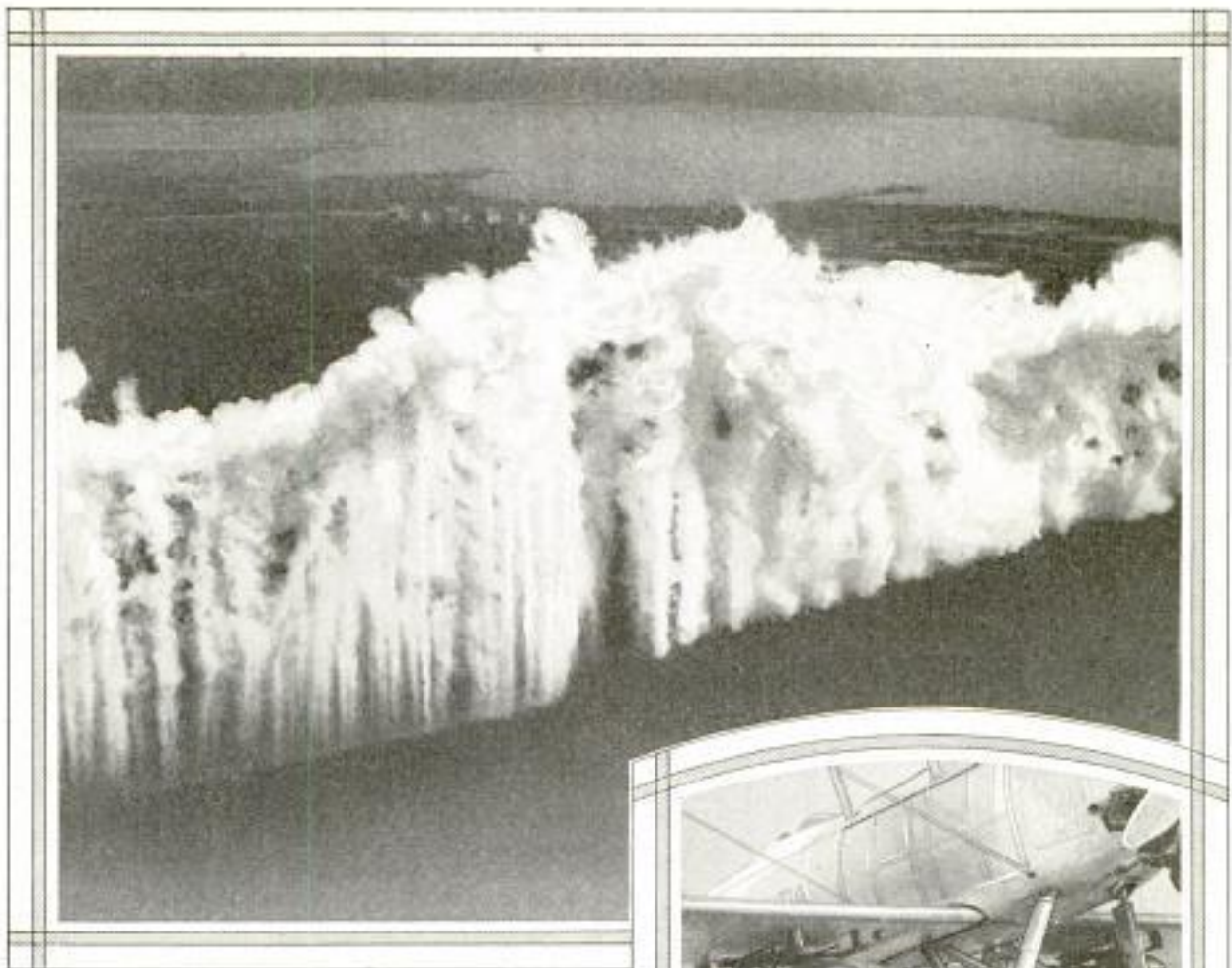
And then there is another chemical plaything which may be used in another war, called hydrocyanic acid. This was known during the World War, but was not used because no effective way had been developed to get good ground concentration. The airplane, however, can carry it very well. This is the quickest poison that chemical warfare has at hand in large quantities—or rather that may be obtained

in quantity. This acid paralyzes the nervous system and quick death follows.

The killing gases, however, are not so bad as one may think. They are not gentle creatures by any means, but where soldiers are prepared for poison gas, very few get deadly doses. It is no easy matter to get a concentration of poison gas thick



Top, German Civilians Wearing Gas Masks; Center, Gas Tank of Pursuit Plane; Below, Filling Smoke-Screen Apparatus



Smoke-Curtain Spray at 500 Feet: Right, Two Gas Bombs beneath Wings of a Plane

enough out in the open air to slay everything in the vicinity.

To be effective in battle, it has been learned, all the chemicals used need not be of the killing kind. The big lethal gases tend to remain sticking around on objects for some time and this is not always desired. Such gas action renders a position untenable for both friend and enemy. On account of this effect, much has been done lately in developing tear gases and containers. A tear gas that will sneak into a regular gas mask would win a war, according the best experts. A soldier absolutely cannot fight, nor even see, while exposed to tear gas, and his position and arms may be taken without a struggle. This is far more humane than blasting his arms and legs off with guns or sprinkling him with deadly gases and acids.

But there has been developed still another gas, one which acts upon metals. This gas was used to some extent during the war against personnel, but its effective-

ness against the metal of guns was not then appreciated. It corrodes the working parts of a machine gun so that, overnight, it may be made useless.

With airplanes as gas carriers, an attack may be launched at almost any time, day or night. Gas containers which fit underneath an airplane may be hooked up within a few minutes. Thus the heavy and dangerous gases may be carried low over the heads of enemy positions and deposited with telling effect. Even liquid fire may be used to break up machine-gun nests. It has been predicted that asbestos clothing will be necessary in the next war.

☐ Pearl piano keys now can be obtained to replace worn ivory parts.

McMackin Piano Service, Des Moines, Iowa

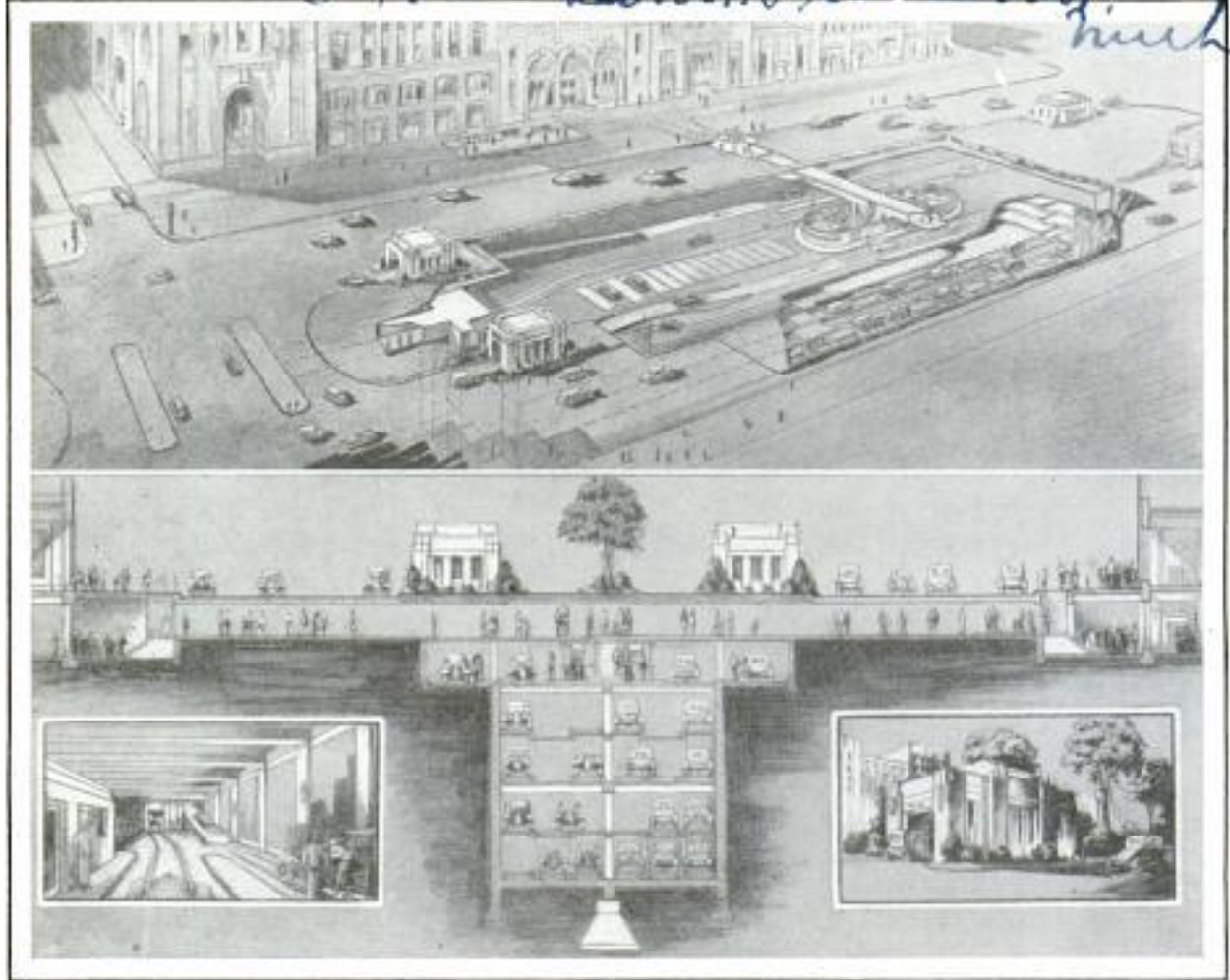
2064 180 Mrs. Wilfred V. Casgrain

POPULAR MECHANICS

and Nolan S. Black

UNDERGROUND GARAGE TO END PARKING PROBLEM

3454 Detroit St. Detroit Mich



Drawings Showing Details of Plan for Underground Garages to Solve Parking Problems in Congested Areas; Elevators and Electric Conveyors for Cars Are Included in Design

To solve parking problems in congested city business districts, a system of mechanically operated garages has been designed to be constructed under the streets where the shopper who wishes to store his car for only a short time will always find a convenient place to park at moderate cost. Except for the underground feature, the mechanical garage would operate somewhat like the skyscraper garage that is already in existence. From a street-level entrance, the patron would proceed down a ramp to the first level, or reception floor, where he would receive a parking receipt and depart. A conveyor would carry the car to an elevator which in turn would lower it to a parking floor to be discharged mechanically to an electrically operated transfer truck running on rails. This transfer truck, with the car on it, would travel to a parking stall selected by an attendant by remote electric con-

trol, and the truck would be shifted sideways into the parking space.

2136

CREATING LIFE IN TEST TUBE STILL DREAM OF SCIENCE

Can man create life from inert matter? The question is almost as old as the dreams of the alchemists who sought to make gold out of baser metals. The answer, to date, is in the negative, for every attempt has failed although sensational results have been obtained. The most recent report that life had actually been formed from ashes and chemicals in a test tube by Dr. George W. Crile, noted surgeon of Cleveland, Ohio, was met with the prompt reply from Doctor Crile that, while he had been conducting such experiments, he was as yet unable to tell whether they would be a success or failure, and that the search into the unknown

Science Service
news Bulletin
507-A 12/8/30

see Aug. 1932-232

was still far from finished. In 1911, H. C. Bastain startled the scientific world by producing what appeared to be living matter in glass tubes from non-living materials. More recently, Dr. D. T. MacDougal and Dr. Vladimir Moravek, noted physiologists, "created" an artificial cell that displayed many of the characteristics of life and twenty-five years ago Dr. Jacques Loeb succeeded in causing unfertilized eggs to develop by treating them with chemicals. His experiments have since been repeated many times, but there was no real creation in any sense as a living egg was used from the first.

2107

MACHINE WEARS OUT CARPETS TO TEST THEIR QUALITY

Wearing qualities of various kinds of carpet are determined by a tester at the bureau of standards. A sample is tacked on a turntable which revolves under two wheels that bear down on the carpet with pressures corresponding to the weights of different persons. The pressure can be varied and, in operating the machine, the carpet receives a twisting motion and horizontal stress, the combined strains being closely equivalent to what the sample would receive in actual service. Changes



© U. & V.
Machine Employed by the Bureau of Standards to Test the Wearing Qualities of Carpets

in the thickness of the piece are measured with a sensitive gauge.

MUSIC IS CHANGED INTO COLOR AND MADE VISIBLE

2130



Combination of Radio and Electric Apparatus Which Transforms Music into Visible Colors

After a year of experiment, a radio-research engineer has succeeded in making an apparatus intended to transform music and voices into visible colors. The machine which translates tones into colors consists of an intricate array of radio and electrical connections and a hooded black box in which the tones are "seen."

Arthur L. Smith

PRESSURE OF GAS IN TREES IS MEASURED

2141

For the purpose of studying the relation existing between the internal structure of woods and gas pressure, an instructor in the department of forestry at the University of Minnesota has made an apparatus to determine the internal gas pressure of trees. It consists of a brass plate with a rubber gasket which, when fastened to the smooth part of a tree, reduces pressure to such an extent that a hole may be bored and a tube inserted. By forcing the tube into the tree trunk about three inches and closing the outer end with a stopcock, gases are extracted and internal pressure measured by fluctuations in a column of mercury connected to the tap. To collect the gases for analysis, a vacuum tube is inserted instead of the mercury tube. The percentages of gases and conditions affecting them thus are obtained.

Warren Chase

Leo Angelus, Calif. 135 W. 62nd St. Minnetonka, Minn.

2115

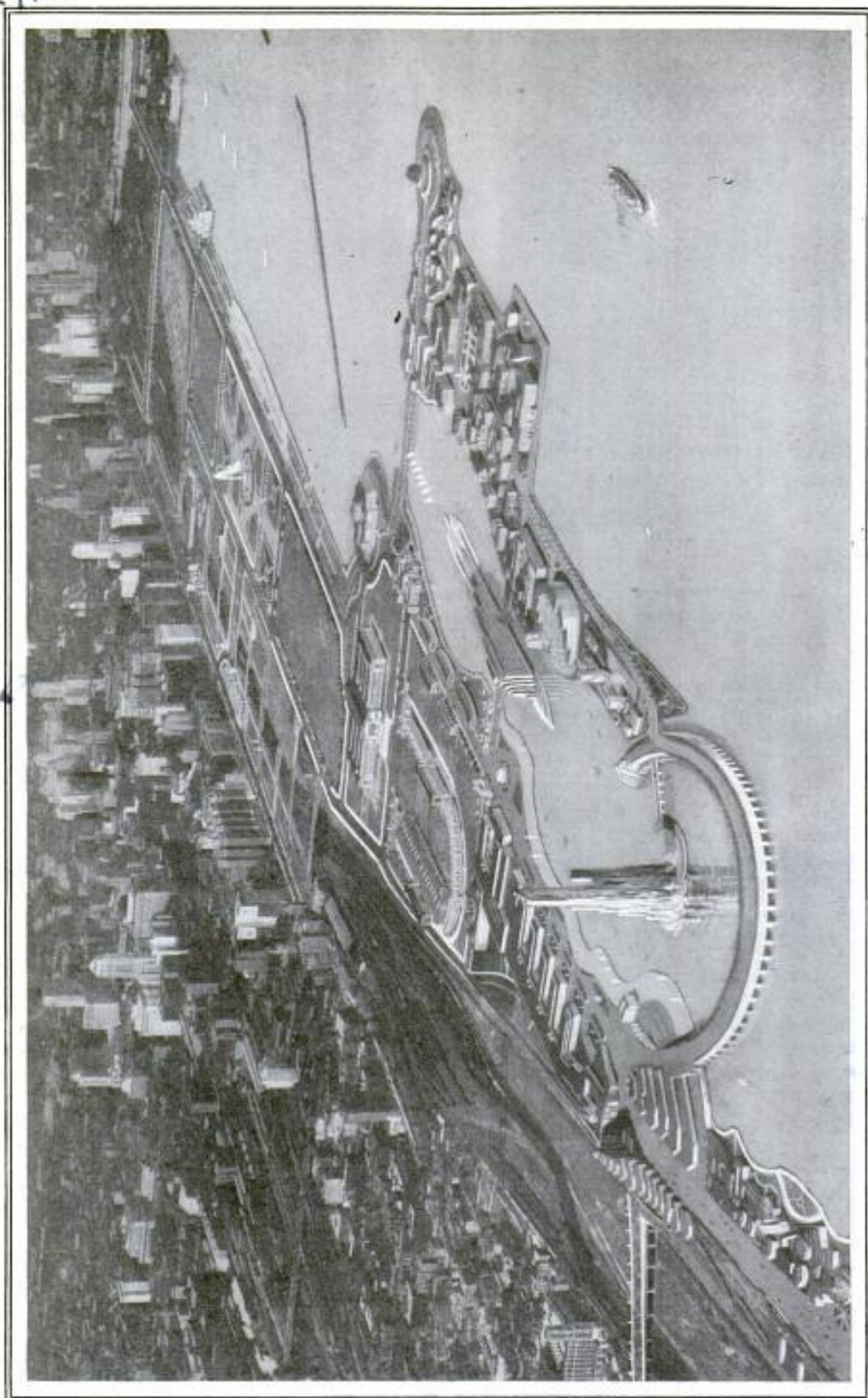


Photo-Diagram Showing Location and Part of the Buildings as Proposed for the Chicago World's Fair Centennial Celebration in 1933; the Fair Structures, Decidedly Modern in Design, Are Augmented by the Field Museum of Natural History, the Soldiers' Field and Other Buildings Already Constructed

© Chicago Aerial Survey
 232 S.
 Copyrighted material
 Michigan
 Chew

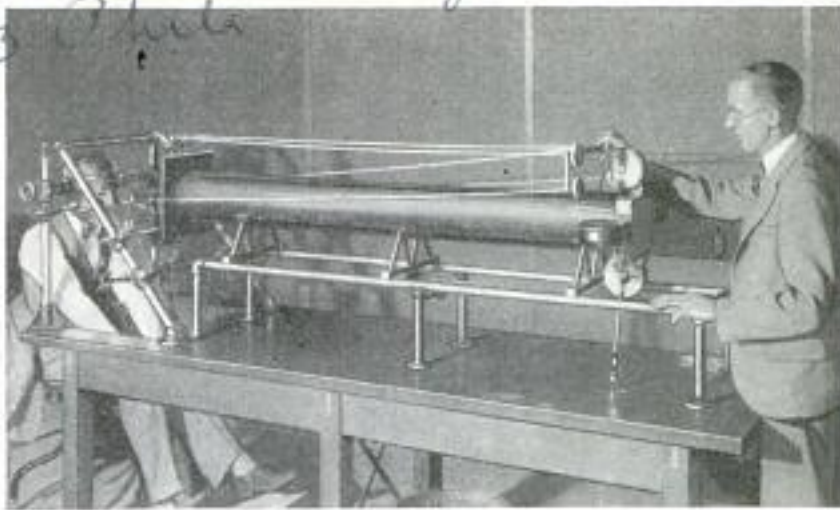
4528 Walnut
Cont. Seco. H. Esphorah
2143

Play a local % of system chief engineer
at Station WCAU
POPULAR MECHANICS
Universal Broadcasting Co

2103

INAUDIBLE SOUNDS TO AID DEAF

Radio principles are being applied as aids to the hard of hearing through the use of sound waves pitched so high as to be inaudible to persons with normal ears. Heretofore most appliances to aid the partly deaf have depended on some form of sound amplification. Research engineers, however, observed that the hard of hearing seemed to hear much better in a subway or other place where there was a constant noise or roar. They decided this was due to the fact that this noise kept the eardrums in vibration and that the vibrating drums were more sensitive to sound than when set in motion from a state of rest. In order not to annoy normal persons, a method was developed for sending out sound waves of a frequency beyond the range of the ear. These waves are not heard, but keep the eardrums vibrating, thus making it easier for the partly deaf to pick up audible sounds. A radio oscillator is used to create the inaudible pitch and a reed operated by compressed air to supply body or volume and frequency.



Apparatus Which Makes a Movie Record of Eye Movements When Reading; It Is Used to Help Correct Faulty Reading Habits

FAULTS IN READING REVEALED BY MOVIES OF EYES

Motion-picture records of a person's eye movements while reading are made with an apparatus at the University of Minnesota which is intended to detect faulty reading habits. A tiny broken beam of light, flickering fifty times a second, is reflected into the subject's eyes by means of small mirrors. The reflection on the surface of the eye changes direction as the eye moves back and forth in reading. This eye movement is magnified five times by an enlarging camera, and then recorded on standard-size movie film. As the subject reads, the eyes move along the line in an irregular manner, making several pauses, then sweeping back to the beginning of the next line. These jerky movements are recorded as a series of tiny dots on the film. Thus the film may be

studied to note defects in the ability to read rapidly without pausing too long on any word or letter, or rereading a passage. No reading is done while the eye is moving, but only when it is held still, and in silent reading the normal person makes an average of five pauses per line.

GOLF-PRACTICE CAGE SHOWS DRIVES AND HAZARDS

Among the many kinds of golf-practice cages on the market, one is intended to afford more of the thrills of the real game, as it registers strokes that go into the rough, into bunkers or water hazards, as well as the length of the drives that stay on the fairway. After each stroke, the cage can be cleared for the next shot by pressing a button. The apparatus is sturdily built.



Golf-Practice Cage Which Registers Length of Drive, and Strokes That Go into the Rough

Escolp, d nos 308 W
Washington Blvd
Chicago

under supervision of Prof. Hyles
A. Miller at U. of Minnesota

SPEEDING AUTO TARGET AIDS POLICE CRIME WAR



Firing at the Target from Moving Car, and Close View of the Target, Showing Scoring Zones



count of five. A hit that would have struck the driver's companion on the seat beside him counts four, tire shots count three and to hit the top scores two. Puncturing the gasoline tank would also count four. Since the police car can be driven past the target at different angles and different speeds, the shooting practice is considered especially helpful.

PULL OF GRAVITY MEASURED WITH BALLS OF GOLD

2095 What is said to be the most accurate measurement ever made of the constant of gravitation, a basis for computing the mass of the earth, the force with which the earth pulls the moon and other phenomena, has just been completed by Dr. Paul R. Heyl of the bureau of standards, after seven years' work. Similar measurements have been made before, but Doctor Heyl's figure, in view of the special apparatus with which he worked and the numerous checks and rechecks he made, is considered to be the most nearly correct of any. A method, essentially like that followed at the close of the eighteenth century by Henry Cavendish, an English physicist, was used by Doctor Heyl who swung tiny balls of gold, platinum and glass at varying distances from large steel cylinders, weighing about 150 pounds each, and carefully measured the attraction exerted

To help police develop accurate aim with submachine guns in their battles with fleeing bandits, an Omaha man has devised a moving target which represents a speeding automobile. It runs on a track and is operated by a motor. Police, riding in a real automobile some distance away, open fire with their machine guns as the target moves. Their shots are scored according to probable results were the target a real automobile carrying bandits. For instance, shots striking the back of the target in such a position that they would have hit the driver, are given a

Serena Service
506 C. 12/2/30

Capt. F. E. Brokaw stationed with P.D. J.C. here
 at Creighton University by Omaha.

2070

by the big units upon the tiny balls. Although the force was exceedingly small, Doctor Heyl was able to measure it with an accuracy of approximately one-thirtieth of one per cent.

ELECTRIC EYE IS ROBOT GUARD FOR WRAPPING MACHINE

As automatic machinery grows more precise, its accuracy and speed surpass human perception, particularly when operations are performed at the rate of more than sixty a minute. Therefore one machine is being placed as a vigilant watchman over the operations of another automatic machine to prevent errors and correct improper adjustments. This plan was evolved recently when machines that wrap packages in waxed paper developed errors, which wasted paper and resulted in unattractive cartons. The robot watchman is an electric eye, or photo-electric cell, actuated by variations in the intensity of light beams. Small printed spots were placed on the waxed paper and an electric light below the paper roll caused these spots to cast shadows on the photo-electric cell. These interruptions of light are converted into electric impulses amplified to operate power relays which gear the feeding unit and cause it to operate at proper speed. Through a variable-speed transmission, the electric eye also regulates the machines when the paper slips, slowing them down or speeding them up, as required. In this manner seventy-two packages are wrapped each minute, and the cut of paper is kept correct within one-sixteenth of an inch.



The Light Shown Is Part of the Electric-Eye Apparatus That Watches over Work of This Machine



Ejecting Golf Ball from Cup by Touching Button in Bottom; Ball Bounces into Hand

GOLF BALL EJECTED FROM CUP TO SAVE STOOPING

Golfers are saved the necessity of groping about in cups after sinking a ball by an ejector which snaps the ball out of the cup and three feet into the air, where the player may catch it without stooping. The cup is equipped with a small mechanical device which does the ejecting. When the ball falls in the hole, it always takes a certain position. The player then inverts his putter and places the handle in contact with a rubber button which causes a hammer to throw the ball out.

PLANTS FOUND MORE SENSITIVE THAN CHEMICAL APPARATUS

Certain seaweeds, known as kelps, are more sensitive mediums in the test for iodine than any chemical known. These weeds have been found to give evidence of the presence of iodine when taken from waters that show no trace whatever of the element when analyzed by chemical means. It has been established by research that these plants are able to accumulate iodine in water which ordinary tests show is entirely free of it.

Moving advertising cards are being installed in taxicabs.

for H.F. Heiny Co and Kalamazoo Vegetable Parchment Co

Adometer Co, 520 N. Michigan, Chicago

With Infg Co., 327-63rd St., Oakland, Calif.

2101

Carl Eckhardt

Department of Botany, Agricultural Director, U.S. + Pa.

Assembled by General Electric Co. Schenectady, N.Y.

2059

2057

2050 Pan. American Airways, Inc
122 E. 42nd St
New York City

Wings Across

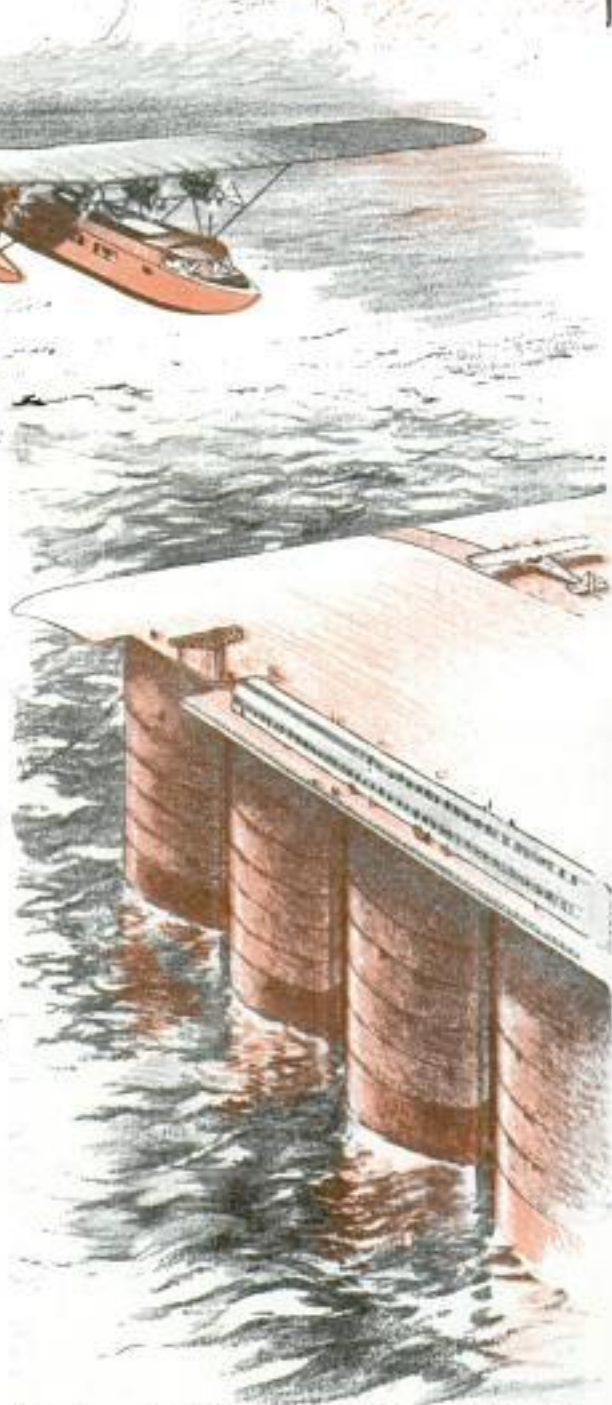
By W. IRVING GLOVER

Second Assistant Postmaster-General

WITH Central and South America already knit to the United States by air, the next step will be air mail and passenger service across the Atlantic. Bids for such a service already have been asked.

Colonel Lindbergh and other great aviators have demonstrated the feasibility of such service. They have flown the Atlantic, conquered the desert, the mountain ranges and the jungles. Long-distance flights, endurance flights, refueling records, the development of better planes, better engines, better radio-communication systems, and other improvements, lend themselves to the proposed service over the waves. All that is needed for the regular transatlantic service is the arrangement of routes, the settling of necessary international negotiations and the development of equipment for the work, including the proper planes, landing and other facilities.

In view of what already has been accomplished and what is now under development, I picture, in the very near future, a three-day air-mail service between this country and Europe. Few persons realize it, but a transatlantic air-mail route already is in operation and has been for about two years. French planes fly from Toulouse down the Spanish and African coasts to Natal, Brazil, using as a way station an anchored vessel several hundred miles from the South American coast. There the planes can be refueled and repaired if necessary. The ship

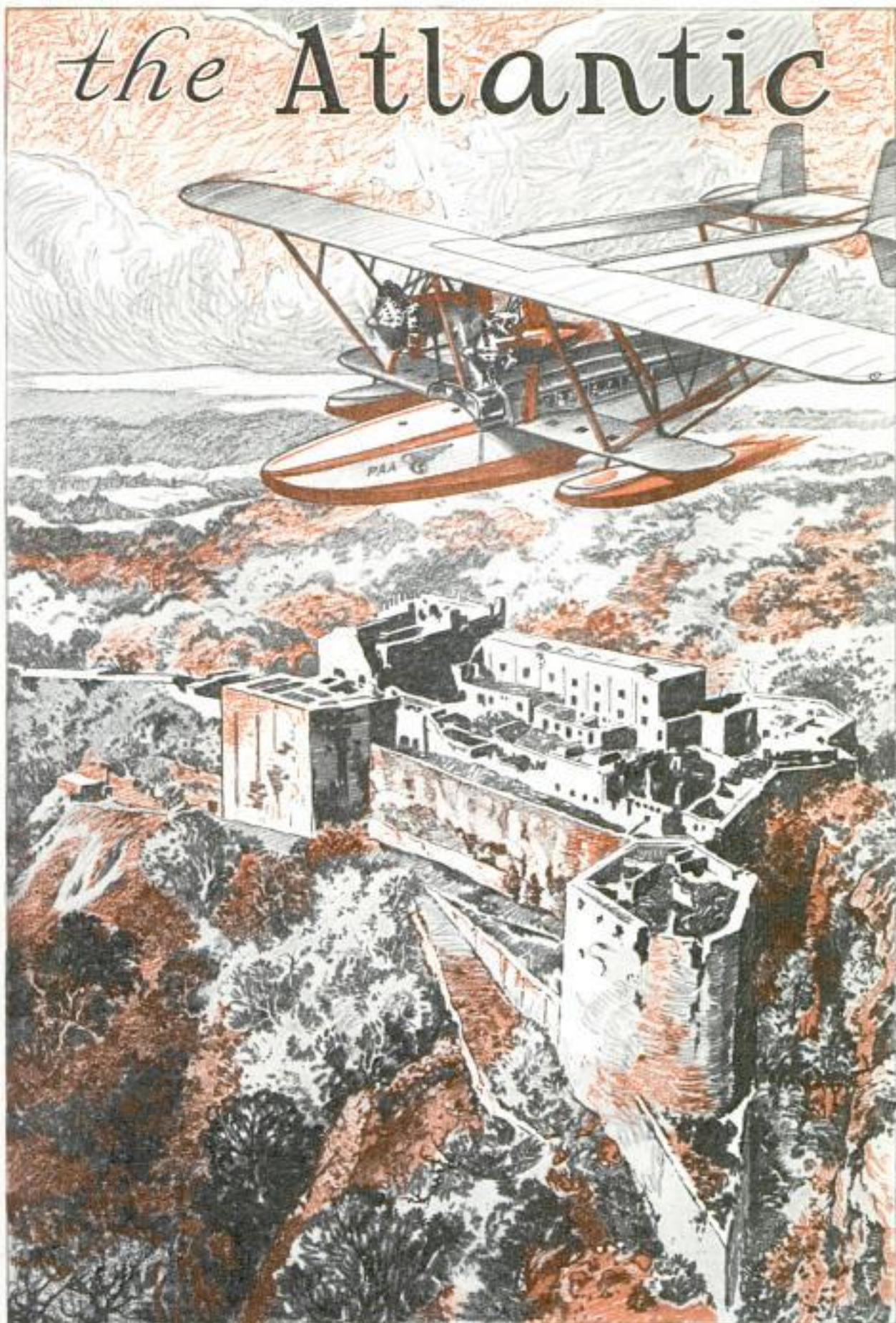


Drawing of Multi-Motored Mail Plane Gliding Down to a Landing on a Seadrome

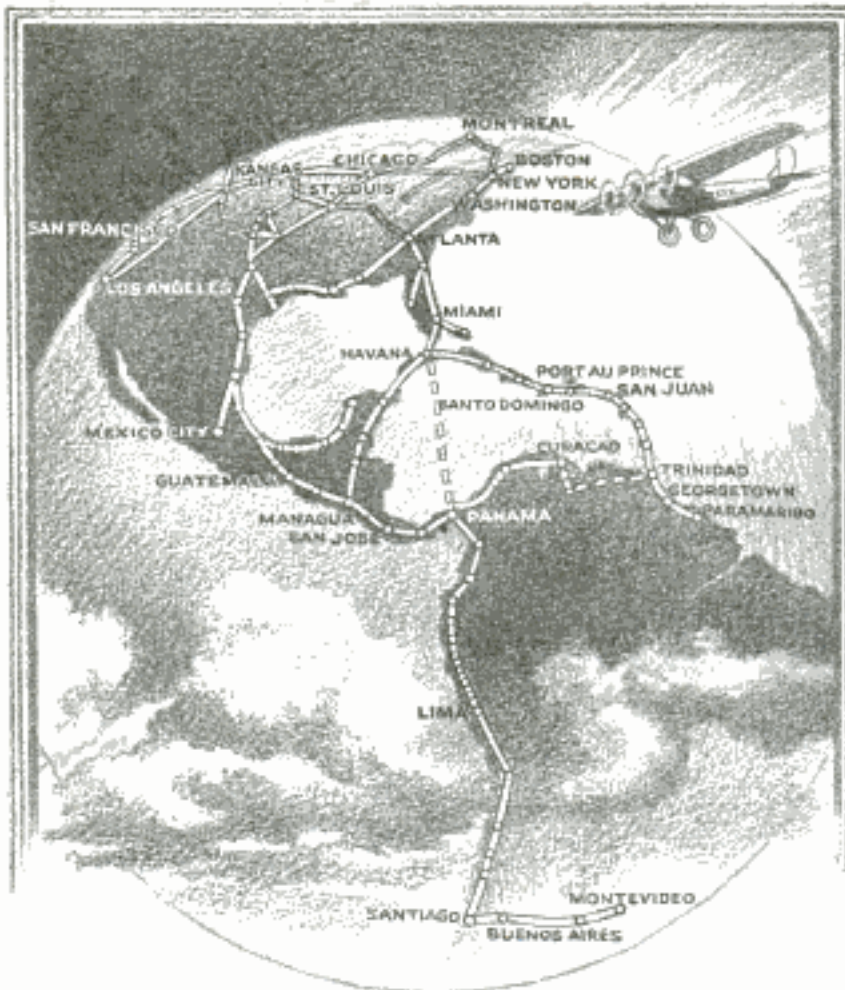
breaks a long water hop, promoting greater ease and safety.

Details of the service between Europe and the United States remain to be worked out, but a feasible arrangement would be something like this: Base ports in this country would be New York, Baltimore

the Atlantic



Planes of the Pan-American Air Lines Now Wing Their Way over Famous Castles, the Jungles of Mexico and Distant South American Countries



Since This Map of Pan-American Lines Was Drawn, Service Has Been Extended to Southern Limit on East Coast of South America

and Charleston, S. C. Planes would leave the latter point for the journey across the Atlantic. The southern way, of course, is longer than the usual passage by way of Newfoundland, but the northern route, repeated flights have proved, is usually stormy and shrouded by fogs much of the time. Weather conditions are generally favorable most of the year by the proposed southern way.

Way points across the Atlantic would be established at Bermuda and the Azores. The long-distance water hops could be broken up by intermediate stations established on "floating islands." Some persons have smiled at the prophecies of inventors who are interested in projects of this sort, but we have learned not to smile too soon. So swift has been progress in aviation that it ill behooves the thinking person to laugh at such proposals. Whether the suggested floating islands will have hotel, swimming-pool and miniature-golf facilities for patrons who desire to stay

awhile, remains to be seen, but the essential idea of a man-made island in the form of an anchored or confined floating landing field suitable for planes to alight upon and to be serviced or repaired, is essentially sound and will probably be realized.

One solution of this problem, an economical and practical one, I believe would be to use vessels already constructed and now owned by the shipping board. They could be purchased, perhaps for as little as \$50,000 apiece. It would be necessary to construct wide decks for landing facilities, but there would not be the expense of elaborate hoisting and propelling machinery essential to the usual airplane carrier. These vessels, equipped with radio-transmitting and receiving apparatus, could be

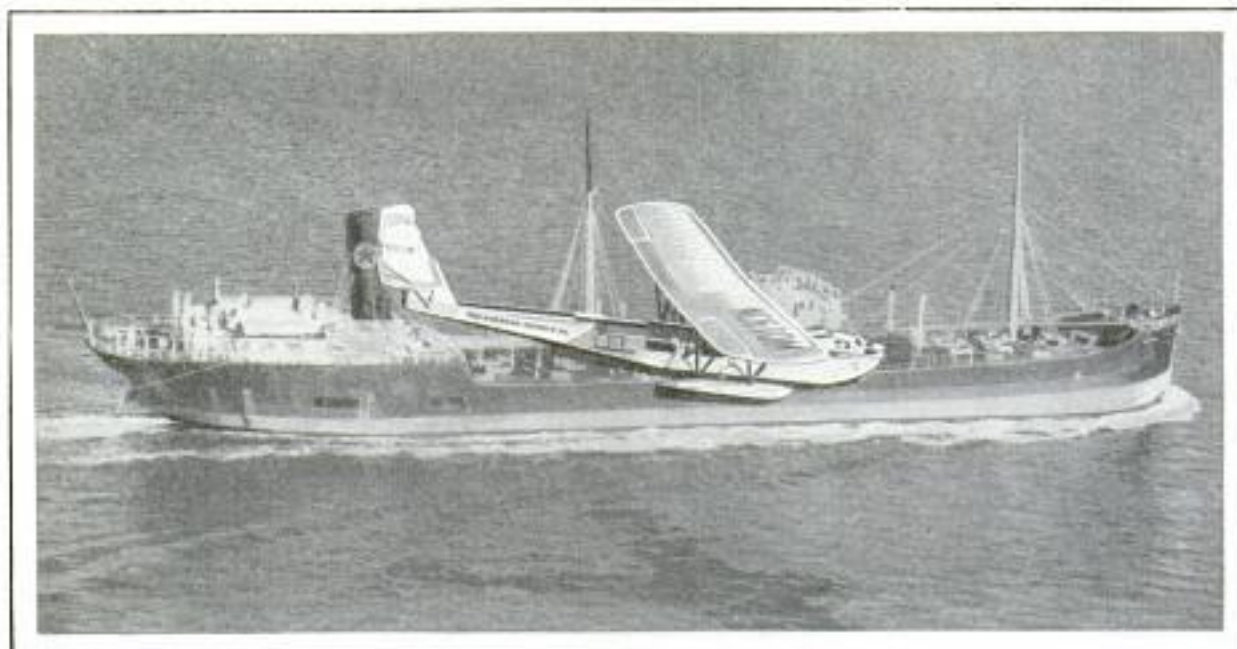
sent out into the Atlantic, stationed at strategic intervals along the proposed route and kept constantly in service as emergency landing and guiding ports for the aid of the planes.

Enough vessels of this kind could be purchased and fitted to form a virtual chain between the mainland, the intermediate islands and the European coast, so that the air route would be marked and serviced with emergency fields just as the present air routes over land are equipped. The vessels could carry, besides their radio and other equipment, powerful beacons for the guidance of night flyers. Their presence in the Atlantic would also be of help to other vessels. The entire fleet of them could be bought and made ready for such service at a total cost well within the realm of practicability.

One of the chief obstacles to long-distance flights has been encountered, not in the actual flight itself, but in getting into



Drawing of Scene at a Cuban Airport Where Modern and Ancient Forms of Transportation Meet in One of the Most Striking Contrasts of the Age



Pan American "Commodore" Plane Passing a Steamer during a Test Many Miles from Shore; Flying Boats Like This Speed over Water Hops of 1,000 Miles and More

the air at the start. The plane is loaded with its necessary pay burden, that is, the mail, express or passengers that it must carry; then, in addition to this, it carries a great quantity of gasoline and oil. It is loaded to absolute capacity. The take-off is often a hazardous and trying affair, straining men and equipment to the limit and often wrecking the hopes of the expedition at the very start.

A solution of this problem could be worked out in a plan for refueling. The ship would be loaded with its pay load and enough gasoline and oil to take it, say 100 miles out. After it had ascended safely into the air and was well under way, it would be met by a service plane and refueled or rather given its full load of fuel from the air, thus saving the tremendous task of taking off with the huge burden of a full pay load and a maximum amount of fuel.

A thorough and dependable radio-beacon and communication service would be installed for the constant guidance of all planes along the way. In case the floating islands had drifted from their set position, the fact would instantly be relayed to the pilots, and little difficulty would be experienced in establishing contacts. The vessels could easily be turned to favorable positions for landing, regardless of the direction of the wind; the hazards of fog and storms are continually

being minimized by the development of better radio systems, improved planes and engines and more skilled pilots. The over-water hops now accomplished in the Pan-American service prove that planes, as now equipped, are capable of long-distance flights in safety. We could start a transatlantic air-mail service tomorrow with the equipment already available, but much more complete and efficient accouterments are rapidly being devised so that, when the service actually goes into effect, no detail will have been overlooked as to safety, speed, economy and comfort for pilots and passengers as well, for the mail planes will also carry people, and a hop to Europe through the air will be a matter of hours instead of days.

We have seen enough of the results of the establishment of air routes to Central and South America, and of the results of the few hops that have been made between America and Europe, to visualize what this regular service will mean in the promotion of international good will and friendliness. After all, the factors that hold the nations apart are largely geographical. When these barriers are literally swept aside as they are being eliminated through the use of the airplane, a large step will have been taken toward the cultivation of world unity of feeling. Geographical nearness is one of the important reasons for the unity of the

Bearing Co. Canton Ohio.

United States. Friendliness with Canada and Mexico is being promoted because the invisible line between us and those nations is now even more invisible, due to aviation.

Air mail to Europe will cut cable expenses, quicken trade, helpfully supplement all other forms of communication now in effect, and will greatly increase the usefulness of the service already established to Central and South America. Man's flights to date prove the feasibility of the project. The necessary equipment, the routes, the personnel and the public co-operation are awaiting call. The post office department, as in the past, is lending its active aid toward the forging of this new link toward international good will.



Big Roller Bearing for Steel-Plate Mill; the Girl Holds a Small Bearing for Comparison

HUGE ROLLER BEARING WEIGHS THREE AND ONE-HALF TONS

Anti-friction bearings during recent years have been growing constantly in size as the machines employing them grew to meet new industrial needs, until recently twenty-eight roller bearings, weighing three and one-half tons each, were produced for a ninety-two-inch plate mill operated by a steel company. These huge bearings are made with the same precision and to the same specifications as the little ones, about two inches in diameter and weighing about seven ounces that are used in automobile wheels. The large bearings, however, have a bore of twenty-nine and one-half inches, an outside diameter of forty-nine and one-half inches and a width of twenty-nine inches, with a load capacity of 8,000,000 pounds at thirty revolutions per minute. One of these big rollers contains enough metal by weight to make thirty-six of the little bearings.

Blind persons in Peoria, Ill., carry white canes which, when raised at street intersections, give them the right of way.

Comb. Arthur Campbell, of The Topeka Capital Topeka Kans.

AIR FOR FIREMEN IS PUMPED FROM HOSE TRUCK

2142

To enable firemen to enter burning buildings without the danger of being overcome by smoke, masks are now provided through which fresh air is pumped from the hose truck. The smoke masks are attached to a small hose connected with the truck pump. Three masks are provided for each line of water hose, enabling three men to enter a burning building with the hose and thus do more effective work. A water trap is provided for the air hose to catch any small amount of water that might be in it when the air is started through. This trap is strapped to the fireman nearest the pumper.



Firemen Equipped with Smoke Masks, Connected to Hose Truck Which Pumps Fresh Air to Them

Used by Topeka Fire Dept.

2002

see file under medicine



Apparatus Installed in a Chicago Hospital for Treating Persons with Curvature of Spine

CURVATURE OF SPINE TREATED BY INTRICATE MACHINE

Curvature of the spine now is being treated by a product of the machine age. A doctor in Italy has developed an intricate apparatus for helping persons with this ailment, one of the machines having been installed recently in a Chicago hospital. The patient is seated on the machine with body bent forward, much as though straddling a horse, and the appliance is then manipulated to cause the desired effects.

Michael Reese

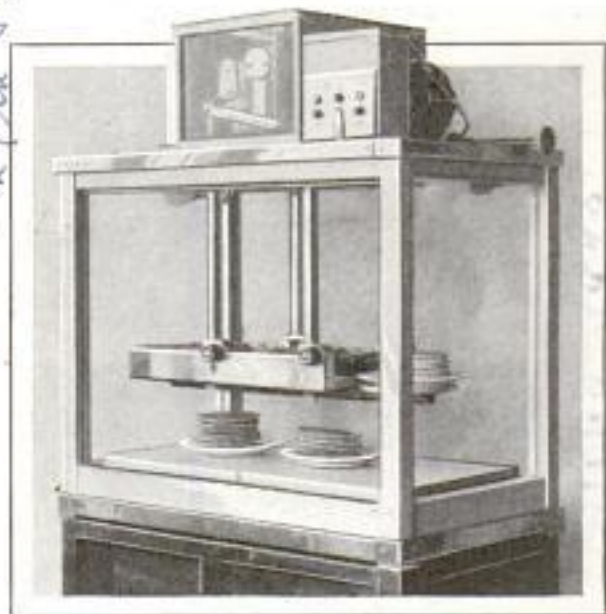
CARBURETOR LIFTS OWN FUEL SAVING GASOLINE PUMP

Vacuum tanks, fuel pumps and other lifting devices are unnecessary with an improved carburation system for gasoline engines which takes the fuel directly from the main tank. It consists essentially of two half carburetors. One, containing the float mechanism and fuel jets is immersed in the tank. The other, having a throttle valve, venturi and spring-con-

trolled air valve, is bolted to the intake manifold in the usual manner. By means of a tube which passes through the muffler, hot air is conducted to the fuel jets, where it picks up the gasoline and carries it through another tube to a hot spot built into the exhaust pipe near the engine. From here the dry gas passes into the front half of the carburetor, where it is diluted with the proper amount of air needed for making the right running mixture. The fuel is partly vaporized at the gasoline tank, making it lighter and thus more easily moved, and the use of the intake-manifold vacuum eliminates the fuel-lifting devices.

CABINET BAKES GRIDDLECAKES AT PRESS OF BUTTON

Griddlecakes are baked automatically in a recently introduced cabinet that functions at the mere pressing of a button and needs practically no attention except to fill a hopper with batter and to remove the cakes. The batter is fed to specially heated plates that cook and flap the cakes and require no grease. The machine can be set to operate continuously or to bake from one to four orders of three cakes at a time. A coin-in-the-slot mechanism may be had if the cooker is desired for drug stores, road stands or self-service restaurants. A thermostat keeps the plates at the proper temperature.



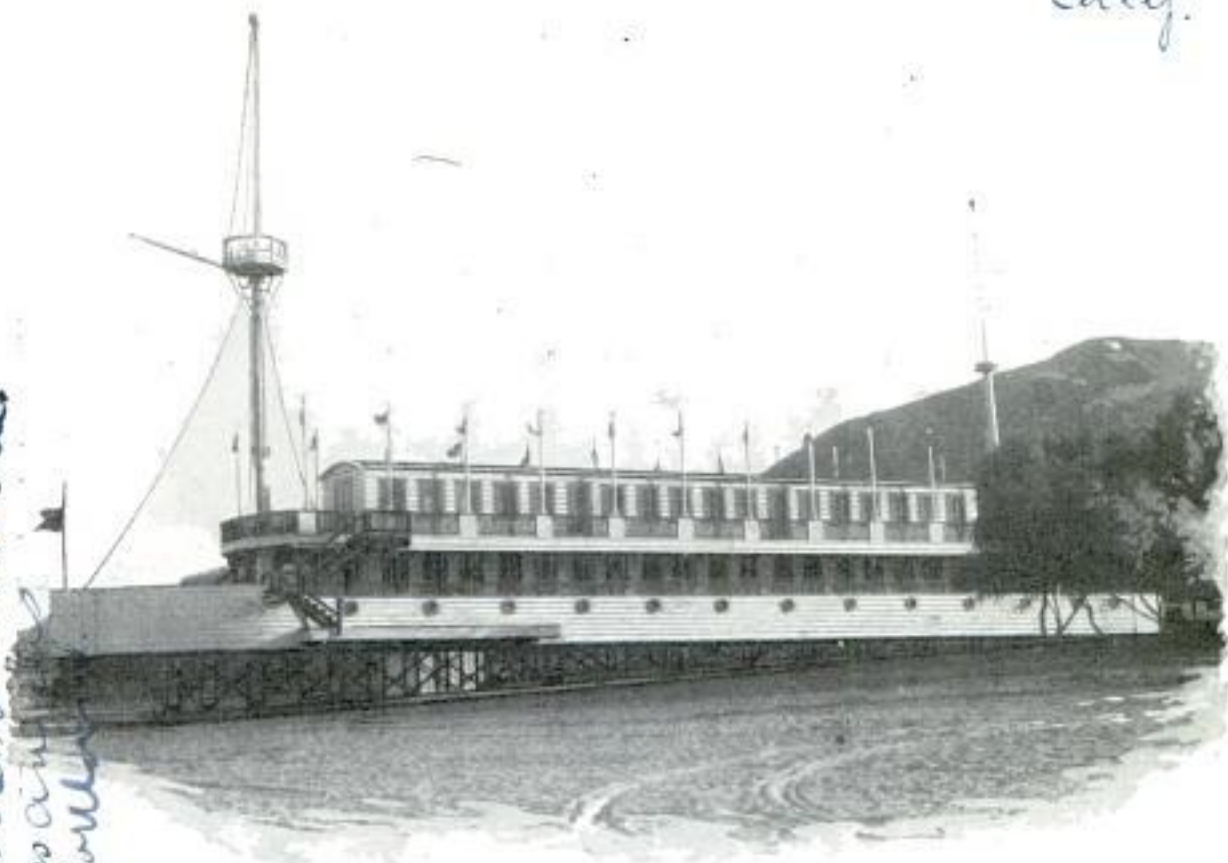
Top View of the Automatic Griddlecake Baker, Showing Stacks Nicely Browned and Ready

Dr. Daniel LeVincich orthopedic surgeon

Do not send cat letters

Stewart Warner Speedometer Corp. 1826 Riverside Parkway Chicago

Simplex Tool Co. W. W. W. Copyrighted material



A Boat That Goes to Sea on a Railroad Track; It Is a Dance Pavilion Built on a Steel Framework That Rests on a Track Which Extends into a Lake

BOAT ON TRACK GOES NOWHERE BUT SERVES DANCERS

Probably the only pleasure boat that goes to sea on a railroad track has been constructed at Elsinore, Calif., as a dance pavilion. A large boat was built on a steel framework, and deep-sea divers were employed to lay a railroad track several hundred feet into the water. By means of an engine and steel cable, the boat, on its track, is run into a lake and withdrawn with its party of dancers when they are ready to depart.

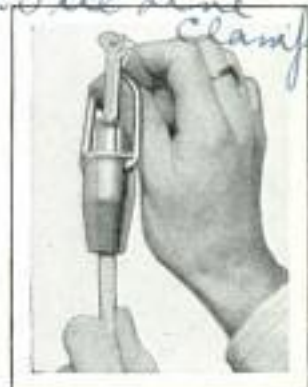
WALLS OF LAMINATED GLASS HAVE COLOR OF PEARL 2076

Walls, table tops, shelves and many other objects are being made of a special laminated glass that has a thin layer of a composition material between two sheets of glass. The middle layer is furnished in many different colors and patterns, and gives the whole the appearance of mother-of-pearl. The glass is especially suitable for the walls of a bathroom, as a substitute for tile. It is easily applied, is al-

ways lustrous, easy to keep clean and will withstand heavy shocks and rough usage. The wide variety of colors and patterns available enables a selection that will harmonize with almost any scheme of decoration.

FASTENERS FOR CLOTHESLINE ARE EASILY ADJUSTED 2043

Three steel balls in a small cylinder with tapering end are the principal parts in a clothesline fastener that is tightened or loosened by a slight pull. The greater the pull on the line, the tighter the balls grip it, but the rope can be released instantly by a tug at the rear of the fastener, thus providing for quick adjustment for length. The device has a brass finish.



The Stanley Works
New Britain, Conn.
Copyrighted material

Chicago - 122 E. Michigan / San Francisco, Atlanta, also New York, Boston, New Orleans, St. Louis, Seattle, Lowell, Portland

Chicago - 61 W. Kinzie

American Window Glass, Farmers Bank, Pittsburg, Pa.

17 40. Cmt. Walter E. Burton
10 32 Florida Ave
Akron, Ohio

RIDING

By W. T. VAN ORMAN

Winner of the 1930 Gordon-Bennett International Balloon Race

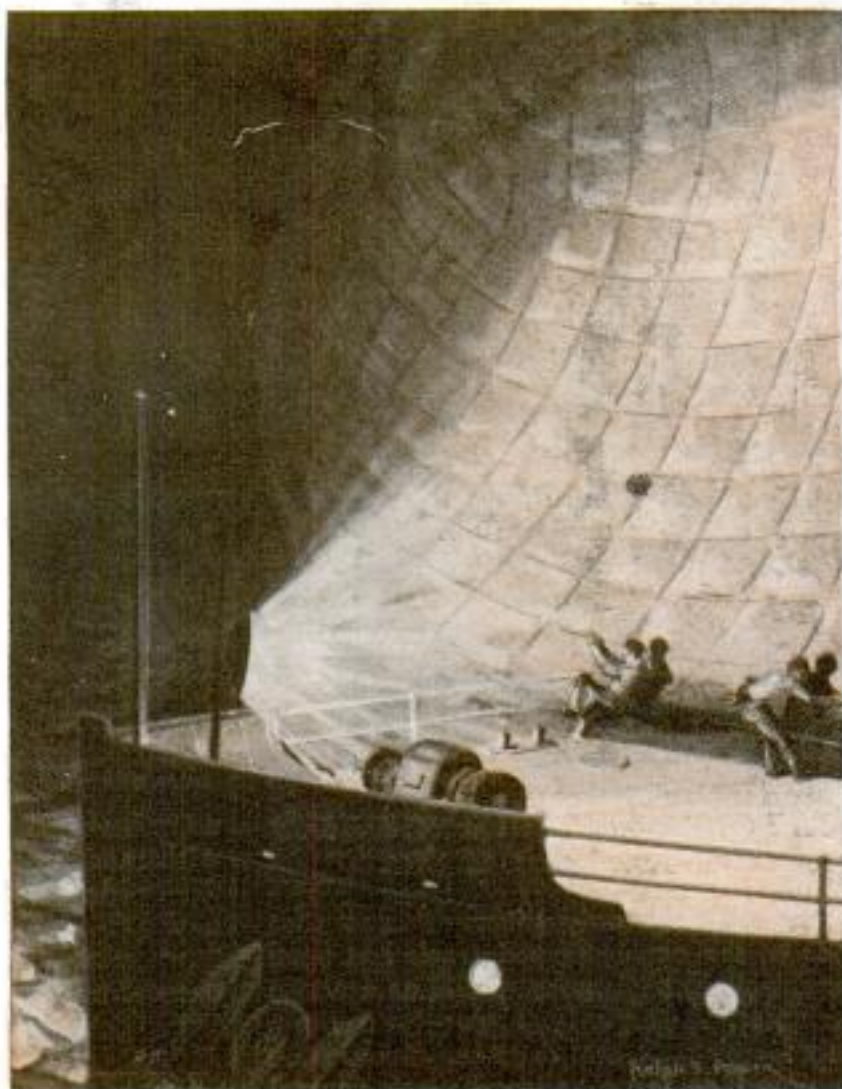
OUT over the Atlantic ocean, with the nearest land 3,300 miles ahead, in a balloon with enough ballast to travel 1,500 miles—that undoubtedly was one of the outstanding thrills I have experienced during years of free-balloon racing in America and Europe.

We—C. K. Wollam, my aide, and I—had started from Brussels, Belgium, the evening before in the Gordon-Bennett International balloon race. Weather reports indicated that our best objective would be Brest, France. Shortly after noon, we passed over the Guernsey and Jersey islands in the English channel. Then something seemed to whisper in my ear, telling me that we had better check our course more carefully.

We did this, and were surprised to find that our present direction would carry us to the north of Brest about five miles, missing land entirely, and straight into the open Atlantic.

We tried all the air currents up to 25,000 feet altitude, but they were absolutely single-tracked—all moving out over the open sea. After vainly trying to maneuver the balloon so we could land on shore, we decided to head for the island of Ouessant, about twenty miles to the west of Brest. But at 7:00 o'clock we passed six miles to the north of the little island—and realized that America was the next stop.

After deciding that winds probably would change after a while, and blow us back over France, we tuned our radio to



station 2LO, London, and picked up the disheartening information that the winds were going to blow toward the west for the next three days.

Then an idea, ridiculous at first, struck me. Why not try to land on the deck of a steamer? Foolish as it sounded, it seemed to be the only way out. We did not wish to descend on the open sea, for that would automatically disqualify us in the race.

Near midnight we sighted a little steamer, rolling in the twenty-foot waves. We were at 2,000 feet altitude. Grabbing a flashlight, I blinked it for several minutes in the direction of the steamer, then signaled, in Morse code: "We are going to land on board." To our great delight, the

the WINDS



disqualified because we had descended on the sea. But the thing that hurt most was that the victory was awarded to a Belgian balloon crew that not only had come down into the sea, but nearly died of seven hours' exposure in the water near Spain.

Although I have flown hundreds of hours and thousands of miles in free balloons, I have yet to make a parachute jump in order to save my life. Not that I have never had occasion to jump, for I had, once. But I did not have time to do it. That was during the 1928 national race that started from Pittsburgh. With Walter Morton as aide, I was making good time over Pennsylvania when we encountered terrific thunderstorms in the vicinity of Greensburg. Efforts to get above the storm were futile, and our balloon was sucked

ship responded by flashing all its lights. So we swung down to thirty feet above the water, threw over our sea anchor to check our thirty-mile speed, and maneuvered until we struck the guardrail of the deck. A half-dozen sailors grabbed the basket, and, after the boat had swung round so that the bag would blow over the deck, I pulled the ripcord that released the gas.

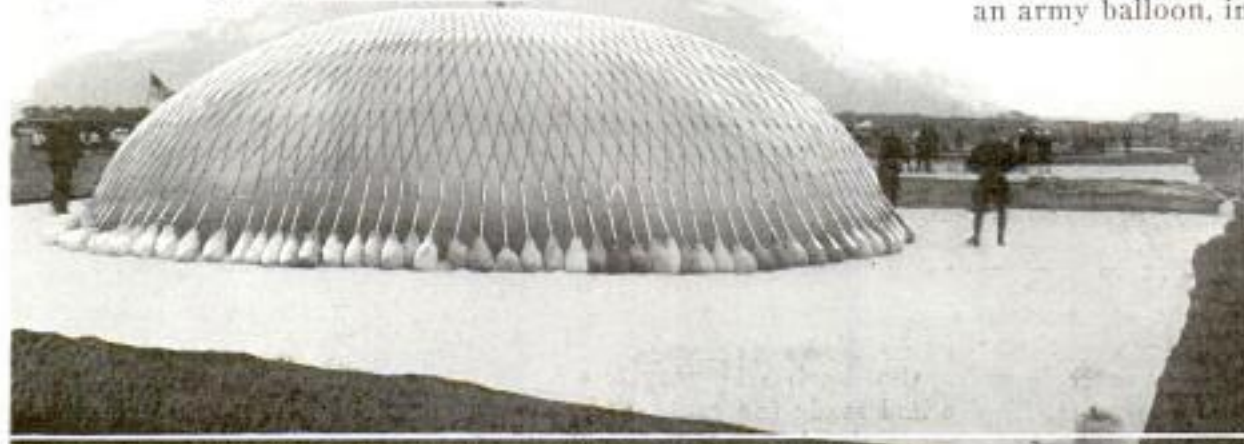
It was the S. S. "Vaterland," bound for Rotterdam, Holland, upon which we had dropped. It was the first time in the history of ballooning that such a landing had been made. We had made the greatest distance of any contesting balloon, but the Belgian Aero Club held that we were

into the swift currents. We reached 12,000 feet altitude, and encountered a severe hailstorm. Then we started downward at forty miles an hour. Morton and I threw out sand as fast as we could, but we might as well have tossed out a handful of tissue paper. The basket struck the ground with such force that our instruments were shattered. Then up we went again, to 10,000 feet, and then started down once more. We struck the ground again so hard it knocked our hats off, and again bounced upward.

At about 2,000 feet, after shouting greetings to Captain Kepner and Lieutenant Erickson in an army balloon that dropped rapidly past us, I turned, and there was a

1740
196

POPULAR MECHANICS



blinding flash of lightning a short distance in front of my face. I looked up, saw the bottom of the balloon envelope clearly, and then everything went black. Five hours later I felt myself coming out of what seemed to be a very deep and peaceful sleep. The rain was beating down in my face. Then I realized that I was lying with my head on the ground and my feet and body in the upturned balloon basket. I called to Morton, but received no reply. After removing the equipment that held down my legs, and unfastening the wet parachute belt with considerable difficulty, I got up, and discovered Morton at my side. I felt his wrist, and was stunned to find no evidence of pulse.

In the distance was a farmhouse. Starting to run toward it for aid, I fell flat on my face. Then it was that I found one of my legs was broken. After five minutes of shouting, I heard several farmers come running across the fields. A physician was summoned, and announced that Morton had been struck by lightning, passing away instantly.

I later found that the hydrogen gas in the balloon had been ignited by the lightning, and that the craft's fall had been checked somewhat by part of the bag forming a parachute.

That same thunderstorm claimed two other balloons. One was an army balloon, in

Testing Balloon-Basket Protector That Shields against Lightning; the Start of a Night Balloon Trip from Los Angeles, and Inflating the "Goodyear VIII" for the International Race of Last Year

1740

which Lieut. Paul G. Everet was killed. J. F. Cooper, aide of a third balloon, was struck by lightning and severely burned, but recovered.

In spite of this awful experience, I do not consider ballooning extremely hazardous. The danger of lightning, one of the greatest that balloonists have been forced to face, has been largely overcome by means of a lightning shield which I developed, in co-operation with Arthur O. Austin, of Barberton, Ohio, following the Pittsburgh race.

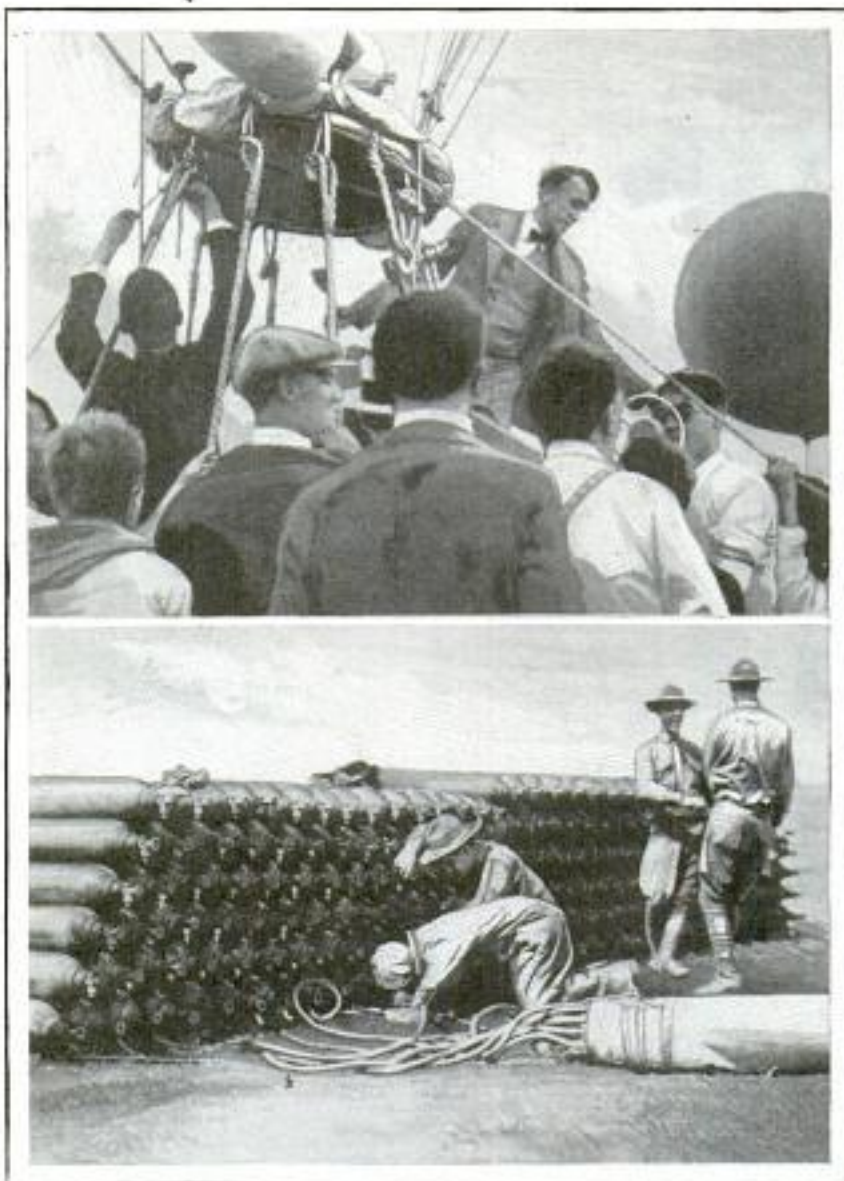
One of the most pleasant thrills I remember came to me one night, following a take-off in a national race from San Antonio, Tex. Wollam was my aide. We were drifting at 2,000 feet over central Texas, in absolute silence. We turned on the radio set and tuned in stations all over the country. At midnight, we picked up WTAM, at Cleveland. Then, with startling clearness, came the voice of Mrs. Van Orman, speaking from Cleveland, 1,100 miles away, wishing us Godspeed.

The radio receiver has become one of the most important pieces of equipment the balloonist carries. It enables him to pick up weather reports, to learn of the progress of competing balloons, to detect and avoid thunder-storm centers, to enjoy music during dull hours in the air, and to locate his position



Ward T. Van Orman Taking Sand Bags Aboard Just before a Race; a Trainer Balloon Landing at Akron, Ohio, and Line-Up of the Bags in the 1930 Gordon-Bennett International Race

1940



Van Orman, Left, and Alan R. MacCracken Just before the Take-Off, and Filling Van Orman's Balloon

rel rifles. Many believe the mountaineers do this because they think the balloons carry revenue officers. I am more inclined to believe that they regard the balloons, especially when they are flying high, as toys, not realizing that they are fifty feet in diameter, and carry two men and about a ton of sand.

Ballast is perhaps the most important part of a balloon's load. The more ballast carried, the farther the craft can travel. When sand is exhausted, equipment is thrown out, the less useful or valuable pieces first.

Often the question is asked, "Is the value of free ballooning consistent with the risk involved?" I feel that there is but one answer to that query, that the free balloon is, as we use it, the laboratory of the air. The Pittsburgh race, although it was tragic in many respects, gave much valuable data on vertical air currents and the lightning hazard.

with considerable exactness through the use of radio-compass equipment.

During the 1930 international race from Cleveland, my aide, Alan R. MacCracken, and I were able to receive constant weather reports from airways stations and from WTAM at the starting point. Perhaps the most exciting moments of this race were provided by thunderstorms that kept us company throughout much of the distance from Cleveland to Boston, where we landed.

There is one state over which most balloonists have learned to fly at a high altitude. That is Kentucky. It seems that the mountaineers, for some reason not exactly known, are fond of taking potshots at passing balloons with their squir-

We can say now definitely that vertical currents reach a speed of thirty-five miles per hour, and that, through ballooning, numerous improvements in navigating instruments have been developed, which are proving of value in other forms of aerial travel.

RADIO TUBES ACT AS FURNACE FOR BROADCAST STATION

1984

Radio tubes are used to heat and supply hot water for the building housing the transmitting equipment of station WHK, at Cleveland. The rectifying and power-amplifier tubes behind the transmitting panel are water-cooled. From twelve to fifteen gallons of distilled water

Emb. Walter & Burton

are kept moving past the tube plates, and this process heats it to about 120 degrees. From the transmitting panel the water is led to the basement of the building, where it passes around another coil, part of the heat being transferred to a tank that supplies hot-water faucets. The water from the tubes then travels through copper coils kept cool by fans. In warm weather, air from these fans is led outside the building, but in winter an auxiliary fan forces the warmed air through a register into the building. It is only in rare instances that an emergency heater need be employed to keep the building warm. The heat that makes it necessary to cool a large radio tube does not come from the filament, radio engineers say, but is generated by electrons, shot off by the filament, striking the plate and raising its temperature, just as a steel target for a machine gun might be raised in temperature as the energy from speeding bullets is transformed largely into heat.

vice is especially suited to restaurant doors where waiters pass through with loads of



Door That Is Opened by Electric Eye When Approached, and Apparatus Which Operates It

dishes and are often in difficulty if they have to open the door in the usual way. As the person approaches and passes through a beam of light, shining on the cell, the interruption in the rays affects the cell, actuating a relay which operates the door-opening mechanism. The apparatus shown in the accompanying illustration is of the electro-hydraulic type and was recently tested in the laboratories of the General Electric company.

RUBBER GUARD FOR ICE SKATES PROTECTS THE RUNNERS

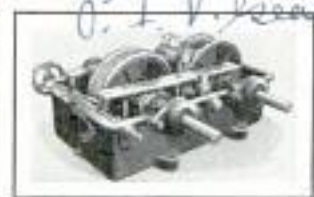
Flexible-rubber guards are now provided for ice skates to protect the runners when the skates are not being worn. The guard is adjustable to fit different sizes, and is easily carried in the pocket when not in use.



Nestor Johnson Mfg. Co.
1900 N. Springfield Ave
Chicago

VARIABLE-SPEED CHAIN DRIVE REPLACES GEARS

Power is transmitted at variable speeds through a chain drive instead of by the usual gear method, thus increasing the efficiency and flexibility of various machine tools. The chain has self-adjusting slats projecting at right angles beyond its sides. It works between two pairs of conical disk wheels that have radial teeth cut



in their sides. The slats on the chain engage the teeth on the wheels, the various speeds desired being attained simply by altering the position of the wheels so that the chain operates about them at different diameters. The movement of the wheels is controlled by a pair of easily operated levers, and a speed indicator permits ready adjustment at the proper setting.

DOOR THAT OPENS ITSELF IS BOON TO WAITRESSES

Doors are opened without touching them through use of the photo-electric cell, the "magic eye" of science. The de-

one in use at Stevens Hotel

made by Richards Wilson & Co. Aurora, Ill.

Litch-Bell Co., 910 S. Michigan Ave. Chicago

1953

1968

Schenectady, NY

2053
200

W. E. Sprayth and
F. L. Christianison



Special Flag Authorized by Government to Mark Landing Fields Used by Air-Mail Planes

SPECIAL FLAG FOR AIR MAIL MARKS LANDING FIELDS

To designate airports where air mail can be received and dispatched, the government has authorized a special flag to be flown on such landing fields. The banner has a wing design on a light background and dark stripes at top and bottom. Only fields used for mail planes are permitted to display this flag. The flag was first flown at Burbank field, California.

INVERTED FISH BOWL IS HELD IN UPRIGHT CONTAINER

Double fish bowls are now becoming popular, a small one of crystal glass, which magnifies the fish, being inverted in a larger bowl. The large bowl is first filled with water, and the top one inverted and placed in position. A rubber hose is employed to suck the air from the in-



verted bowl, water meanwhile being added to the larger bowl, so that it will rise into the smaller one to replace the air.

HEAT WAVES PENETRATE BODY ACCORDING TO LENGTH

Why is it pleasant to bask in the sunlight while a hot iron held three or four inches from the face gives an uncomfortable sensation? The sun's seemingly cooler rays are actually much more energetic than those from the iron, yet they cause no pain. One reason, according to General Electric company experts who have been studying the heating values of various kinds of apparatus, is that sunlight is a deeply penetrating form of heat. It acts somewhat as a hypodermic, going beneath the surface of the skin without causing pain, while longer waves, emanating from relatively cooler sources than the sun, are partly reflected from the surface and partly absorbed in a very thin layer where they increase the surface temperature as in the case of heat from an iron. The body, consisting largely of water, absorbs or reflects heat much as water does. Water screens are sometimes employed in front of heaters to keep out the wavelengths that cause discomfort, while allowing the others to pass.

My Herald Tribune 1/23/30

RADIO SWITCH ON TELEPHONE SHUTS OFF SET AT WILL

Answering the telephone without first making a trip to turn off the radio and later making a second trip to switch it on again, is now possible with a remote control for the radio set attached to the telephone. When the phone rings, it is only necessary to flip a switch on the instrument to turn off the radio set, and when the conversation is concluded, the set is again turned on without disturbing dial setting or volume adjustment. The control unit works with any set.



restarted to Optical Society
Jackson Mich
Geo Electrical Products, Inc

2044

Hanger Electric Mfg Co. The Geo Electrical Products Co.
Merchandise Mart Chicago Jackson Mich



Above, Taking Tractor across a River in African Jungle; Right, Descending a Hill After Natives Had Prepared Steps; Below, Resting at a Native Jungle Camp



JUNGLE TRIP THROUGH AFRICA MADE WITH A TRACTOR

Journeying through the African jungle in a tractor was the novel experience of American engineers who a short time ago were given the task of spanning a vast empire in the heart of equatorial Africa to deliver the tractor and some farm machinery to plantations of the Belgian Congo. They used the tractor to cut a swath through the primeval wilderness, blazing a trail never before imprinted by tracks or wheels. Rafts and temporary bridges were often necessary to transport

the equipment over lakes or crocodile-infested rivers, and at other times in descending steep declivities, natives were called on to prepare wooden steps to ease the heavy load down. Three weeks after delivery, fifty acres of virgin land had been cleared and was ready for crops, a task which would have been a year's work of the whole man and woman population.

☐ A clock with an individual telephone number strikes the hour and gives other time signals when a phone user calls it; the arrangement is such that this number is never "busy."

1856

Electronics, 330 W. 42nd Street



By GEORGE W. GRAY

ARCHIMEDES discovered the power of the lever more than 2,000 years ago, and boasted that if given a suitable fulcrum he would move the world. O. H. Caldwell, former member of the Federal Radio commission, recently pointed out that we now have an electrical lever so powerful that it recalls the old Greek's boast.

"Just as the principle of the lever is used repeatedly in this mechanical age," he said, "so the vacuum tube and its associated circuits present almost inconceivable possibilities in the electrical future."

But it isn't only to the future that we must look for the working of the electrical lever. The device is already on the job in a hundred different places in the home, the office, the factory, the school, the theater, the airplane, even on the street corner.

How, you may wonder, can a vacuum tube function on a noisy street corner? Well, in the town of Wilksburg, Pa., not long ago, I saw one of these electrical levers at a street intersection. One street was a main highway with an almost continual procession of vehicles. The in-



Artist's Drawing Depicting How the Wave of a Distant Hand Can Control a Factory's Machinery

tersecting street was a side road with only an occasional automobile or pedestrian. Ordinarily the traffic light at the crossing shone green for the main highway and red on the crossroad. And yet, every time a vehicle approached on the crossroad the light promptly shifted.

It seemed a weird, uncanny performance, until you discovered a small electric lamp mounted high in a protecting case by the sidewalk. From this lamp a nar-

Electrical Lever

row beam of light shot down across the road, so that it fell upon a sheltered vacuum tube. Then, the explanation was easy. Every time a vehicle approached on the cross street it interrupted that beam of light. The photoelectric cell saw the shadow and responded instantly by setting off an electric signal which actuated a relay, or switch, and this changed the traffic lights.

The idea of the vacuum tube as a lever is peculiarly apt, because the tube does to electrical power what a lever does to mechanical energy. It amplifies power. With a crowbar a man may easily lift a ton. The vacuum tube does this electrically. The vibrations in space which carry radio broadcasts are unbelievably slight. When they reach your receiving set they would not be able to cause the slightest movement of your speaker or earphone. It is the vacuum tube, by its powerful leverage, that amplifies these weak impulses into energy strong enough to vibrate the speaker and produce sound waves.

Recently I saw S. M. Kintner, assistant to the vice-president in charge of engineering for the Westinghouse Research laboratories, place his hand on a small silvered tube. Instantly lamps lighted in a miniature train, the train's wheels began to turn, and it moved off down the track as steadily as though an engineer were at the controls in the electric locomotive. As the train approached a station, the station lamps lighted up and remained aglow until it had passed. Presently Mr. Kintner removed his hand from the vacuum tube, and at once the train stopped.

Perhaps you think that this was only a toy demonstration. Then listen to this. A big steel plant down in Pennsylvania had recently been modernized by the installation of electrical machinery. One



The Grid Glow Tube. Resembling an Ordinary Radio Tube, but Capable of Magnifying Energy 100,000,000 Times

day the head of the company sat in his skyscraper office, on lower Broadway in New York, before a small glass bulb mounted on his desk. He touched the bulb lightly with a wave of his finger, and in response the electric current flowed into the mill 500 miles away, its wheels began to turn, its machines to operate.

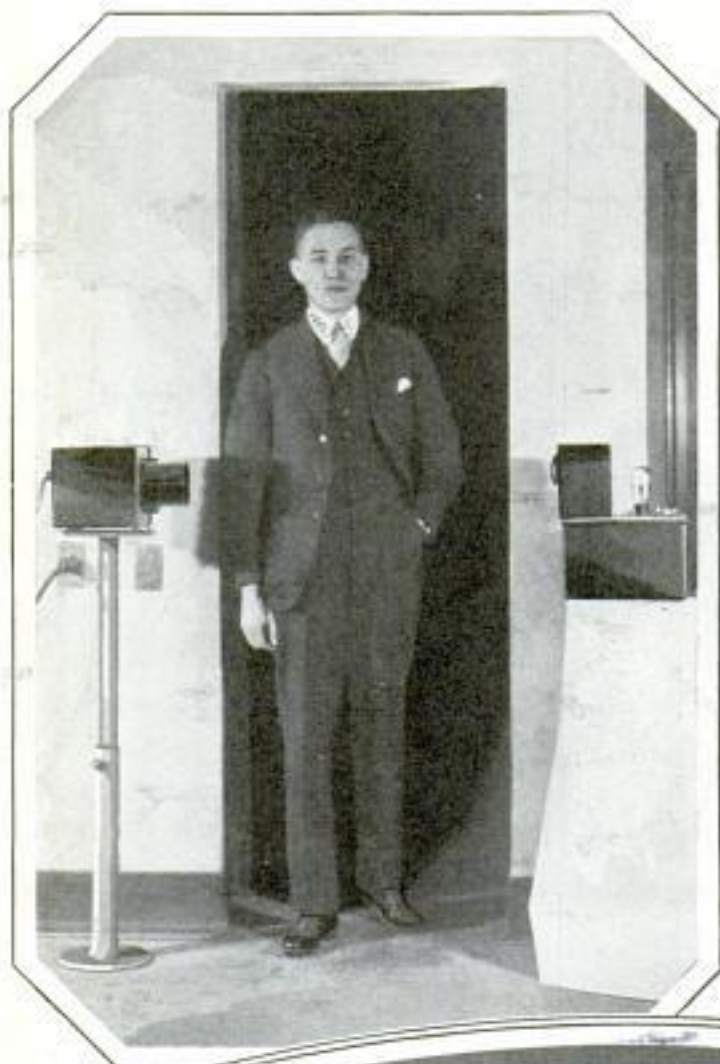
This control device, used both in commanding the toy train and in energizing the great industrial plant, is the grid glow tube, an invention of D. D. Knowles, a young physicist of the Westinghouse staff. "It is capable of multiplying the energy used to start its operation 100,000,000 times," explained Mr. Kintner.

The grid glow tube looks much like the ordinary radio tube, but it has no heated electrode and is no vacuum tube, but contains a small amount of inert gas. It is a relay tube, and has found a place in scores of mechanisms where swift and powerful control of larger energy is needed. This form of the electrical lever may be actuated by touch, by radio impulses, by light

Electric Mfg Co East 203
Pittsburgh

1856
204

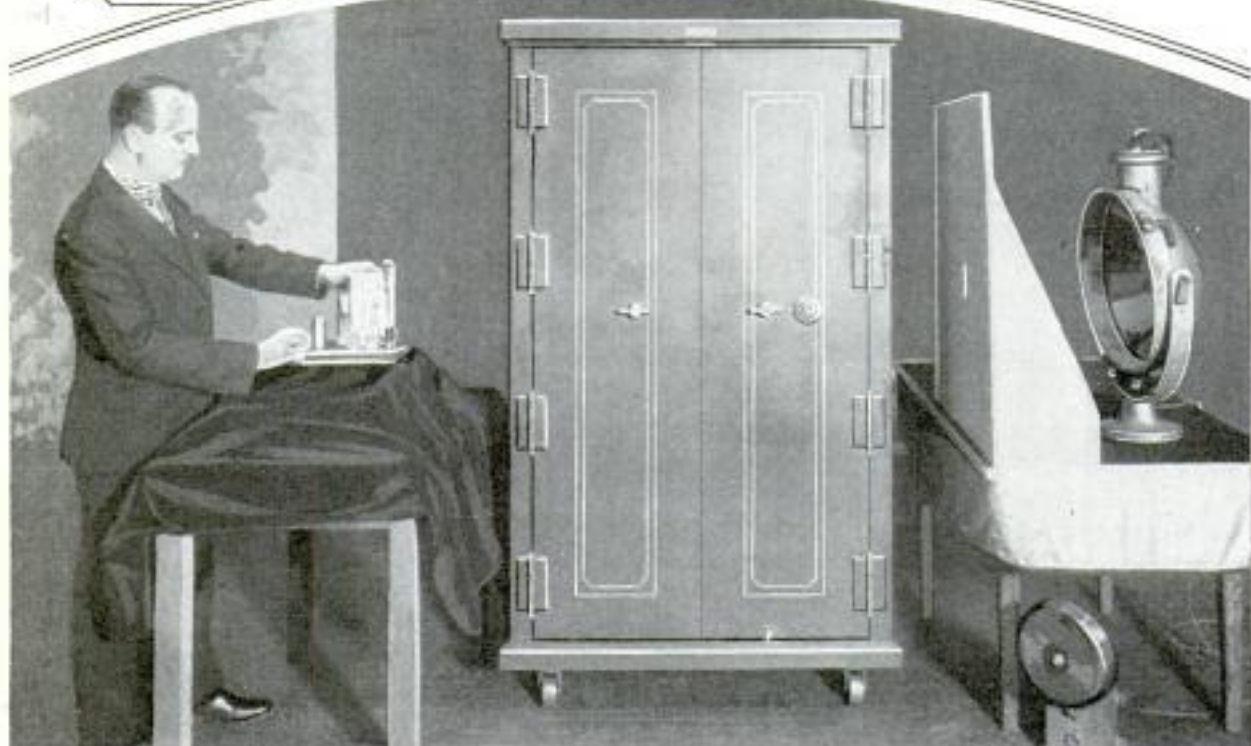
POPULAR MECHANICS



through a photo-electric cell, or by sound through a microphone.

An interesting example of the use of sound waves in such a control was demonstrated at the Newark airport. An airplane was equipped with a siren which sounded a peculiar note. On the roof of the airport was stationed a large horn attached to a microphone—an electric car. When the airplane came speeding in at night through the darkness, the pilot sounded the siren. The peculiar note of this signal, picked up by the microphone, actuated a relay which instantly switched on the floodlights, and the landing field was as bright as in daylight.

Televox, the so-called mechanical man, is operated on the same principle, with grid glow tubes as the brains of the robot. By a code of whistles, it can be called and asked any of a number of questions, and made to execute orders—to turn switches, open valves, measure the amount of



Above, the Electric Eye Keeping Watch at a Door; Below, Demonstrating How the Invisible Ultraviolet Ray Can Be Used as a Watchman and Burglar Alarm to Protect a Safe's Contents

1856



One of the Huge Tubes That Is Capable of Generating the Powerful Cathode Rays; This Type of Vacuum Tube, and the Cathode Rays Themselves, Still Are in the Experimental Stages

water in a reservoir and report fires, floods, and other accidents. In short, it can be made to inform a remote human manager of conditions at the plant, where televox may be the only attendant. The Westinghouse engineers report that this electric control system has been installed in more than 400 industrial plants.

The use of the photo-electric tube to pull the long arm of the electric lever has brought a myriad applications, and the electric eye is fast rivaling the electric ear in numbers and in talents. Television, the talkies, picture transmission, fire-alarm systems, counting machines, inspecting machines, color-matching machines, heat-control devices—these are but a few of the applications of the photo-electric tube in the swift pace of modern life. It has been found that this electric eye is 165 times as sensitive to light variations as the human eye.

The electrical lever is a measuring device too. At the Washburn observatory of the University of Wisconsin, Prof. Joel Stebbins has installed two extremely sensitive vacuum tubes to measure the heat of stars trillions of miles away. The same vacuum tube—a four-element device—is being used in laboratories to measure minute electrical currents. Other types of vacuum tubes are adapted to different duties—one is being used to measure

stresses and strains in material. It is said that so delicate and precise is this instrument that it will reveal and measure the bending of a three-inch plank caused by the weight of a fly alighting on it.

This lever was first put to work about twenty-five years ago and yet there are now nearly 200 different ways in which it is being used in industry, science, art, medicine and transportation. And this, we can only believe, is just the beginning. The electrical lever will eventually take over the major work of the world—if we are to judge its future by the past.

PLANES ARE LANDED BY RADIO WHEN FOG HIDES FIELD

Airplanes can be landed safely by special radio guidance even when dense fog shrouds the field. Transmitting and receiving apparatus developed by the bureau of standards make it possible for the pilot to tell by indicators if he is on the proper course, when he reaches the boundary of the field and if he is sending the ship down at the right angle of glide to make a safe landing. A visual pointer, actuated by radio beams, shows the proper curve to make at landing and tells if the plane is too high or low for safe approach. The signal is loud until the boundary is reached, and stops when crossing it.

H. Leonard and J. W. Lunn
Patented material
Radio engineers

Service 503-46 11/10/30

Mr. Ansel B. Clark 955 Clinton
St. Portland, Ore.

POPULAR MECHANICS

Business address - Decorative Engineering Co
American Bank Bldg
Portland
Oregon



Price 1/4 hp. unit \$60.00

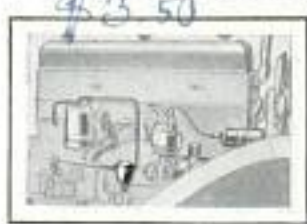
Artificial Waterfall Produced by an Altered-Gravity Pump and Air Compressor; the Diagram Shows How the Pump Aerates and Lightens the Water, Thus Forcing It to Lift Itself

WATER FORCED TO LIFT ITSELF BY ALTERED-GRAVITY PUMP

Water is forced to lift itself five to eight feet a minute by the use of a pump operated by a one-quarter horsepower motor that runs an air compressor. The compressed air is not used to force the water upward, but aerates and lightens it in a chamber at the base of the pump so that incoming water does the lifting at a rate of from twenty-five to thirty gallons a minute. No moving parts are used on the device, known as the "altered-gravity" pump, which is employed for raising water for artificial waterfalls, aerating and circulating water in tanks and ponds for the transportation and keeping of fish, and the aeration of acid baths for engraving plates. The pump has five parts, an outer steel shell or container, a circular chamber acting as pumping head, a discharge pipe to which the head is attached, an air line connected to the compressor, and a

cap clamp. Since it is built of pipe, it is claimed it will last the life of pipe metal, and electricity is the only expense, since, in waterfalls and for other purposes, it uses the same water supply over and over, while the aeration purifies the pond of green algae and other growths. The motor can be installed as far as 600 feet from the falls. Sticks and stones of ordinary size, it is claimed, will not clog the pump, which is self-cleaning.

MOTOR OIL FREED OF WATER BY ELECTROLYTIC METHOD



Water that seeps into and pollutes the oil in the crankcase of an automobile is removed automatically by a recently

invented electric appliance which is quickly installed on any car. The water

Pump 4 to 5 ft. \$165.00
 7 to 8 ft. \$215.00
 Decorative Engineering Co. American Bank Bldg. Portland, Ore.

Refer to Decorative Engineering Co Box 6 Central Station Portland, Ore

The Oilator Co
20027 Litchfield Road
Portland, Ore.

is trapped by the device and separated into its elements, hydrogen and oxygen, by electrolysis, these gases then passing off harmlessly. The water remover has no moving parts to get out of order and no switches, the oil itself acting as a circuit breaker, starting and stopping its operation. When working, it uses less current than a light.

2051
BICYCLE WHEEL IS EXERCISER FOR EYE MUSCLES

Muscles of the eyes, like those of other parts of the body, require exercise to grow strong, and an optometrist has made an exerciser to give the eyes their daily dozen. The apparatus is an old bicycle wheel covered with a dark cardboard or other surface. When the wheel is turned, a white mark is drawn on the board in the form of a spiral which the eyes follow as it enlarges.



Pilot Demonstrating How He Repaired a Broken Landing Gear While the Plane Was in Flight, Enabling Him to Make a Safe Landing

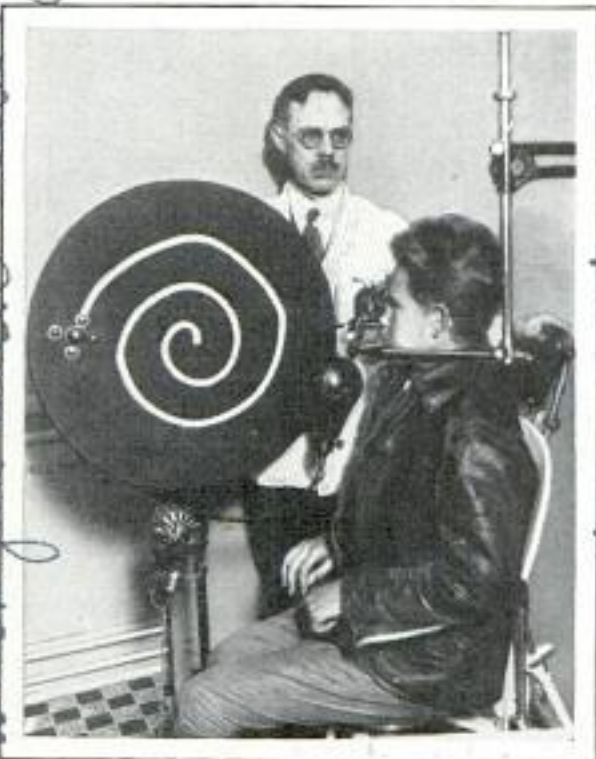
LANDING GEAR REPAIRED IN AIR WHEN PLANE IS DISABLED

Stretched on the wing of an airplane in flight, and without a parachute to save him if he loosed the grip of one hand, Floyd H. Ririe, a transport pilot, recently repaired his ship's landing gear. He pulled back into position a part of the gear that had broken at the take-off, and made a safe landing on one wheel. A student flyer kept the ship in level flight while the pilot performed his perilous task.

DEADLY AUTO GAS ELIMINATED BY FUEL-SAVING APPLIANCE

Tests have been conducted recently with a small appliance which is attached to the intake manifold of an internal-combustion engine for the purpose of regulating the fuel mixture, thus effecting gasoline economy in the operation of an automobile or airplane, and at the same time reducing the amount of deadly carbon monoxide in the exhaust gases. It has been used on an airplane, where the inventor claims a fuel saving of one-third was shown, and with an automobile virtually doubled the mileage per gallon. It weighs only a pound and a half, is not expensive, and is easily installed. A dial on the dash registers the wastage of fuel, and the instrument is adjusted to correct the mixture.

Waukegan Natl Bond Bldg



Apparatus to Exercise Eye Muscles Made of Bicycle Wheel; the Eyes Follow the White Line

Herold Tribune 12/2/30

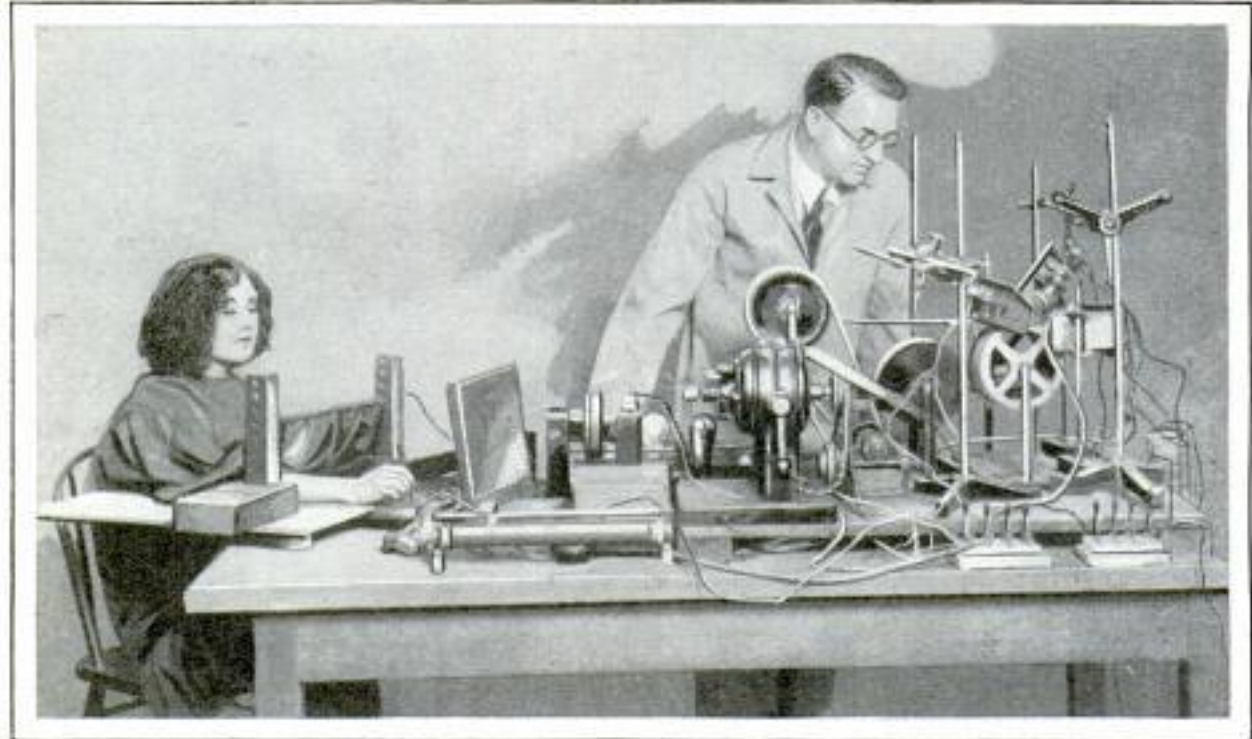
2073
Mr. L. J. Miller
100 West St. N.Y.C.
Keeps White Division

Chas. H. Otto Thompson
4. E. Eisenlee - St. Waukegan

2060

Cont. Isler Perrins, 1030
Starting St. Ogden
POPULAR MECHANICS Utah

ELECTRIC SHOCK PROVES EFFECT OF PUNISHMENT



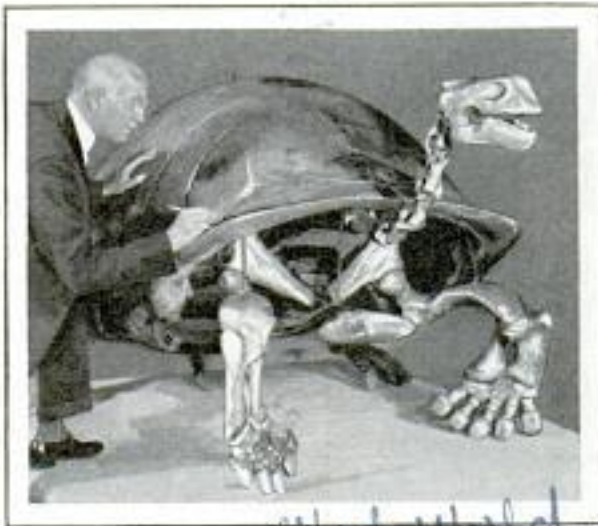
Apparatus for Measuring the Effect of Punishment on Children; the Subject Is Trying to Guide a Stylus through a Star-Shaped Channel, Each Error Resulting in an Electric Shock

Through the development of an intricate piece of apparatus, the influence of punishment on learning, especially among children, can now be measured. The machine, invented by Dr. M. C. Barlow, of the psychology department of the University of Utah, seems to verify the truth of the adage, "Spare the rod and spoil the child." The apparatus is used to determine the effect of electric shock in learning mirror tracing, the shock being the "punishment" which is meted out when a mistake is made. The student gazes at a star-shaped maze in a mirror placed in front of him and above the star, and attempts to guide a metal stylus through the quarter-inch-deep channel of the star. If the stylus touches certain points, a distinctly unpleasant electric shock is transmitted. The conclusion reached

from the experiments was that "mild punishment brings about a decreased rate in visual sensory-motor learning, but increases the accuracy."

SEVEN-FOOT TORTOISE SHELL DISCOVERED IN INDIA

Having a shell more than seven feet in length and nearly three feet in depth, the fossil of a huge tortoise, perhaps the grandfather of the entire tortoise family,



Fossil of a Prehistoric Tortoise; the Shell Is Seven Feet Long and Nearly Three Feet Deep

was found in India by Barnum Brown, dinosaur hunter. In life, this tortoise probably weighed more than 2,000 pounds, seven times as much as the largest of its kind now in captivity in the New York zoo. The fossil has been brought to this country and placed on display in the American Museum of Natural History in New York.

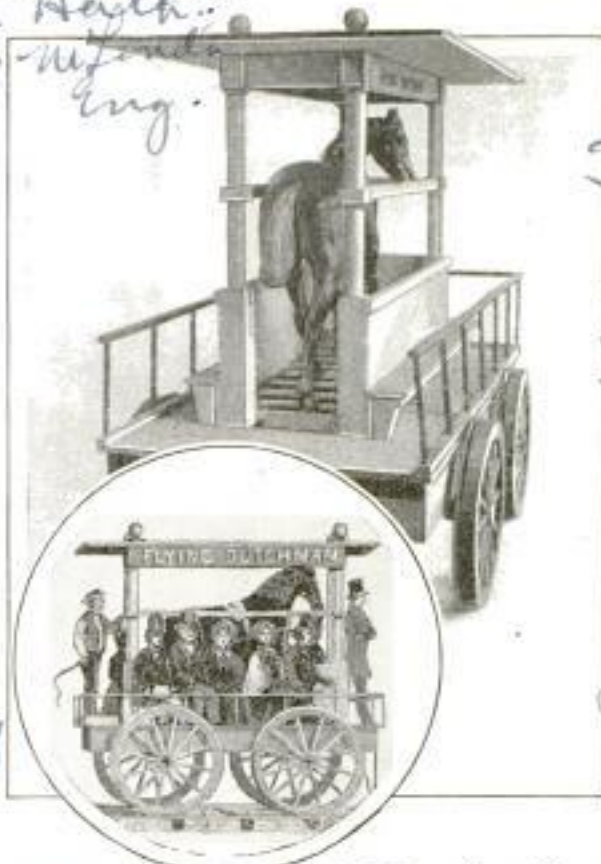
Cmt. Harold J. Welton Esq
29. Bean Street,
Colombie, Chesley Hayth.

FISH ATTRACTED BY WHISTLE
ARE CAUGHT IN HANDS 204

Natives of some sections of India have several unusual methods of catching fish, including luring them by whistling. In Assam, fishermen crouch on the banks of shallow lakes and emit a shrill whistle which attracts a species of mountain fish. Lured by the sound, this fish darts into the open palms of the whistler and is caught. In other places the direct rays of the sun force mountain fish to seek shelter beneath or beside rocks along the banks of streams. The cunning hillman crawls to a bowlder behind which a fish is hiding, strikes the rock a heavy blow with his steel-shod club, and catches the fish, stunned by the sound vibrations.

LANDING GEAR FOLDS IN WINGS
TO INCREASE SPEED 200

To increase the speed of the monoplane purchased several months ago by Col. Charles A. Lindbergh, a retractable landing gear and a wing, with a recess in its underside to receive the landing gear, have been made. When the ship is in flight, the large doughnut-shaped low-pressure air wheels and braces are folded up into the wings to decrease wind resistance. These large wheels assure a safer landing on a muddy or rough field but, until the retracted landing gear was developed, decreased the ship's speed. With this latest equipment Colonel Lindbergh's ship is expected to be able to travel at 225 miles an hour in level flight.



Early Locomotive Which Derived Power from Horse, Walking Treadmill Geared to Car Wheels

LOCOMOTIVE RUN BY A HORSE
ONCE WON PRIZE

Seeking a dependable motive power for its road, the South Carolina railroad company one hundred years ago decided that horse power was the most promising, and offered \$500 for the best design of a horse-operated engine. The National Museum today has the model of the "Flying Dutchman" which took the prize. It derived its power from a horse walking an endless-chain treadmill geared to the car-wheel axles. C. E. Detmold invented the locomotive which literally had one horsepower, and it was judged successful when it hauled twelve passengers at a speed of twelve miles an hour. The Baltimore and Ohio railroad tried a similar engine after a sailing car had failed.

Seeking a dependable motive power for its road, the South Carolina railroad company one hundred years ago decided that horse power was the most promising, and offered \$500 for the best design of a horse-operated engine. The National Museum today has the model of the "Flying Dutchman" which took the prize. It derived its power from a horse walking an endless-chain treadmill geared to the car-wheel axles. C. E. Detmold invented the locomotive which literally had one horsepower, and it was judged successful when it hauled twelve passengers at a speed of twelve miles an hour. The Baltimore and Ohio railroad tried a similar engine after a sailing car had failed.

Ask the Bureau of Information for further details on articles in this magazine.



Retracting Landing Gear and Wing Developed for Colonel Lindbergh's Plane; the Wheel Folds into the Recess in Underside of Wing

1986
209
Cmt. Frank A. Taylor, Asst. Curator, Dept. of Mineralogy and Mech. Sec. U.S. National Museum, Wash. D.C.

Lockheed Aircraft Co
1212 Pacific Mutual Bldg
Los Angeles, Calif.

1884

Cont. George W. Gray
- Sparkill, Ny

New Conquests



Above, Attacking Copper Plate with Oxy-acetylene Torch; Right, Interior of Berlin Restaurant with Modernistic Effects in Metal

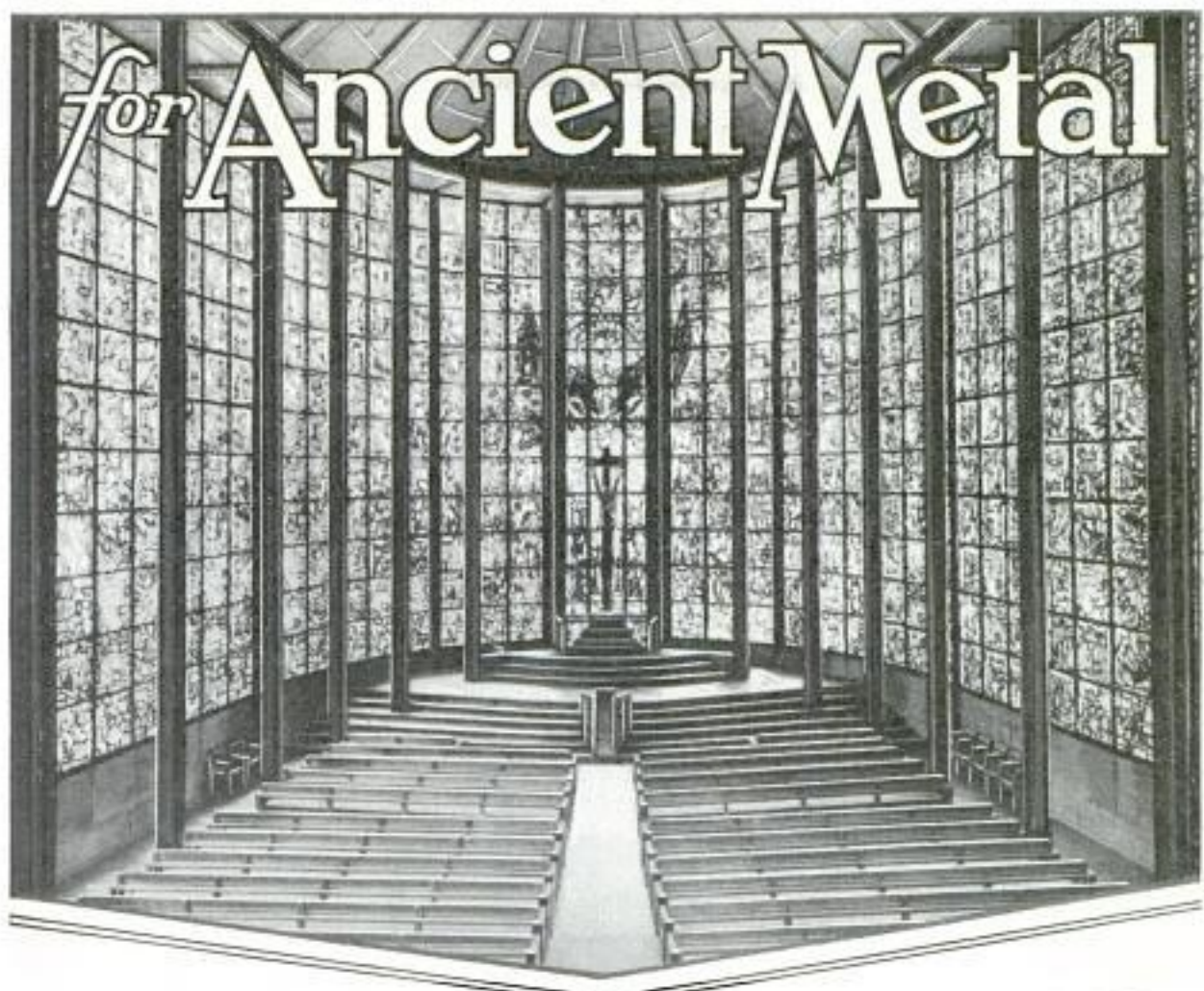
COPPER, oldest of the metals in the service of man, is finding new uses which make it one of the most modern and adaptable of all materials.

In Germany, architects are building five-room cottages and massive churches of copper. In America, they are lining bank vaults with sheets of copper and imbedding heavy copper plates in steel vault doors.

Everywhere, both here and abroad, the ancient metal has come into increased use for roofing and piping, for screening, and as an essential in the electrical circuits and the automatic machines which are characteristic of our age.

One of these automatic machines is the mechanical refrigerator. A problem of the early makers was that of getting an air-





Glass Walls of a German Church Set in a Framework of Copper and Steel to Give an Unconventional Design of Unusual Beauty; the Nearest Approach to the Outdoor Cathedral

tight system. Try as they might, the joints and seams would sooner or later spring a tiny leak through which some of the refrigerative gas escaped.

Brazing, soldering, welding—all the various means of sealing metal—were tried in vain. Then Dr. W. D. Coolidge, whose laboratory had been working on this problem, remembered an odd discovery he had made in an experiment some time before. The event makes an interesting story.

It seems that this earlier experiment was concerned with the queer metal tungsten, which was difficult to work because, when heated, it immediately combined with the oxygen of the air and rusted. To get away from this danger, Doctor Coolidge pumped the air from the furnace in which he heated the tungsten and filled the chamber instead with an atmosphere of hydrogen gas. The tungsten showed no tendency to combine with hydrogen,

and so he was able to proceed with his experiments.

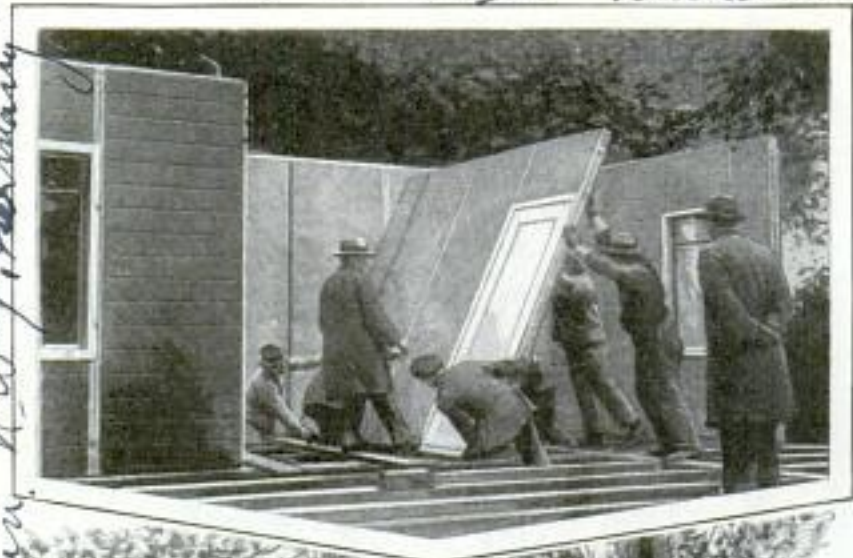
Now, this experimenting had nothing whatever to do with copper. In fact, as you will see, copper entered into the matter quite by accident. In order to keep the tungsten in place, Doctor Coolidge wrapped and tied it with a small steel wire. One day an assistant used a copper wire, and when the scientist opened the furnace he found that the copper had melted and allowed the tungsten to fall. Apparently the experiment had miscarried.

But as he poked amid the debris, Doctor Coolidge saw something strange about that molten copper. It had run all over the place and down into the minutest crevices and pores. He had to get a microscope to follow the penetration of the copper, and chemical tests showed that it had flowed into holes even smaller than the microscope was able to reveal. The copper had "wetted" the metal cham-

Hirsch Kupfer- und Messingwerke

A. S. POPULAR MECHANICS
A. S. Neue Wilhelmsstr. 9-11, Berlin N.W. 7

Hirsch Kupfer- und Messingwerke
A. S. Neue Wilhelmsstr. 9-11, Berlin N.W. 7, Germany



Above, Erecting a Copper Cottage, a Task Requiring Only Twenty-Four Hours; Below, the Completed Home a Day Later

which has long been a heavy user of copper. Silver is a better conductor but is too costly, and copper remains the great conducting material. The electrical industry last year used more than 1,200,000 tons.

A recent development is the use of hollow copper tubes instead of solid wires as electrical conductors for high-power lines. Scientists have a theory that when an electric current passes along a wire, it is the surface particles of the metal only that are concerned. These surface electrons flow, and in their movement form the electric current, whereas the interior of the wire contributes very little to this flow. Since, therefore, the current is confined to the surface, engineers figure that a hollow cable will give as good conduction as a solid one, and at the same time will save weight and metal.

Another use of copper had its origin in the chance overnight visit of an American metallurgical engineer in a peasant's home in France. While motoring through the country his car broke down, and he applied to the nearest farmhouse for food and lodging. Watching the thrifty housewife prepare the evening meal, the American noticed that though her fire was small and her fuel sparse, she quickly cooked a large meal piping hot. He observed that the kettle, pots and pans were all of copper, and being a metallurgist, he realized at once that the copper was responsible for the swift and economical cooking, for it is an excellent conductor of heat.

Hastening home to America, the engineer set up a plate of steel, one inch thick, and with an oxyacetylene torch burned through it in two seconds. Then he burned through two inches of cast iron in seventeen seconds, using a fluxing rod

ber as completely as kerosene wets blotting paper. Other tests showed that copper has this amazing wetting capacity only when it is melted in hydrogen.

Here was a clear tip for the refrigerator makers. They built some huge hydrogen furnaces. They welded the refrigerator parts as efficiently as they knew how. Then they took these welded parts and placed them inside the furnace and brazed them with copper in the hydrogen atmosphere. Thus copper, treated in this special way, has proved to be the most effective plug for atomic leaks. Says one of the engineers who had part in this development: "It would be easier for a camel to go through the eye of a needle than for a single gas atom to go through one of these hydrogen-brazed evaporators."

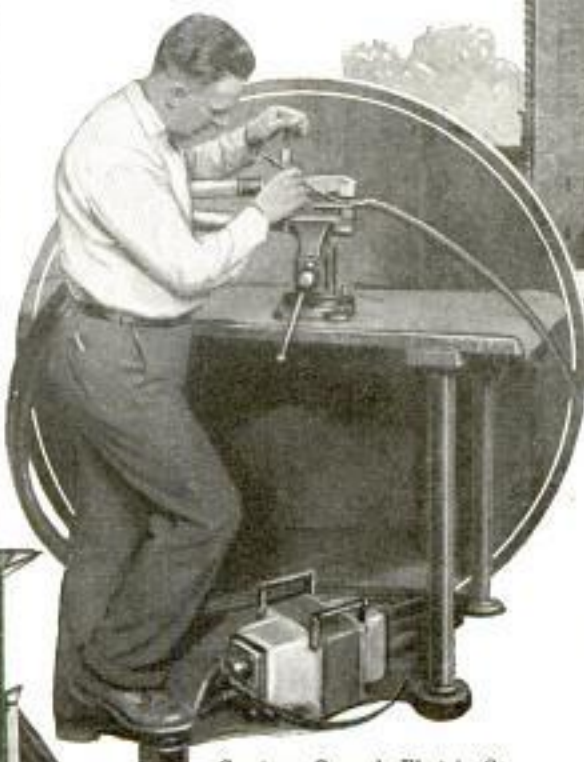
Radio opened a great new field for copper, although it may be classed as only an extension of the electrical industry

myr

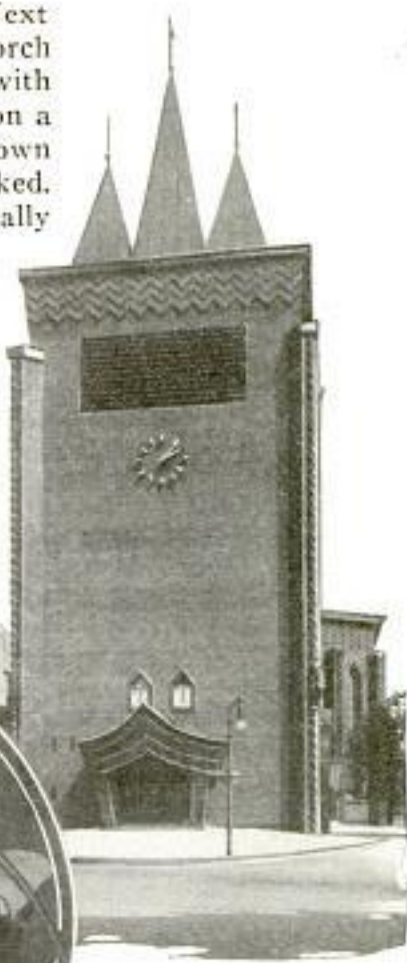
1884

to help the torch and push through the molten metal. Next he set up a plate of copper, seven inches thick, and the torch flared and hissed into incandescence. Its flame, glowing with a temperature above 6,000 degrees Fahrenheit, played upon a spot on the metal. Soon the tip of the torch melted; its own heat destroyed it, whereas the copper was only just marked. Another tip was put on, and in a while it melted. Eventually the engineer was able to spurt the fiery blast for fifteen minutes against the plate of copper. Then his supply of gas was exhausted, and the torch went out. Measurement showed that the copper had been penetrated less than an inch. At that rate, the metallurgist figured, two solid hours of continuous burning would be required to put a hole through the seven inches. Since these tests, more than three hundred banks have protected their vaults with copper.

The most spectacular recent application of copper, however, is in the building industry. Builders have long used copper for roofing, for water pipes and other conduits, and for ornamental pur-



Courtesy General Electric Co



poses. But it has remained for the modernistic architects of Germany to lead the way in adapting this metal as a material for walls and towers and structural sections.

Churches, restaurants, apartment houses and private

dwellings have made use of copper in towers, entrance canopies, window bays, staircases, balconies and other strategic places which are usually given over to some other material.

In Hamburg, there was erected during 1930 what its builders proudly call "the world's first copper dwelling house." It is a one-story, five-room cottage of the bungalow type. The entire exterior is of copper, with the exception of windows and doors. Houses of this type and size are being sold in Germany at about \$900. The parts are all cut and shaped at the factory, and are numbered, and delivered to the site, ready to be erected with the aid of a wrench and a screwdriver.



Copper-and-Brick Church; Brazing with Copper in Electric Tongs; Copper-and-Glass Tower

1998
214



Tiny Grinding Tool, Powered by Compressed Air, and So Small It Is Used Like a Fountain Pen

AIR-POWERED GRINDING TOOL USED LIKE FOUNTAIN PEN

So small that it can be held in the hand and used much like a fountain pen, a tiny grinding tool, powered by compressed air, employs mounted grinding wheels and smoothing stones of various shapes and sizes. It is intended to run at 60,000 revolutions per minute, this high speed being attained with such small tools without lack of balance. Special tips are provided to produce a high mirror finish on steel or soft metals, and felt buffing tips and abrasive tubes and sleeves are also available. The worker in wood can use the grinder with carving cutters.

TORNADOES ARE LESS DEADLY THAN LIGHTNING OR FIRE

Considering the frequency with which they occur, tornadoes are less deadly to human life than either lightning or fires. This is because tornadoes are short-lived and limited in scope, seldom traveling far enough to collide with human settlements. An average of more than 300 persons perish each year in the United States in such storms, but of the hundred or more tornadoes occurring annually, only a few cause loss of life, although when one does strike a populated district, it exacts a heavy toll. Tornado warnings are not issued by the weather bureau because of the extremely slight chance that such a storm will strike any given place, and

usually only those causing loss of life are reported in the newspapers, thus giving rise to the impression that most such storms have fatal results. A twister seldom lasts more than an hour, and in any one place hardly more than a minute, its average path being about thirty miles long and only 1,000 feet wide. Therefore, if underground shelters are unavailable, it is often possible for those in danger actually to run out of the path of an approaching storm. It travels from twenty-five to forty miles an hour usually, and the velocity of its whirling winds has been estimated at from 300 to 500 miles an hour. In the center of the storm a vacuum is created. When this area of low pressure surrounds a house, it literally causes the structure to explode, because of the higher normal atmospheric pressure remaining in the house. The storms dip to the earth and rise again, often jumping over long stretches without damage, then descending to play havoc at points far removed from their last previous attack.

CATERPILLAR BIG AS A WHALE WHEN VIEWED BY CAMERA

Caterpillars and whales have little in common, particularly in appearance, but the eye of the camera can be employed to make even these forms of life look alike. An unusual enlarged close-up of a caterpillar on the stem of a leaf was taken recently. At first glance, the photograph bears some resemblance to a whale.



Not a Whale or a Prehistoric Monster, but Only a Close-Up of a Caterpillar on a Leaf

2006

2018

Science Service 504 G,
4/20/30

Emb. Ernst Keil
1235 N. Persimmon Ave
Hollywood, Calif

WINDMILL RAISES SAND TO RUN WATER WHEEL FOR MINING WORK 2046.

Prospectors setting up their equipment to operate a mine found that the only stream available did not furnish enough water to operate a water wheel, and tried a windmill, but this was also impracticable because the wind blew mostly at night when the ore crushers were idle. Finally the windmill was employed to operate a device much like a small grain elevator, and dry sand was raised by windmill power to bins, the sand being used later to run an overshot water wheel which in turn operated the rude mill for pulverizing the ore. The sand worked as well as water.

WET SUMMERS IN INDIA MEAN COLD WINTERS IN CANADA 2038

Why do dry summers in India mean mild winters in Canada six months later, and wet Indian summers presage cold Canadian winters? Examining reports for a period of forty-four years, weather experts have found that, with four exceptions, when the Indian climate was unusually wet or dry, winters in Saskatchewan and Alberta have been either colder or warmer than normal. Such decided relations indicate that not only India's monsoon, but also the flood of the Nile in Egypt have a measurable effect on distant Canada, while high pressure over India is later reflected by correspondingly high temperature in Canada. On the basis of these correlations between pressures, temperatures and rainfall, Dr. C. F. Brooks, of Clark University, for six successive years had prepared a forecast for winter weather for Canada based on the summer in India. Of these six, two were nearly perfect, two fairly correct, one good and one poor. *Reported to Weather Bureau*
More than 1,000,000 passengers rode in airplanes in this country during the first half of 1930 when American aircraft flew over 68,000,000 miles.



Small All-Steel Boat That Will Not Sink and Can Be Taken Apart Easily; Air-Filled Caissons Support It

NON-SINKABLE STEEL BOAT CAN BE TAKEN APART

Small boats of all-steel construction that are unsinkable and fireproof recently have been tested successfully in France. The craft is easily disassembled, making it a simple matter to carry the parts on a trailer behind an automobile. It can be rowed, sailed or propelled by an outboard motor, the latter system being particularly suited for shallow water. The craft is supported by three air-filled caissons, two at the rear and one in front, and the motor is placed between the two rear compartments. It has an over-all length of about sixteen feet and a beam of four feet. Such boats can carry ten or more persons at a speed of ten or twelve miles an hour, with a four to five-horsepower motor, or heavy loads for camping, such as tents, etc., can be transported with a smaller number of passengers.

maker unknown

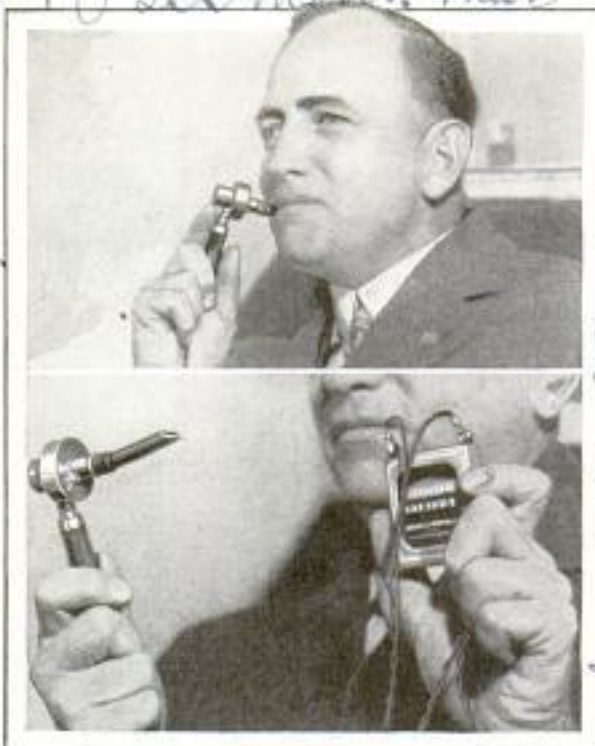
Gene Service 505-03-1120/30
Cmt. es. H. Eckhardt

Cmt. A.L. Gilchrist, 63 rue D'algueire
Paris, France

And Fred Krossmayer
Passau Germany

Cont. John L. Cogswell
16 Edgemoor Road
Belmont, Mass

195 Broadway New York



Above, Using Artificial Larynx That Works Like an Auto Horn; Below, Showing Its Compactness

ARTIFICIAL VOICE FOR MUTES LIKE AUTOMOBILE HORN

To restore the power of speech to persons rendered mute by surgical operation or paralysis of the larynx, S. P. Grace, of the Bell Telephone laboratories, has made a convenient and practical artificial "voice," which actually is a miniature automobile horn. Some time ago he turned out an artificial larynx, but it was found cumbersome to carry, awkward in operation and required close concentration on the task of talking. The latest apparatus weighs about four ounces and is simple to work. An electric battery which can be carried in the vest pocket, actuates the instrument. Connected to the battery is a little device consisting of a handle, a short metal cylinder and a soft rubber tube, two inches long. To speak, one must be able to make sound and force it through the mouth and nose, movements of the tongue and lips forming the sound into intelligible words. The artificial voice has a vibrating diaphragm which gives off a humming sound when a button in the handle is pressed to close the circuit. Vibration of the diaphragm not only creates the sound, but also, by drawing in air over the periphery of the tube opening and expelling it in a jet, gives it

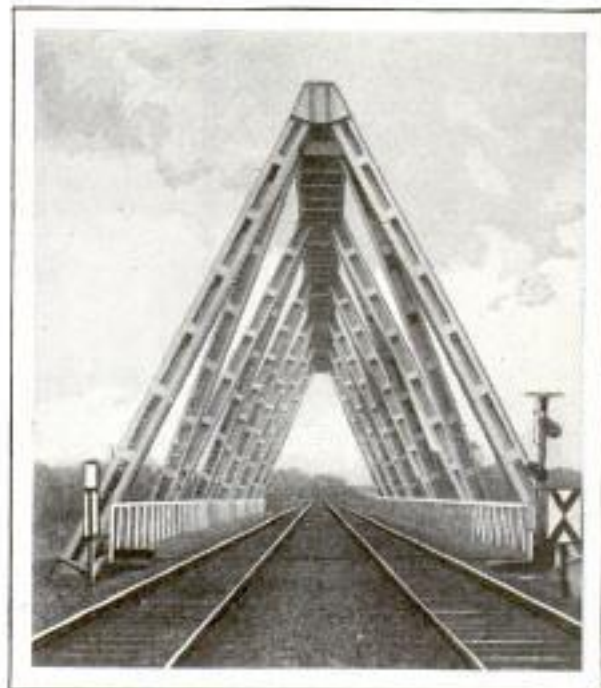
driving force over the tongue and out through the lips. The user simply inserts the rubber tube in a corner of his mouth and presses the button. Then he manipulates tongue and lips exactly as in speaking and intelligible words issue.

ALUMINUM-PLATED SHINGLES

Aluminum-wrapped cedar shingles are being used on the Pacific coast where they are found to be impervious to the weather. They are obtained in various shades, only the part of the shingle exposed to the weather being treated. A plate of very thin aluminum is pressed by a machine on the butt of the shingle, and the sides are crimped down over the wood. Such shingles do not crack or break and stand long exposure to water or sun.

TRIANGULAR BRIDGE HAS EXTRA STRENGTH AND STABILITY

Unusual strength and stability are claimed for a triangular railroad bridge recently constructed over the Roer river in Germany. The top of the structure forms the apex of a triangle to which the steel supporting beams are attached. In addition to the claim of greater strength, it has also been found that construction costs for such bridges are substantially lower than for the conventional types.



Triangular Railroad Bridge Which Is Stronger and Less Costly than the Conventional Kind

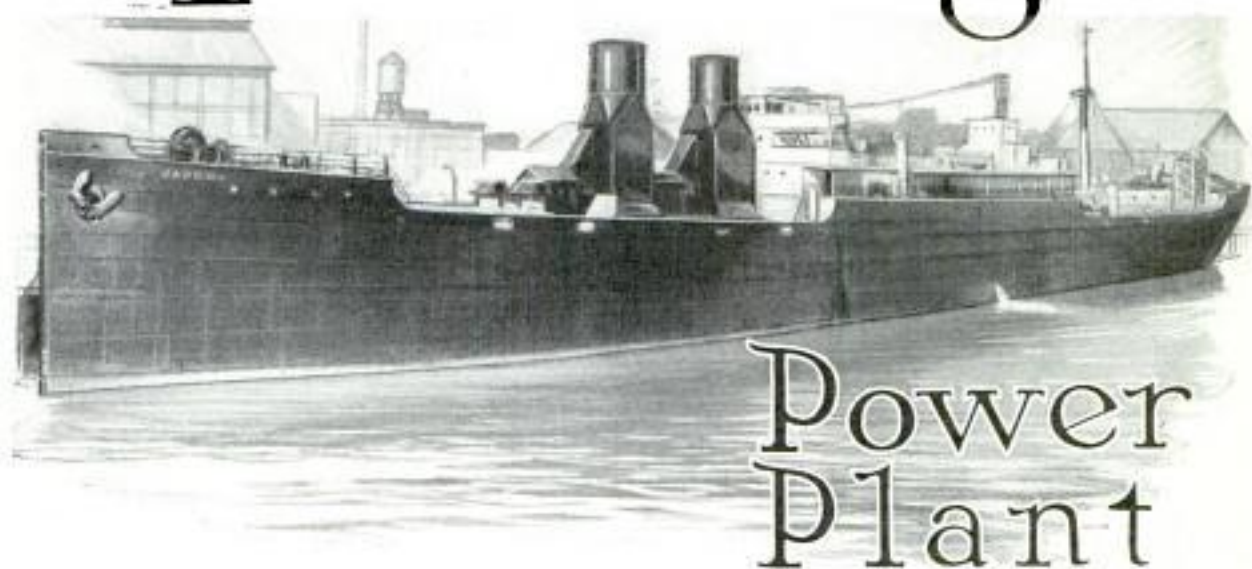
Chicago 360 N. West 948

Aluminum Company of America
2476 Belmont St
Belmont, Mass

Cont. Geo. Z. Paul

1917
Capt. Lt. Corley
Langley
McLaripieit,
Field,
Hampton Va

A Floating



ONE of the strangest ships of recent days has been turned out of the ways of the Newport News, Virginia Shipyard and Drydock company. This ship is the "Jacona," a floating power plant. She was once a seagoing vessel belonging to the U. S. shipping board, but now her "insides" have been removed, and in the place of regular sea machinery, there are installed huge generators, transformers, oil tanks and other things necessary for a regular land power station.

A "mobile power plant" is probably a better name for the "Jacona" than "floating power plant." The ship was really designed to be moved from place to place where power is needed, and hooked up with the local terminals. The novel idea of having a mobile power station of this sort came from the president of the New England Public Service company of Augusta, Me., Walter S. Wyman. The "Jacona" belongs to this company and was converted under order by the Virginia shipyard. She was lying up the James river with a large number of other idle shipping-board vessels when the New England company began looking for a suitable hull to house a floating power station. The "Jacona" seemed to fill the

bill and was accordingly towed down the river to the shipyard.

In the hull of the "Jacona" a 20,000-kilowatt electric-power plant has been installed. The old boilers were removed and new ones put in, the former compartments below deck were torn out and room made for the huge generators. A double bottom was fitted and large tanks installed to hold fuel oil and water for the boilers.

The "Jacona" is 396 feet long and fifty-three feet across the beam. She draws about fourteen feet of water in towage, but when she is making a "set" before some town and she has her tanks filled with fuel, her draft will be much greater. The great advantage of a mobile power station is readily seen. Cities and towns located on the water could get electric power within a few hours if their local plants should become demoralized by storms, fires or floods, provided the power ship were anywhere in the vicinity. This is exactly what the New England company intends to do with the "Jacona" this winter. During the winter months storms play havoc with electric lines up and down the New England coast—and other coasts, too, for that matter—but the "Jacona"

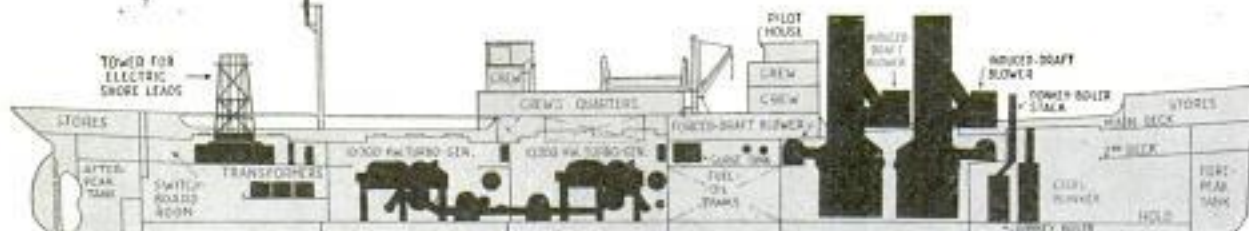


Diagram of the Floating Power Plant on Board the "Jacona," the Black Sections Representing the Location on the Ship of the Various Units of the Generating System

will lie in wait for such emergencies. The moment the power of a town or city is demoralized, she will be sent on her way to furnish rescue power.

In addition to regular emergency duty, the "Jacona" will be able to augment the local power plants when more electricity is needed. There will be times when the local power plants will need regular repairs, and the "Jacona" can be sent in to furnish current during this period. Local plants may also have new installations of all sorts made and the town lose no power, if this ship can be called in.

The idea underlying the "Jacona" has suggested several uses for similar ships. One of these is to furnish power for some of the numerous summer colonies along the coasts. Ships with much smaller power plants than the "Jacona" would be sufficient for such purposes. These colonies are usually entirely vacated during the winter, but contain several hundreds and even thousands of people during the summer. Electric power for such places during the "boom" months would be appreciated by the people and they would be glad to pay more than the normal rate for the convenience of being supplied with current.

It was no easy matter to overcome all the difficulties in converting the "Jacona" into a power station. Some of the shrewdest engineers had to knit their brows over blueprints. The "Jacona" was originally a two-deck, three-island-type cargo vessel of 5,128 gross tons, built in 1919. The stack had to be removed during the conversion as well as the foremast, the shaft alley, lineshaft and tail shaft, and the stern bearing had to be blanked.

New foundations had to be built for the power plant. Four boilers were put in, and these will furnish steam for two turbo-generators rated at 10,000 kilowatts each. The boilers deliver 280,000 pounds of steam per hour at 425 pounds' pressure.

The crew's quarters were not changed. During ordinary work the ship may house fifteen or twenty men.

The method of connecting the ship to the shore terminals was one of the greatest problems. But an arrangement was decided upon which consists of a steel tower on deck that may be moved if necessary. Two separate three-phase circuits, consisting of heavily armored and insulated cable, run from this tower and over a barrel crossarm to the shore. A large amount of slack must be left in this cable because of the tides and high waves.

WHY THE ORCHID COSTS MORE THAN ANY OTHER FLOWER

Orchids, contrary to popular belief, are not so difficult to grow, but gain their reputation as the world's most expensive flower because it takes them so long to mature. Six years is the usual period for



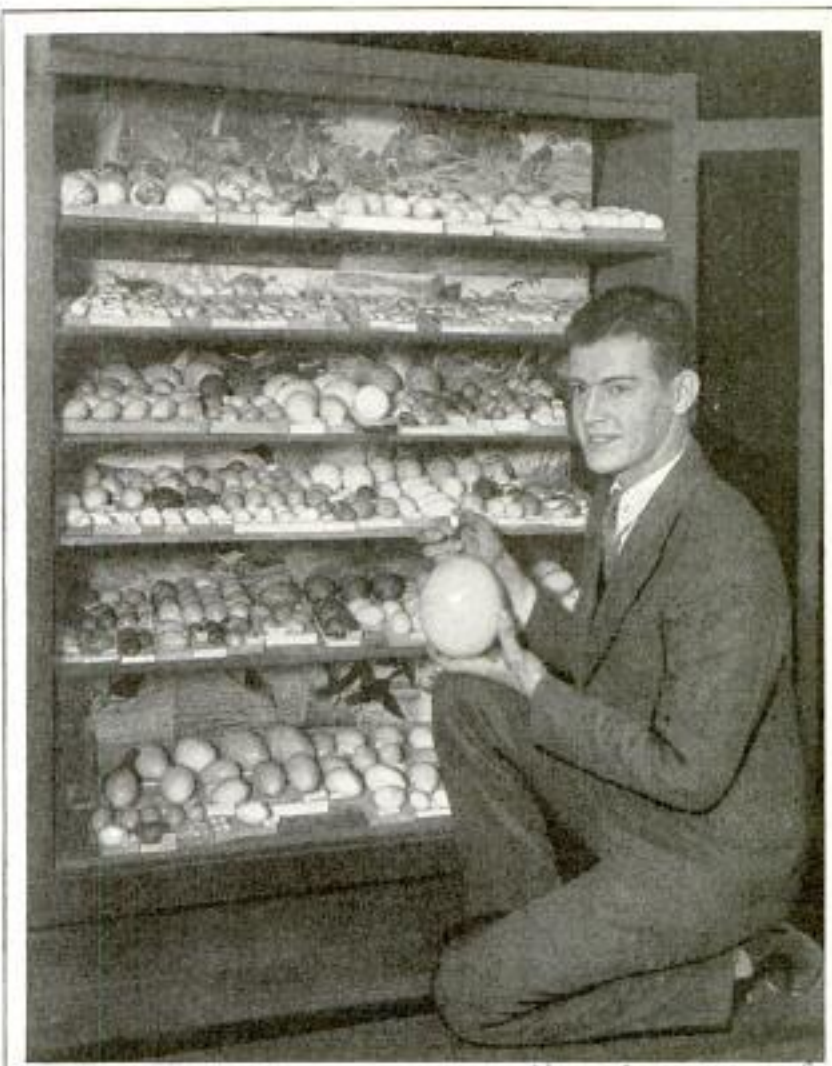
Orchids in a Hothouse in Various Stages of Cultivation, Ranging from the Tiny Seedlings to the Plant Blooming Several Years Later

maturing a plant from seed, and then one flower only, or at most two, greets the orchidist. The next year he may get more blooms, and in twenty-five or thirty years, a fair succession of blooms. At one time their expense was due to the fact that they were gathered in the jungles along the Amazon, but today the finest specimens are cultivated. Dr. David Lumsden, department of agriculture plant specialist, has thousands of these rare flower plants valued at potential millions in all stages of cultivation in a hothouse on the outskirts of Washington. Orchid seeds, after pollination, are grown in test tubes containing agar, a gelatinous seaweed substance from which the seeds obtain food. The slips and plants are transplanted several times as the growth continues, the orchid house being kept at a constant temperature

of from fifty-five to sixty degrees. In nature, pollination is accomplished by the bee, but in the nursery a pencil point or toothpick is used. Seeds are developed eleven months after pollination. The orchid is the only flower of which there is a perfect record of crosses, and the rarest color is the albino, or white, occurring in nature only once in 10,000 times.

BOY'S BIRD-EGG COLLECTION HAS HIGH VALUE

What is believed to be one of the largest amateur's bird-egg collections in the United States has been gathered by Linscott Hall, a Missouri boy, who has a government permit to collect eggs and who has been pursuing his interesting hobby for ten years. He has 800 eggs which he values at \$800. More than 260



Some of the Valuable Collection of 800 Birds' Eggs Gathered by a Missouri Boy; More than 260 Species Are Represented

species of birds are represented in the collection, which has been carefully arranged and tabulated. Young Hall sends an annual report to Washington concerning his finds during the year.

PLANE CONTROLLED FROM SHIP BY RADIOTELEPHONE 1988

Control of airplanes from the navigation bridge of a ship may be carried on by radiotelephone up to a distance of about fifty miles, the navy's bureau of aeronautics announced after experiments with aircraft squadrons attached to the cruiser "Houston." The ship used its loud speaker as radiotelephone transmitter for ship-to-plane communication. Voice reception aboard the planes was good, and on one occasion was easily intelligible up to fifty miles.

1230

Amherst Place

St. Louis, Mo

H. S. Daily 11/19/38

U. W. C. A. Chicago
 220
 2003



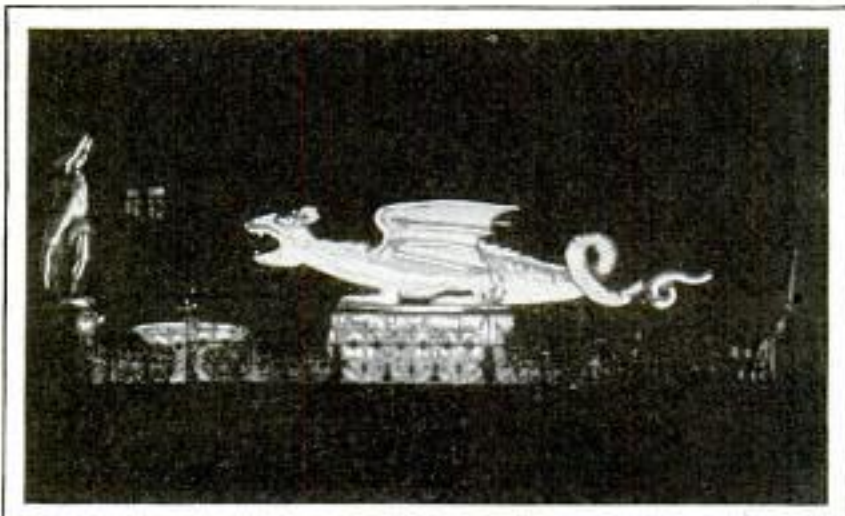
Basketball on Roller Skates, an Exciting Sport That Has Attracted Chicago Business Girls

BASKETBALL TEAM ON SKATES COMBINES TWO SPORTS

Chicago business girls have conceived the idea of combining two fast diversions—roller skating and basketball. They now play basketball on roller skates and find the game more fascinating than either of the forms of exercise separately.

FOUNTAIN SHAPED LIKE DRAGON ILLUMINATED AT NIGHT

1931 Probably one of the most unusual fountains in the world is that known as the



Grotesque Dragon Fountain in Austria Illuminated at Night

"Lindwurm" fountain in Klagenfurt, capital of the Austrian province of Carinthia. The Lindwurm is a legendary monster of the dragon type which figures in Germanic mythology, and the fountain, with its dragonlike aspect, presents a grotesque spectacle. Recently its appearance was made still more terrifying when floodlights were played on it at night during the celebration of the tenth anniversary of a plebiscite in Carinthia.

AIRPLANE DRAGLINE HELPS PILOT LAND IN FOG

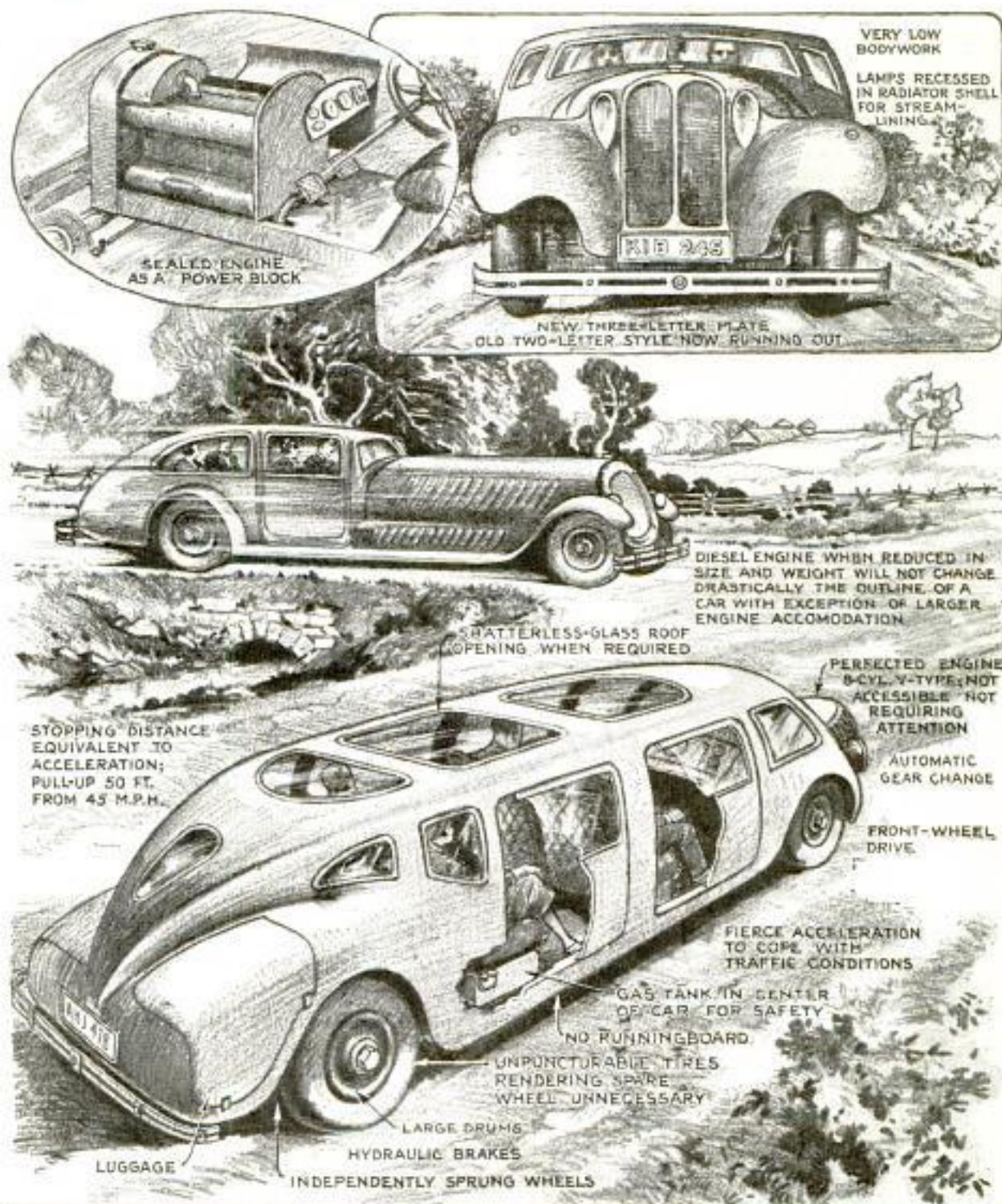
To assist the pilot in landing his plane safely on an unlighted field, or when fog obscures the area, British engineers have developed a simple dragline device which has worked successfully in a number of tests. It is of special aid during those last few seconds in "flattening out" just before the wheels touch the ground and when there is danger of stalling with a more or less serious crash. The apparatus, known as a "ground proximeter," is simply a weight attached to a linen thread and hanging thirteen feet below the wheels. As long as the weight rides free in the air, a green light shows in front of the pilot. The instant the weight touches the ground, a red light flashes, warning the pilot that the field is not more than thirteen feet below, so that he can glide on in with comparative assurance. His wind-speed indicator and other instruments enable him to check his speed so that there is little danger of stalling, and knowing that the ground is immediately below him, the pilot has little trouble in descending the remaining thirteen feet. More than 100 tests were made with the device, and three pilots pronounced the signal a success. The warning lights are operated on an independent circuit and are conveniently placed on the cowling above the instrument panel, in such a manner that they will not interfere with the visibility of the other gauges and dials.

2. Altemark Sh. W. L. London Eng.

the W. W. 10/25/30

W. W. Meredith B.S.A.
 before Royal
 Aerionautical Society

FORECAST OF THE FUTURE TREND IN AUTOMOBILES



Courtesy The Graphic

Artist's Conception of What We May Expect in Automobile Design in the Next Ten Years, Judging from the Marked Changes Already Brought About as Portrayed at the Bottom.

1995
222

Big Pine County
Recreation Camp
POPULAR MECHANICS
near Los Angeles



One of the Longest Ski Jumps in This Country Is That near Los Angeles Shown Above; It Has Provision for a 320-Foot Leap

SKI JUMP QUARTER MILE LONG MAY BRING NEW RECORDS

One of the longest ski jumps in this country has been cut through a forest at a recreation camp near Los Angeles in the hope that the big jump will result in establishing new world's records. From the starting point on a tower to the brink of the "jumping-off place," the distance is 480 feet, with provision for a maximum jump of 320 feet, and a 500-foot runway at the end of the jump.

COMMERCIAL FISH NOT FOUND IN HUDSON BAY REGION

Hudson Bay and Strait contain no commercial fish. A special expedition from the department of fisheries at Ottawa spent twenty-two days at fifty-five different stations in the district, covering 3,100 nautical miles, without finding any commercial varieties. The bottom of the

Hudson Bay area consists chiefly of mud, loose rocks and boulders, an unsatisfactory type for trawling operations. The various forms of life composing the bottom material were very meager and differed from those found on good fishing grounds.

BURNER CONSUMES WASTE CRANK CASE OIL

1989

Utilizing waste automobile crankcase oil for fuel, an oil burner now is available that is inexpensive to operate and is adaptable to any type of heating unit. The burner is said to be free from soot, smoke and odor, and a series of special units are intended to overcome the difficulties usually encountered in burning crankcase oil, which, polluted with dirt and water, ordinarily has a low point of combustion.

A motor contains the only moving parts. To install, the grates of the heating unit are removed and the firebox specially bricked. Fuel oil is first used to heat the generator brick, against which the waste oil is sprayed after it has been mixed with air in the nozzle of a gun leading from the motor into the firebox. Three minutes is required to heat the generator brick and then the waste oil is used. An electric device shuts off oil and motor if the fire goes out, and should the electric current cease, the oil flow stops as the motor dies. Ordinarily about eight gallons of the waste oil, which can be obtained at little



expense, will heat an average house for twenty-four hours.

2017

Dept. of Commerce,
Fishery News Release
11/21/30

The Pal Oil Burner Co. Box 81
Waterloo, NY
Copyrighted material

James W. Lawrie,
Director of Chemical
Research for U.S. Army
Manufacture U.S.

Bruce Chemical
Corp. Laboratories
Box 2 & 4
223
Milwaukee, Wis.

**BETTER WAY TO FINISH WOOD
IS FOUND BY RESEARCH** 2055

Research workers have found that present methods of sanding, filling, staining and varnishing woods are at least theoretically incorrect, and better methods of beautifying and preserving them have been developed in the laboratory. Floors now are being curried instead of sanded, the "whiskers" being shaved off and filler applied under pressure. Such floors are much more durable than those treated in the ordinary way.

*Science Service 505.6.
11/28/30*

**FIELD-GUN PRACTICE INDOORS
ON THIRTY-FOOT RANGE** 2021

Superimposing a rifle of small caliber and an airgun on a regulation army howitzer one-pounder, an army gunner has created a weapon that enables accurate field-firing practice on an indoor range, thirty feet long. The smaller gun is placed over the larger and the regulation one-pounder sight is used. By research the exact aiming point has been found, making the small gun as accurate as the mother piece. Aiming through the howitzer sights, the gunner is able to fire the airgun or rifle with such accuracy that he can hit a match at thirty feet, this being equivalent to firing at the ordinary target at 1,200 to 1,500 yards with the field piece. A miniature town has been constructed as a target to make the practice range more realistic.



Field-Gun with Small Rifle Superimposed on It for Use in Indoor Target Practice



Tiny Air-Cooled Gasoline Motor, Weighing Eleven Pounds and Developing One Horsepower

**TINY GASOLINE MOTOR WEIGHS
ONLY ELEVEN POUNDS**

Weighing only eleven pounds and developing one horsepower, a tiny gasoline motor has been invented by a German engineer. It is air-cooled, has no crankshaft and is so compact and light in weight as to be carried about easily.

Jaschka

**LUCKY PHONE NUMBERS SOLD
TO JAPANESE PATRONS** 2011

Telephone subscribers in Japan who do not like the number assigned to them may buy another more to their fancy through brokers who perform this service as a regular business. Certain numbers are considered lucky, and these bring large prices, often from \$500 to more than \$3,000, depending on the desirability of the number as an omen of good fortune. Eight is considered the luckiest number of all, and 357 is extremely popular. On the other hand, some numbers are considered unlucky, forty-two being the worst because it signifies death, while forty-nine also is undesirable. For this reason, the unpopular numbers are often assigned to police stations.

Copyrighted material

at Fort Sam Houston Texas
 under direction of Capt. Rufus Boylan
 Co. Com.

Work of Corp. John L. Black, 1st Cavalry, 1st Recon, Headquarters, 4th Infantry

Herr Engelbert Jaschka
 Berlin, Kuno-Hofstr. 21
 Düsseldorf, Japan
 Electrical Engineer

see May 1932

2004
224

u/po/30



Diver Jumping from Springboard into Sand Pit, His Movements Being Regulated by Trainer Who Manipulates Ropes Attached to Safety Belt

SAFETY BELT USED BY DIVER FOR LEAPS INTO SAND

To train his swimming stars in attaining the proper form for diving, Princeton university's swimming coach has made a diving frame from which those in training leap headlong toward a sand pit instead of into a tank of water. The apparatus consists of a pipe framework, fifteen feet high, from which a safety belt is suspended by a pulley system. The diver fastens this belt about his waist and takes off from the springboard in the frame just as though he intended to jump into water. The coach manipulates the rope attached to the safety belt to balance the diver.

HARDY SPECIMENS OF WHEAT BROUGHT FROM RUSSIA

Several new varieties of grain from the oldest wheat lands in the world recently have been brought to this country from the great plateau grass lands of Russia, where wheat has been grown for centuries and where wild grain grows side by side with cultivated varieties. One kind of wheat grown in the Caucasian highlands appears to hold great promise. It

is known as Russian or Persian wheat and is a short-stemmed, heavy-headed plant, maturing in a short season and growing well in a cold soil. The peasants follow the receding snow fields in spring, sowing this grain as fast as the snow melts, and often obtaining a yield of as much as fifty bushels per acre. Wild apples and several other varieties of fruits, including pears and cherries, also have been brought to this country from Russia for experimental purposes.

2022 OLD CHAIN-DRIVEN STEAM CAR LIKE FIRE ENGINE

Bearing an amazing resemblance to a toy fire engine, one of the first automobiles built in this country is now stored in Los Angeles. It is a chain-driven steamer, the ancestor of the steam-driven cars popular a few years later. The vehicle was patented by Achille Fillion in 1892, the same year that Charles Duryea built his gasoline motor car. It was one of the startling sights witnessed by those at-



This Is Not a Toy Fire Engine, but an Early Chain-Drive Steamer, One of First Automobiles

tending the Chicago World's Fair in 1893 and made a speed of ten miles an hour.

Brought to Department of Agriculture by Mr. J. L. Dickerson

Author: Carl Selig Associated Studio Inc. Selig's Zoo

Copyrighted material

Coach Howard is before...

wide world

for Imperial Airways
England



One of Eight Giant Airplanes Placed in Service Recently on European Airways; These Ships, the Largest Used on Any Transport Route, Carry Forty Passengers and a Crew of Three

Handwritten initials: P & A

FORTY-PASSENGER PLANE USED ON EUROPEAN AIRWAYS

Eight giant transport planes, which will be the largest used on any passenger air route, are being placed in service by the Imperial Airways in England. These huge ships each carry forty passengers in addition to a crew of three.

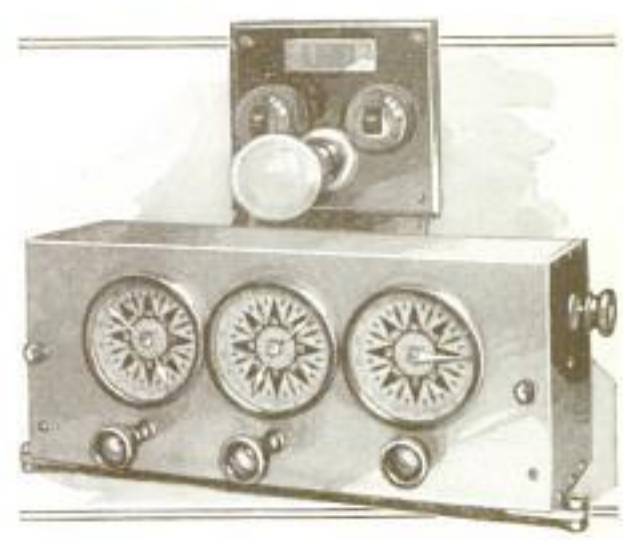
VITAMINS KEPT IN DRIED FRUIT BY DRYING PROCESS 2074

In Europe a process of drying fruit has been developed that is designed to retain all the vitamins and essential oils at their full potency. This method consists in dehydration of fruits and vegetables by low-temperature drying under special humidity conditions and, aside from being rapid and cheap, causes foods to retain their flavor, color and aroma during storage. No preservatives are used in the drying process.

FOG-SIGNAL SYSTEM FOR SHIPS USES TWO-TONE WHISTLE

To prevent collisions of ships in fog, a system of continuous course signaling by means of two-tone whistles has been developed, the whistle blasts indicating to other ships having similar equipment the course of the vessel from which the sound emanates. The mechanism includes three

units, the whistle, a geared motor to control it automatically and a broadcasting and receiving apparatus for interpreting the signals in terms of direction. The latter apparatus has three dials, one of which is set to the ship's course and operates the whistle. The other two are for receiving signals from other vessels, the two hands on these dials being set in motion at the end of one blast and stopped at the end of the next. One hand is used for blasts at intervals of more than one minute, and the other for closer intervals. The precision of the instrument is only impaired by the rate of speed at which the two vessels are approaching, and a correction can be made for this.



Dials Which Interpret Fog Whistles on Ships in Terms of Direction the Vessels Are Pursuing

Reported by Alfred Hutton, American Consulate Office London

James System, Inc.
406 Lounan Bldg
Seattle, Wash.
Copyrighted material

1978

29 Bean Road
Bexley Heath
N. London, Eng

'Round the Horn

By HAROLD T. WILKINS,

IT WAS in the last hours of the "dog watch" in a deserted newspaper office in a Tasmanian town a year ago. Two young Australian reporters, A. J. Villiers and Ronald Walker, had been looking at the picture of a windjammer when the following telegram arrived:

"Three-master sailer 'Grace Harwar,' flying distress signals, stopped liner 'Jervis Bay,' in Great Australian Bight. Boat put off from 'Grace Harwar.' Crew starving, 115 days out of Wilmington, North Carolina. Liner gave her food and steamed on, after blowing siren in salute of full-rigged sailer."

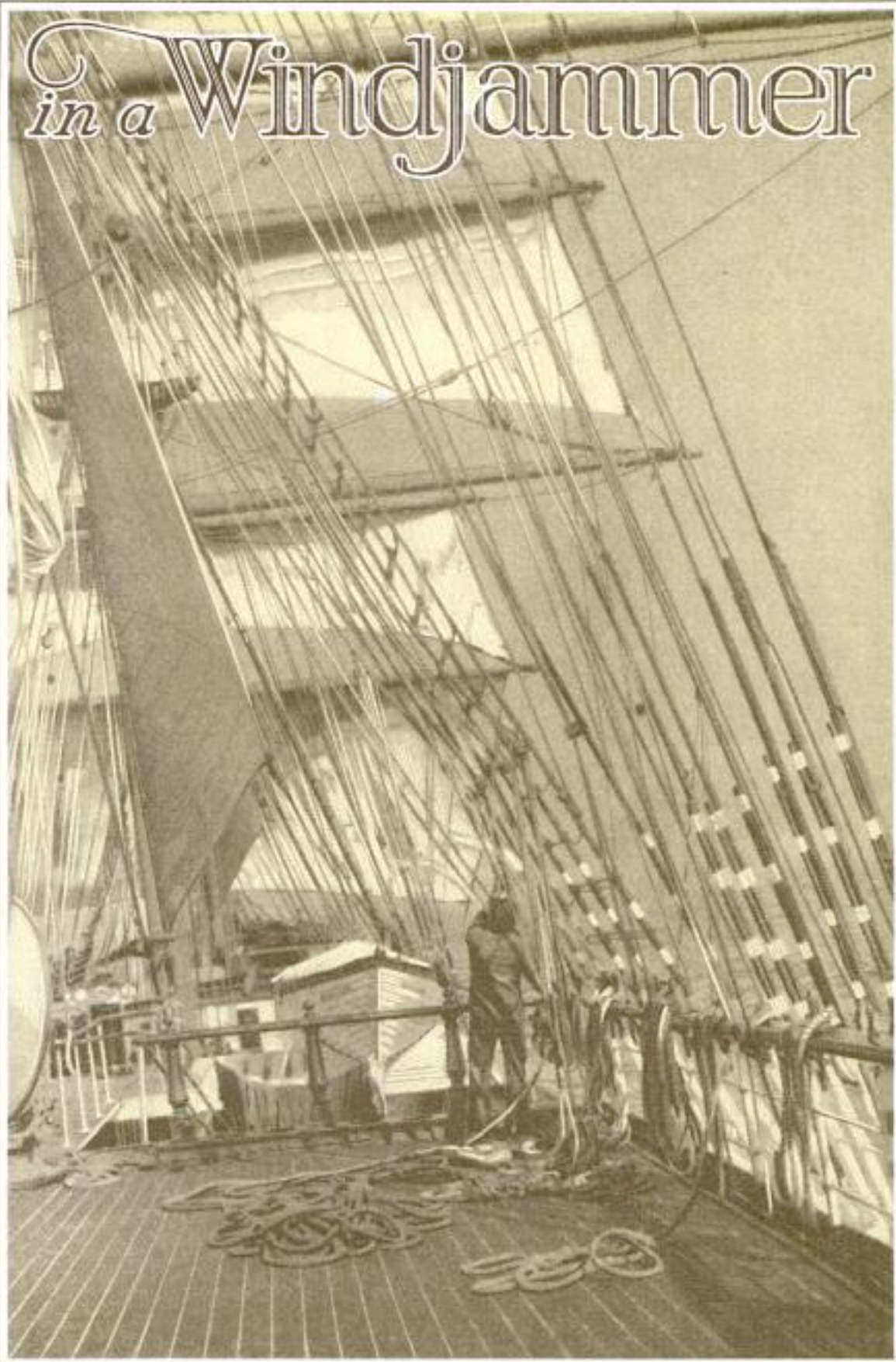
Before twenty-four hours had passed, Villiers and Walker had resigned, wired the "Grace Harwar" for fore's'le berths, and in four days were on the train for Adelaide and Wallaroo, the port of the "Grace Harwar," whose captain had telegraphed "Glad to have you." They boarded this steel full-rigged ship of 1,749 tons gross, stowed 6,000 feet of film and their movie cameras in the lockers under their fore's'le bunks, and with a crew of thirteen—mostly boys of an average age of nineteen years—sailed for Falmouth, England, laden with wheat.

It was their intention to make a record on the film of a square-rigged deep-water windjammer, rounding the Horn in roaring gales, her canvas booming and flapping, while seamen out on the pitching yards sought to bend the frozen sail with stiffened fingers, as the green-gray seas washed the decks.

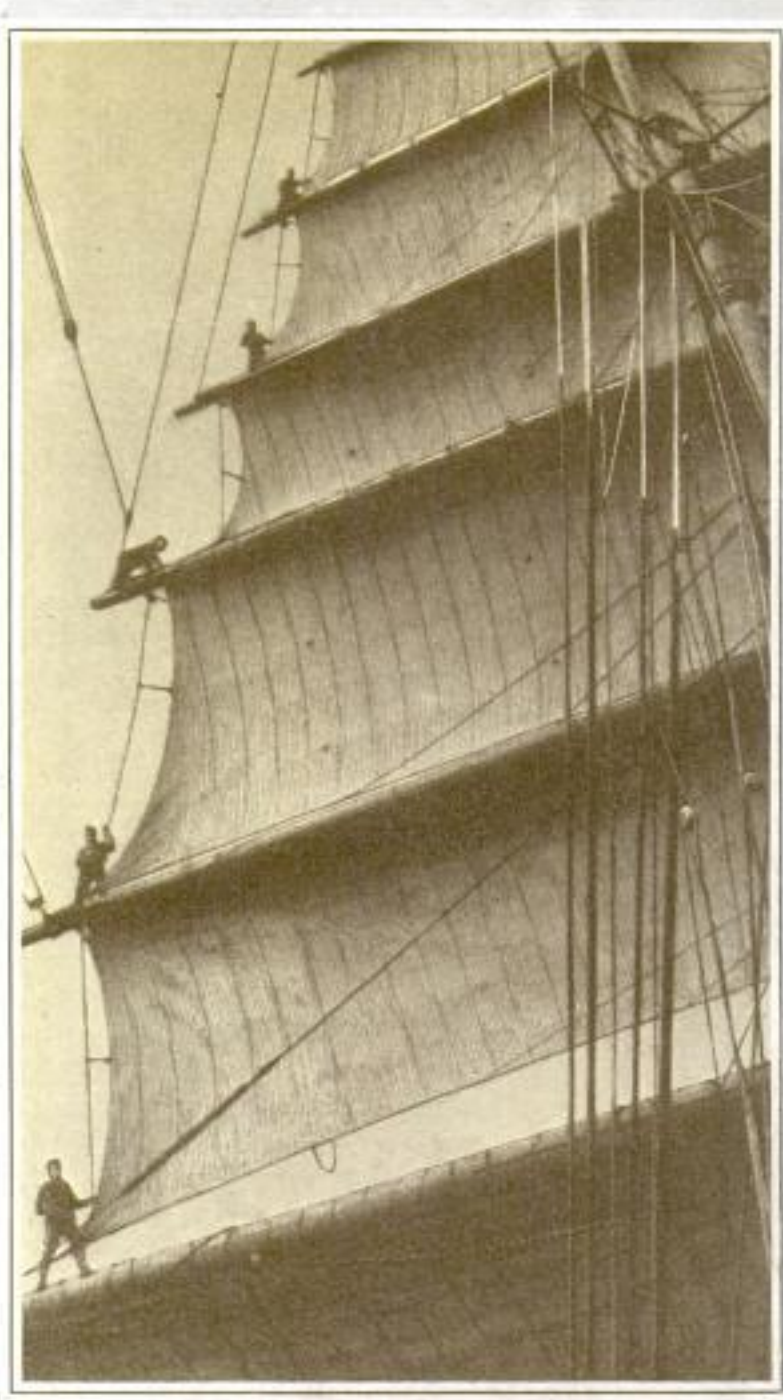


The "Grace Harwar" under Full Sail While a Light Breeze Sends Her Plowing Sturdily through the South Atlantic

in a Windjammer



From His Post Below, the Mate Shouts Orders to the Sailors Aloft on the Yards; Contrast This Scene with That on the Deck of a Modern Steam or Motor-Driven Liner



Aloft on the Yards as the Sails Are Spread to Catch the Trade Winds of the South Atlantic after a Journey around the Horn

booming of canvas thrashing the yards, blown to ribbons by winds, against which the young chap at the helm had all he could do to hold the ship to her proper course.

The gales drove the "Grace Harwar" a thousand miles out of her course, but there was worse to come. Aboard ship, the two newspaper men and amateur cinema photographers had no dark room and no fresh water to develop negatives. Fresh water in sailing ships bound round the Horn, is too precious to waste on films.

"We had a tiny cabin in the foc's'le, just abaft the cook's galley. It was a kind of dark room to load the film magazines, but there was no chance of developing, and it was infernally wet, and exposed to all the heavy seas that broke aboard and swept on over the lee side of the bulwarks," said Villiers. "They swept aboard ceaselessly and smashed against the steel bulkhead. The door fitted badly, the port leaked, and no putty would keep the water out. The sea seeped in from the galley outside as well as from the decks. Six inches of cold sea

"We had struck a real old-timer, where the frozen wretches of the crew, on the long bitter run to the Horn, had to stand their frigid tricks at the huge open wheel, unprotected, tortured by the cold fury of the wind, sodden by the ceaseless rain, cut by the merciless hail," Mr. Villiers says.

water would be swirling over our floor and wetting our bunks, and the salt spray so often smashed the glass of our one oil lamp, that at last there was only one glass left."

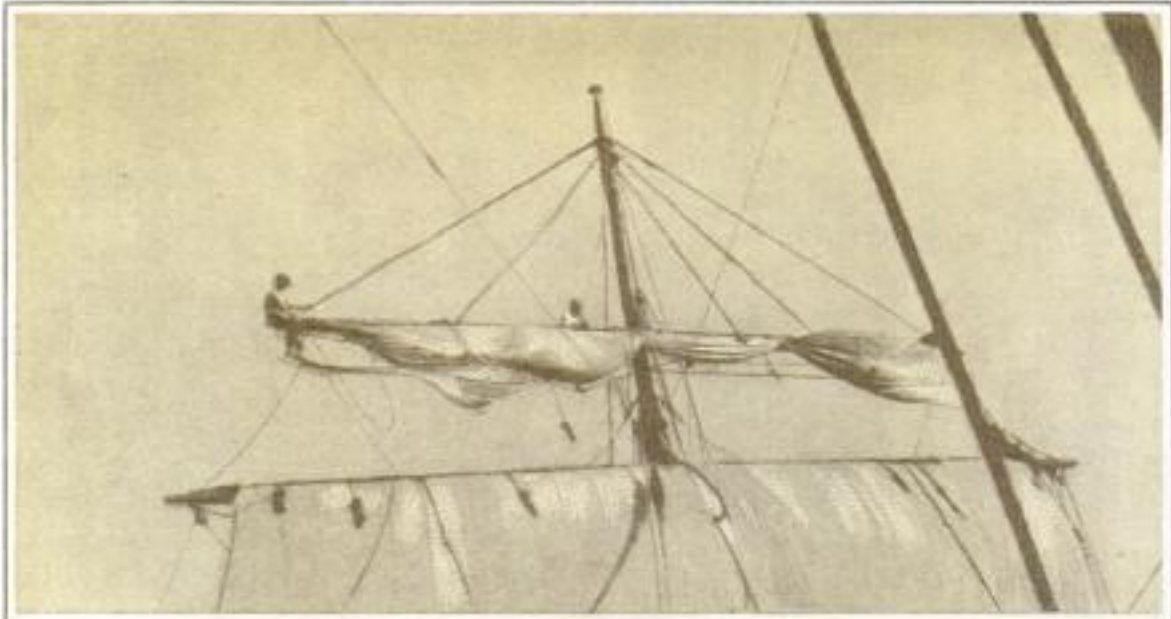
Right from the start, heavy weather assailed the ship. Young fellows, astride the yardarms, furling sail amid a mad

Thirty-eight days out of port, one bitterly cold dawn, the "Grace Harwar" was in the grip of tremendous seas and a hurricane, halfway to the Horn. She was helpless and could advance not a yard. Walker and a young Finn sailor boy were



Skill and Strength Are Prime Requisites for the Crew of a Windjammer; Even Sheeting Home a Sail with the Capstan, as Shown Below, Takes Plenty of Muscle

9 78
200



aloft loosening sails. The watch below on deck were bearing on capstan bars, operating a very primitive device for hoisting the heavy yard aloft. It was pitch-dark and icily cold.

"Are you all right up there?" shouted the second mate above the roar of the wind and slapping of the canvas against the masts.

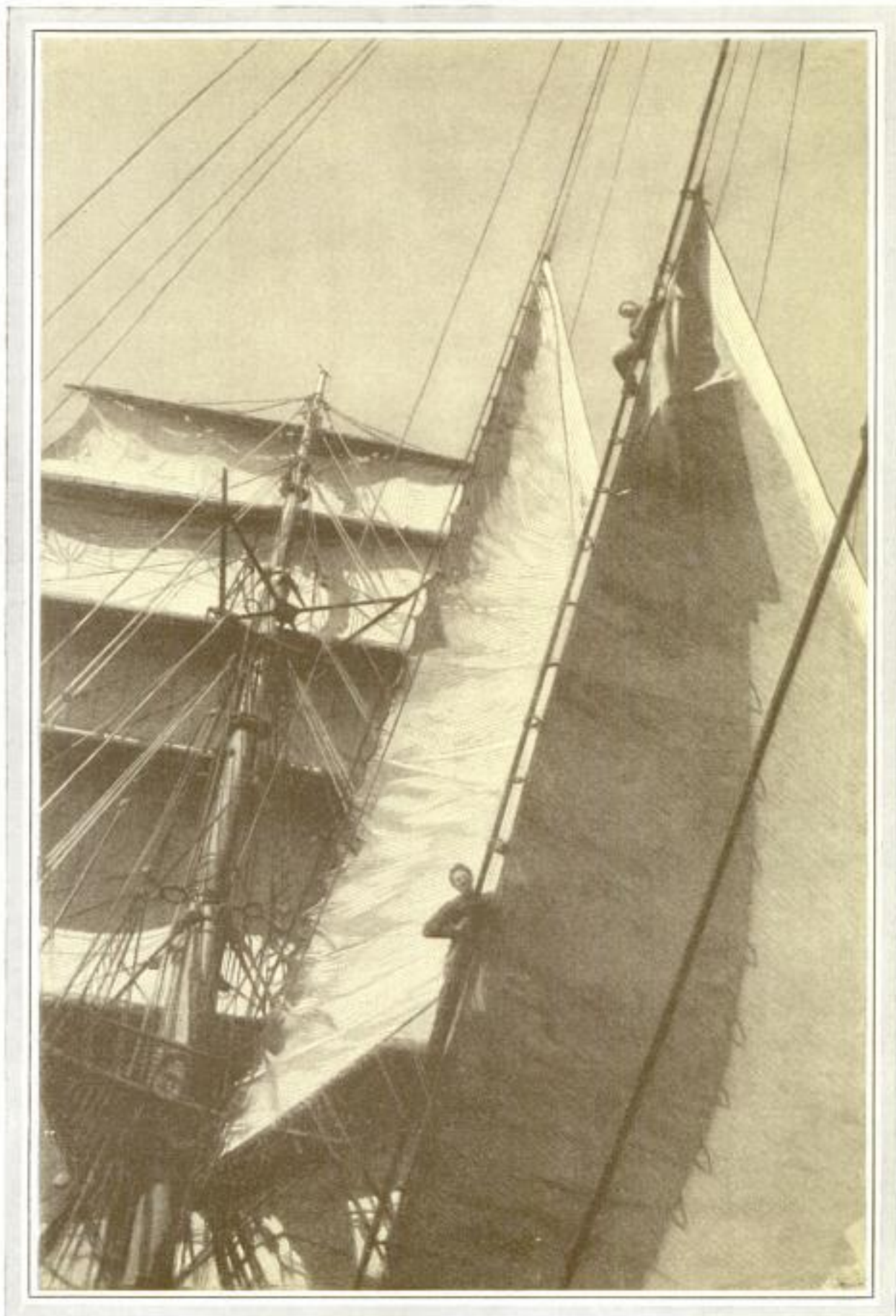
"All right, sir," shouted Walker.

"Suddenly, without warning," says Mr. Villiers, "there was a wild roar of smashing chains and blocks. Something hurtled swiftly downward in the darkness, and the watch scuttled for safety. High aloft a yard had crashed down onto something."

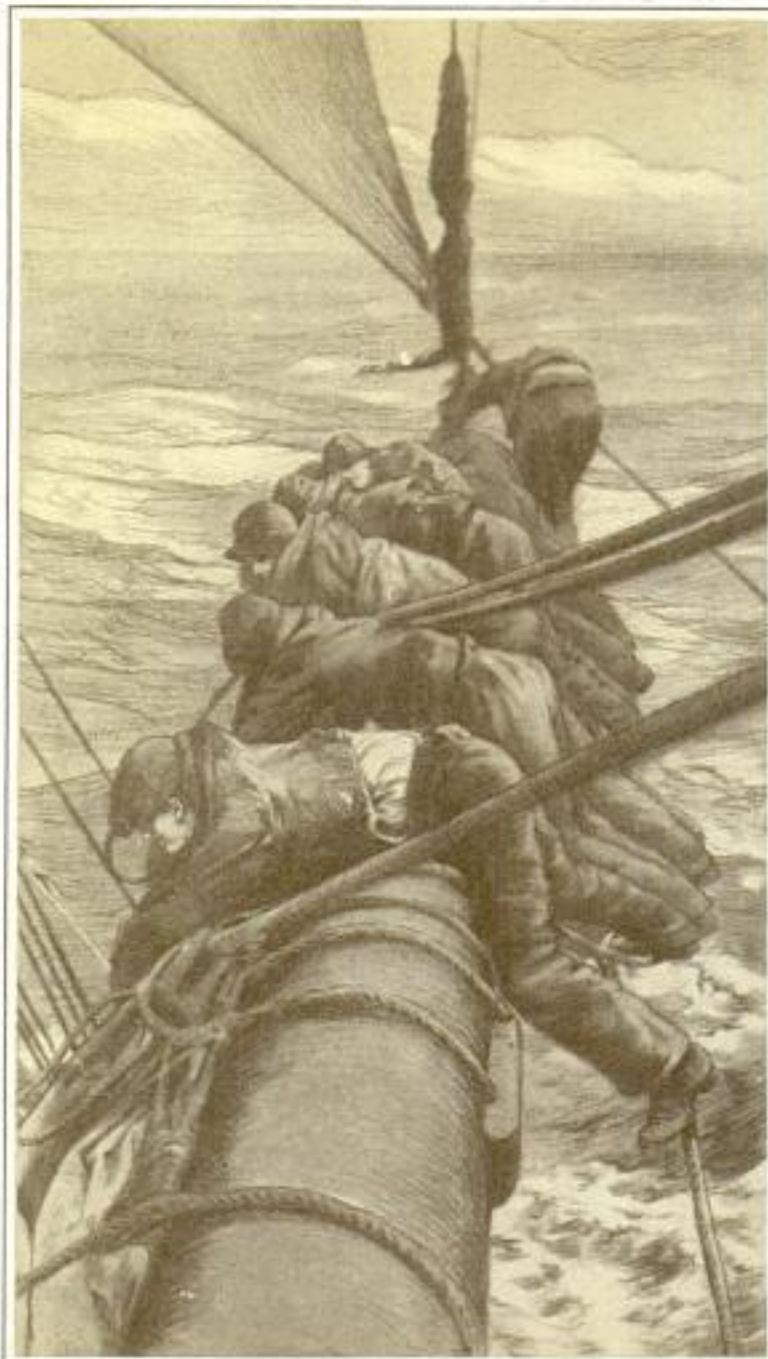
"Walker is hurt. He is caught between the yards," came a voice from aloft.

In less than half a minute, every man of the watch had shinned up the ratlines into the rig-

Casting Loose the Mizzen Toppallant Sail and Scene on Deck When the Weather Is a Bit "Fresh" in the South Atlantic



Hoisting the Sails for Friendly Winds; Fearless and Nimble, the Trained Seaman Is Master of the Maze of Rigging in All Sorts of Weather



On the Main Yard; Furling the Mainsail While a Blow Is in Progress
Somewhere off Cape Horn

ging. Walker, still and white-faced, his lips and nose stained with blood, was lying on the yard close to the mast, with his feet still on the foot rope.

Blocks and tackle were rigged up, and, one sailor supporting the inert body, Walker was gently lowered to the deck—no easy matter with the ship buffeted by wind and water, and swaying like a pendulum.

There was no surgeon or radio and no other ship within a thousand miles.

"We laid him on a blanket at the foot of the mast by the capstan," said Mr. Villiers. A figure with a hurricane lamp stepped forward and gave a slow look. It was Captain Svensson.

"He is dead" he said.

Next day, on a Sunday, the weather grew worse, and, at great risk, the main yard was backed, and the ship hove to for the burial service. The Finn helmsman tolled the wheel bell, the captain read the service and gave a short address standing bare-headed on the poop, while the crew could hardly keep their feet on the heaving decks.

"It is the first sea burial I have ever seen, and I never want to see another," Mr. Villiers declares.

Villiers then took up the photographing, all of which had previously been done by Walker.

He would shoot a few feet of pictures, and then crawl down the masts, where ratlines were often missing, to the decks, and wedge himself into a dark corner in the hold, while the seas pounded the ship and rolled her from side to side. Here he opened his camera, reloaded and sealed up the taken pictures.

The flying spray often drenched him and his camera, and more than once he was washed into the scuppers while he was trying to shoot the breaking seas. There was no dry place in the ship on the Cape Horn road, and no cool place in the tropics. It was a severe test of

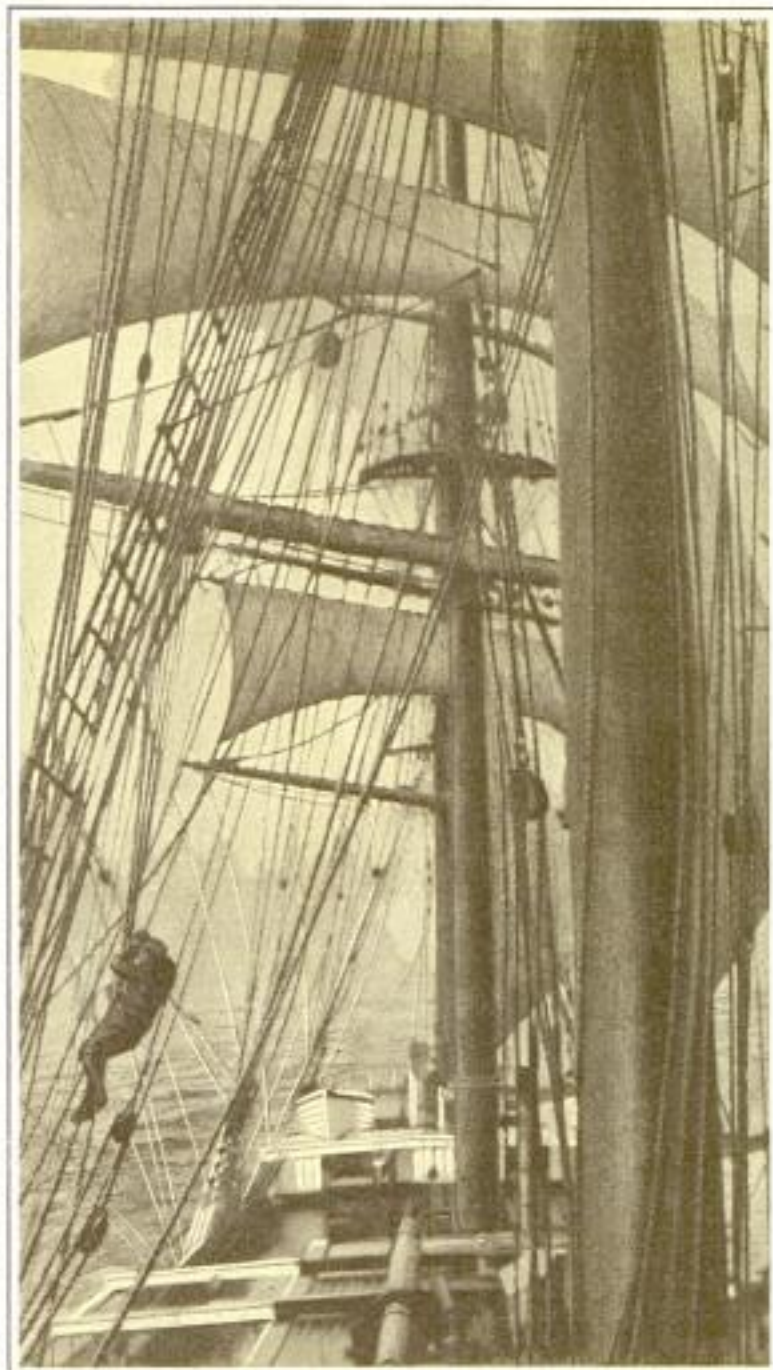
1978

cameras and film. He could not even develop a piece of the film to test the working of the camera. Off the Horn, a huge sea came aboard, broke through the steel door of the cabin and washed around the films in their sealed canisters of steel. He was not even sure if he could preserve the films when the pictures were taken.

Accidents still pursued the laboring ship. Rounding the Horn, a big sea came aboard and washed a boy into the boiling waves. The captain saw him swept past the poop, and promptly threw a lifebelt overboard. Then at the risk of all their lives, he ordered down helm. The masts trembled as the "Grace Harwar" came up into the wind and lay to in the trough, a boat was launched, Villiers in her, and the second mate stood up with a big steering oar, while the sweating boys labored to row the boat. Just when the light was going and all hope abandoned, the boy was sighted on the lifebelt and dragged aboard unconscious.

At last, one day, the "Grace Harwar" was holding on her way up the South Atlantic, when she sprang a leak. It was all hands to the pumps, amid heavy seas swirling in the waist of the ship. Foul gases rose from the wheat in the hold. There was risk of fire from spontaneous combustion, but the raging seas made it difficult to ventilate the holds.

The ship was headed toward Capetown, but, when halfway across the South Atlantic, a sudden gale drove her far north. There was nothing to do but resume the



South of the Line in the Region of the Trade Winds; Seaman Taking Quickest Way Down from Aloft

original course. Food was running low when, 123 days out of port, the half-starved crew saw the lights of a steamer ahead. She saw their signals and changed her course, and sent aboard stores and food. A fortnight later, the "Grace Harwar" berthed in the harbor of Queens-town, Ireland, and a few weeks later, a tug towed her to Glasgow, where Mr. Villiers quitted her on the Clydeside.

ARTIFICIAL BLIZZARDS HELP TO PROTECT PLANES

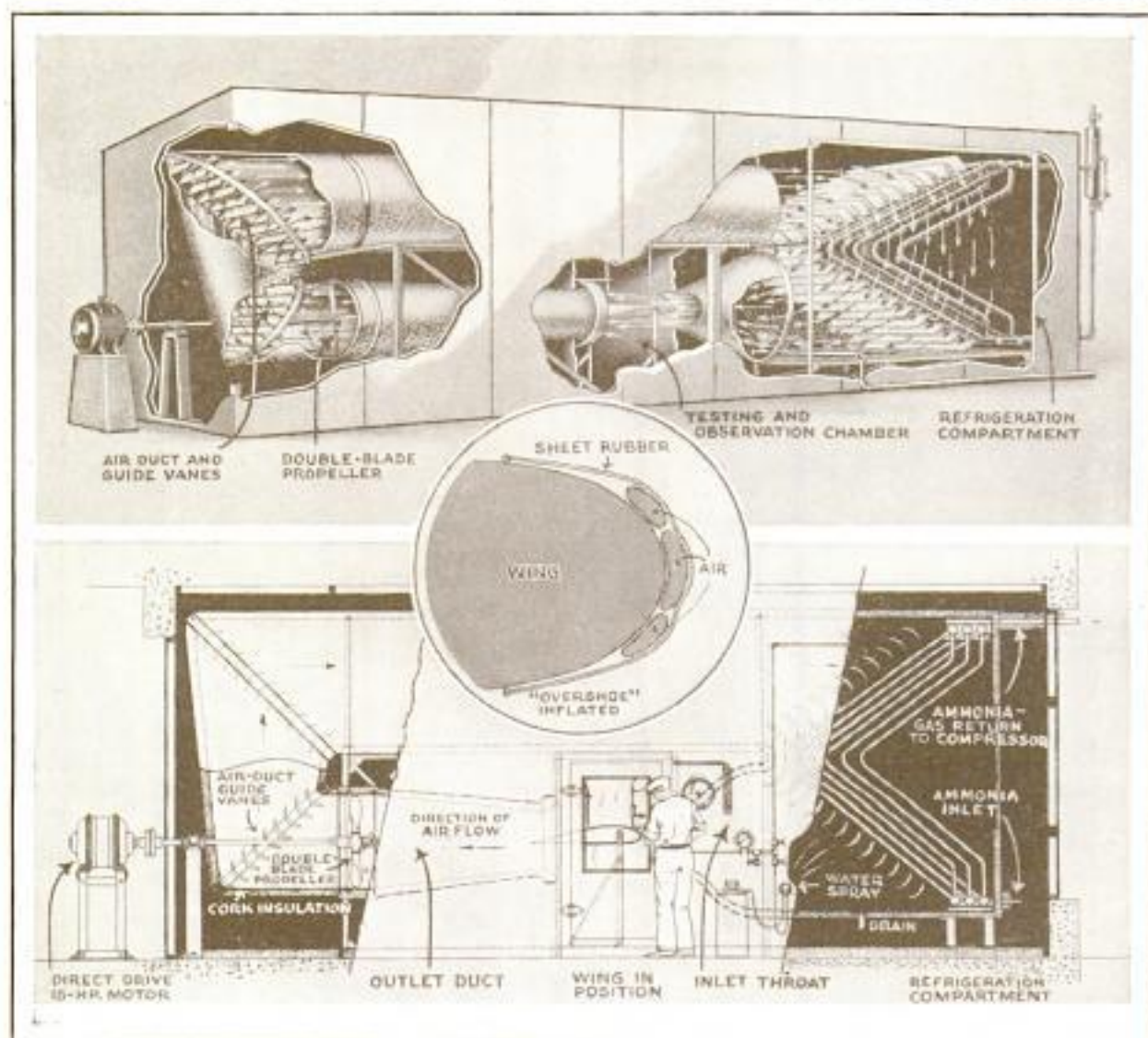


Diagram and Cross Section of Refrigerated Wind Tunnel Where Artificial Blizzards Are Produced to Study Effects on Planes; Center, Rubber "Overshoe" to Protect Wings from Ice

"Have a blizzard ready at one o'clock." This is not an order given the weather man, but is a typical request that would not cause much excitement among engineers at the B. E. Goodrich Rubber company in Akron, where one of the largest weather factories in the world is being operated. The other day a group of army aviators flew from Wright field, at Dayton, to Akron and watched one of the worst storms they ever had seen. An eighty-mile gale laden with snow and ice at below-zero temperature screamed past them, yet they remained comfortably warm because the storm was confined to a twenty-seven-foot box. The refrigerated wind tunnel was constructed as a weapon to be used against old man winter, who,

in the past, has caused numerous air-plane accidents by loading wings, wires, struts and other parts with ice. Full-scale wing sections can be placed in the test chamber and a layer of ice deposited on the leading edge in a few minutes. Motive power for the synthetic blizzard is provided by a large electric motor that drives two propellers placed at right angles to each other on a shaft. The air, in making the round trip several times a second, passes over cooling coils. Temperature of the air can be lowered to ten degrees below zero, and the velocity can be boosted to eighty miles an hour or better. The most dangerous temperature for the aviator is about twenty-eight degrees above zero, it has been found. At

this point, tiny droplets of water, super-cooled to four degrees below the freezing point yet still liquid because of their surface tension, are floating in the air. When an airplane flies through such a mass of water vapor, the droplets are agitated, their surface tension altered and they immediately freeze into ice, much of which is deposited on leading parts of the craft. In the wind tunnel, this condition cannot be duplicated exactly, because the air and not the wing is moving. But ice can be created nevertheless. As the cold air passes through a funnellike opening just before entering the test chamber, it picks up water vapor from a set of spray nozzles. This is carried to the part being tested and deposited as ice. Dr. William C. Geer, of Ithaca, N. Y., has devised an "overshoe" for airplane wings, struts, wires, radio masts and other parts, and development of this to a commercial form is being carried out at the Goodrich laboratories. In the wing installation, a rubber shield or flap is placed about the leading edges and securely fastened along both edges by a slightly elastic device. In normal flight, this flap rests snugly against the wing and has practically no effect on the aerodynamic qualities. But when the plane enters a region where ice is deposited—and this sometimes happens with alarming speed—the pilot turns a valve, compressed air, introduced into a trio of rubber tubes beneath the overshoe, expands the surface, and the icy crust cracks. In a few seconds the ice has been removed, the pieces carried away by the air stream. The ice remover installed on wires is similar in principle, but has only one tube, and the air, normally kept at a slight pressure to preserve the contour, is exhausted when ice forms.

BASEBALL GAME WITH TOP LATEST INDOOR SPORT

Walter Johnson, famous pitcher and manager of the Washington "Senators," has introduced an entertaining baseball game played on a board with a spinning top. Counters are advanced on the board which represents a baseball diamond, according to directions which fall upward on the side of the top after it has ceased spinning. Practically all the plays pos-



Courtesy The Washington Times
Baseball on a Table-Top Diamond; a Spinning top Directs the Movements of the Counters

sible in a real game are designated, and two players representing opposing teams may enjoy the board at one time. The counters are carried in a compartment within the top. With the game are furnished a number of scoring pads.

TYPEWRITER CASE ALSO SERVES AS AN OVERNIGHT BAG

Double utility now is offered in the carrying case of one



make of portable typewriter. This case is designed along lines to make it a companion to conventional hand luggage, and when the typewriter is left at home, the case can still be taken along as an overnight bag. In the latter capacity,

it is large enough to accommodate two dresses and other articles of clothing and toilet accessories. It is finished in brown to blend with other hand baggage.

L. C. Smith + Corona Typewriter Co., 51 Madison Ave. New York City.

Chicago 582 Washington

LL

Copyrighted material

2054
Capt. Andrew C. Boone
613 Spreckels Theatre Bldg.
San Diego Calif

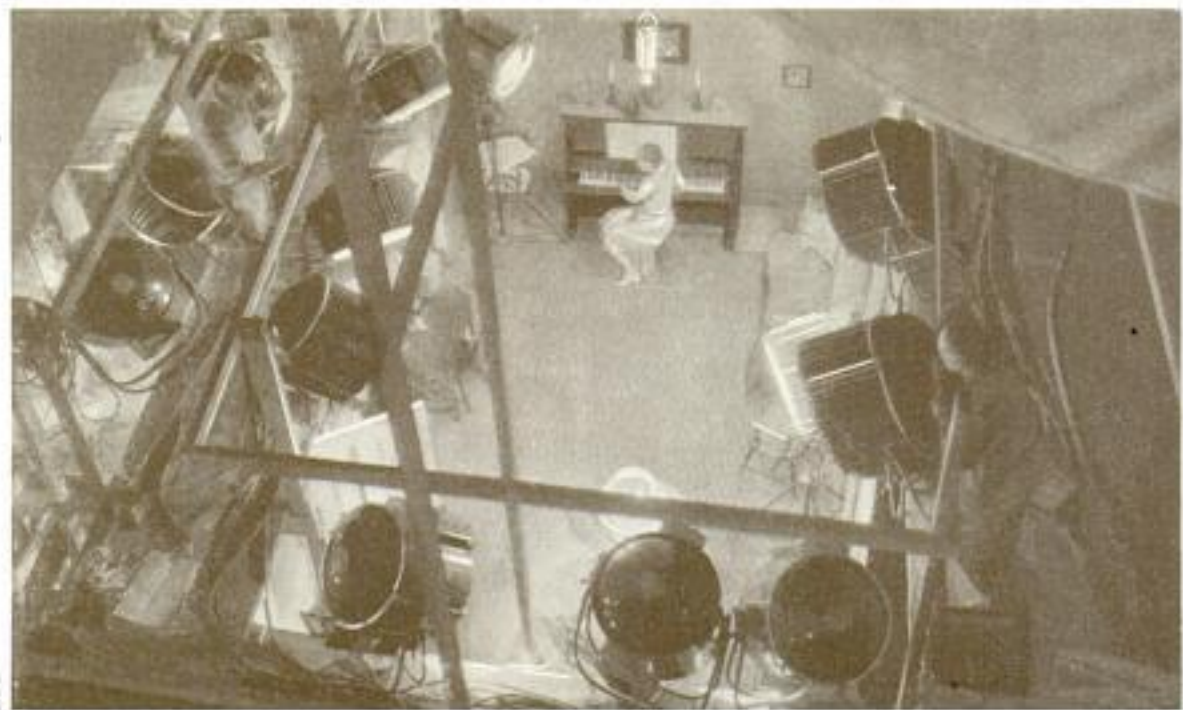
Sound Tricks

By JOHN DRAPER



THOUSANDS of tons of earth in a gigantic land slide move down a mountainside. The hero hears the rumbling grow in volume, is warned and snatches the heroine from her perilous position directly in the path of the onrushing tide.

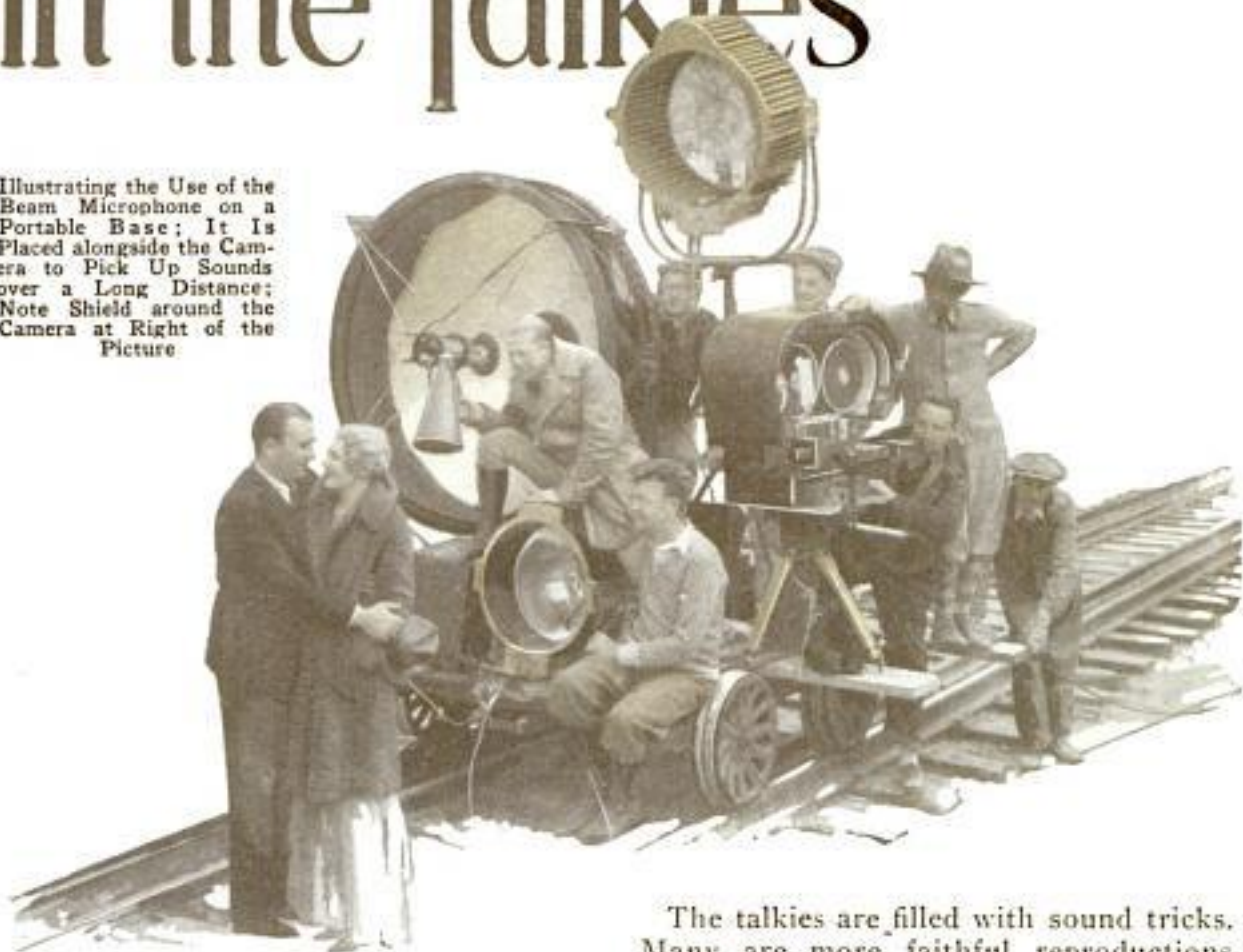
Photographically, the problem is simple. In motion pictures, filming hair-raising scenes long ago were realized. But the sound? How did the sound engineer and the sound-effect technicians record on a narrow track the noise of earth sliding down steep mountainsides to its final resting



Above, Director William C. DeMille Crouching under Soundproofed Camera, and, Below, Looking Down on a Scene Featuring Doris Kenyon; Note Microphone in Center

in the Talkies

Illustrating the Use of the Beam Microphone on a Portable Base; It Is Placed alongside the Camera to Pick Up Sounds over a Long Distance; Note Shield around the Camera at Right of the Picture



place on the floor of a valley far below?

On the lot during the filming of the picture to contain that scene workmen had completed a ten-foot-deep excavation. A brilliant idea occurred to the sound-effects men. Lower a microphone to the bottom of the pit, fill a dump truck with rock and dirt and pick up the noises as the load rumbles seventeen feet down the truck floor into the hole.

Easy, but not complete. Five cubic yards of dirt sliding down a seventeen-foot incline hardly approaches the volume rolled down in a gigantic earth slide. But by making two prints of the sound track, which is assigned a narrow slice along the edge of the completed film, re-recording the doubled volume and, having added a background of noises from "stock" in the studio's sound library, again doubling these, the sounds from the dump truck reached four times their original volume and theatergoers heard a "devastating" land slide that sounded far more realistic.

The talkies are filled with sound tricks. Many are more faithful reproductions than the noises created during the scenes you witness. And the tricks, both of making the noises and applying them to the finished film, require the services of hundreds of sound engineers, sound-effects experts, mixers and assistants of one sort and another.

Not a telephone bell tinkles in a drawing-room scene, not a door slams, until the sound experts have placed their approval on the effect. Unfortunately for these busy technicians, whose lives are one long series of experiments under high pressure, the microphone picks up sounds in many cases with greater fidelity than the human ear. Low notes and high notes drift into the mike, and they must guard against any sound finding its way onto the track which will not stand the test of repeated reproduction.

The thick concrete walls of the sound stages serve at once to protect microphones on sets from outside noises and to provide the background for reverberations of cannonlike explosions. As I



Getting Ready to Take a Scene for "Cimarron"; Note Arrow Pointing to Beam Microphone and the Light Reflectors Adjusted on Set Opposite One to Be Filmed

rounded the corner of a large building on one of Hollywood's largest studios recently, I came suddenly on a sound truck and a group of serious young men engaged in recording the explosions of a series of powder balls. As each quarter-pound of black powder, wrapped tightly in tape, exploded, the noise was recorded in sounds which will boom out on audiences like sixteen-inch naval guns. And that's exactly what they are intended for. A queen, sailing from her seaport capital, will be saluted by her navy. A silent film showing the navy saluting will be rerun, the explosions from the tiny balls of powder added to the sound track at intervals to coincide with explosions of the big guns, and there you'll hear the navy firing its best.

As I sat in the sound truck during the powder explosions, I saw how the mixer brings in the full force of the explosions.

"Ready," he spoke into the phone.

"Okay," came a voice from the scene of explosions. "One, two, three—bang!"

As the bang came, a light flashed through an aperture on the sound machine. As the light flashed, the mixer turned a knob, flooding the apparatus with

electricity in order that it would pick up the full energy of the rumblings, reverberations and echoes of the explosions.

Although this is a trick, the Hollywood sound engineers seek to give the public natural sounds, and in many instances improve on nature. Recently one director, in shooting a prison scene, wanted to use machine guns. Blank cartridges "plopped"; wax bullets disintegrated and gave a "blob" effect; pneumatic hammers striking wooden boards failed to give the snap the machine gun itself produced, and machine guns with steel bullets by their sharpness broke the light in the recording machines. Then one of those unsung geniuses of the movie studios devised an electrical shock absorber to stop vibrations of the light globe, and the day was saved. Real machine guns shooting steel bullets sang their songs of death and were recorded and reproduced in hundreds of theaters.

The roaring of an engine heard when a motor cop chases a crook probably was not recorded when the picture was taken. Movie sound engineers do not consider this a trick but rather a necessary means of recording the sound properly and pre-

senting it most effectively for your enjoyment. Here's how they accomplish this effect: First they shoot a silent picture showing the chase. Then they bring a motorcycle inside the studio and make three sound tracks, one recording the steady running of the engine, one recording the motor starting and pulling away from a standstill, and a third recording its entry into the scene and the rider cutting off his engine. On a fourth track, at predetermined intervals, the siren is recorded. After all this is done, they have a sound track much longer than the silent picture showing the chase. Here then they need only cut away some of the constant sound of the motor from the center, work in the two ends and, to get their proper volume, mix the motorcycle and siren noises on the picture film.

The sound engineers face a constant problem of moving their microphones to get as near the source as possible, yet remaining outside the camera range. Thus the mikes are mounted on beams and moved around to follow the action. Sometimes, however, not even this arrangement is adequate, and recently Carl Dre-

her and other sound engineers developed a beam microphone, used in combination with a mirror which reflects sound instead of light.

The beam microphone resembles a huge searchlight. It is suspended in the center, its open end away from the speaker in a position to receive reflected sound impulses. When a sound hits the concave surfaces of the concentrator, as technicians know it, it bounces off and takes any new direction toward one central point where the mike is located.

"Our business," said Mr. Dreher, "is to reproduce sound naturally and pleasantly. We can make good voices bad but we can't make bad voices good. Since the sound apparatus is becoming more compact and more efficient, we are gradually eliminating overriding background noises and approaching true sound reproduction."

Bringing pleasant noises to the screen involves both the use of sound-recording devices and apparatus for producing those effects. Since the early days of radio when a metal broom beating on a drum simulated steam escaping from a train,



Murray Spivak Playing Tuned Water Pipes; at Left Is a Rain Machine; Steamboat Whistles, in Rear, and Drums, at Right, Produce the Sound of Winds

2054
240



Laurence Tibbett Singing with Chorus: His Voice and Those of the Others Go through Separate Microphones to a Mixer Where They Are Properly Blended for the Film

the recording of these sounds has become an almost exact science. In pictures, sound effects frequently reproduced are caused by actually employing the same principles as the originals. For instance, the starting of a locomotive when recorded for the screen is done by actually exhausting a column of air through a five-foot-square speaker.

As I explored the storeroom of one sound-effects laboratory, Murray Spivak, who came to pictures through New York orchestras and the radio, pointed out a great heap of junk, whistles, bells and all the paraphernalia that once provided realism on the talking screen. Now they're being packed away in bins, probably never again to be used.

In their place has come new apparatus, the secrets of which are guarded carefully by each director of sound effects lest they fall into the evil hands of his competitors. These wizards of noises gradually bring to the screen natural sounds and they zealously safeguard any new developments.

"In another two years," explained Spivak, "after equipment has been perfected, with few exceptions we will be

able to pick up all sound naturally. We are getting closer each month.

"In shooting outdoor scenes, one of the principal difficulties comes not in registering sound but in preventing some sounds from reaching the mikes. We do everything possible to stop the wind from blowing against the delicate diaphragms. Windshields, sometimes in the form of thin ball-like cloth coverings, save the dialog for its rightful prominence.

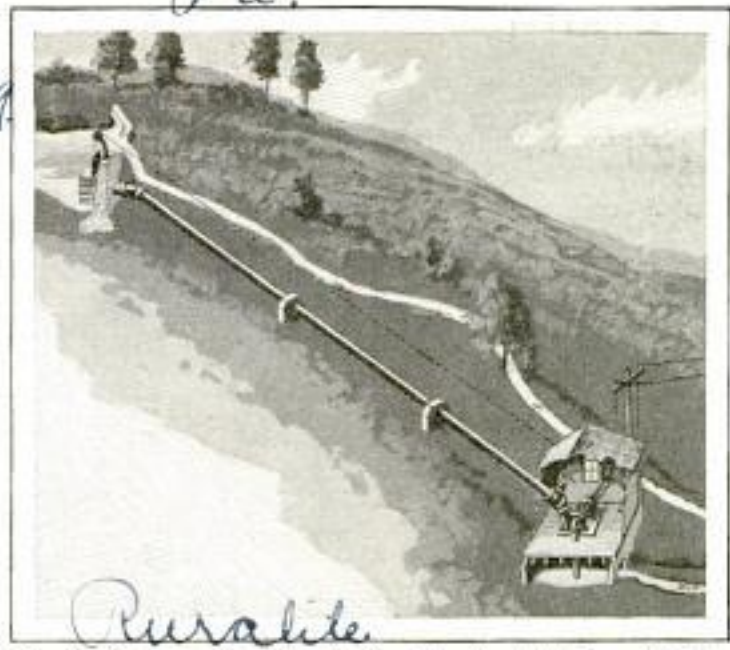
"Suppose we are shooting a scene showing a great wave hitting the deck of a boat. The human ear would hear both the impact and the swishing. On the mike, however, the impact drowns out the latter sound and synthetic sounds to take its place are reproduced with water machines.

"Some sounds are difficult to imitate. Voluminous sounds must have large bodies for depth. A cap-pistol explosion never sounds like a revolver shot. Yet from many instruments, such as discarded automobile brake drums that ring like cathedral chimes, we produce for the screen sounds that ring truer than the originals."

Change 11" Jefferson
American Outboard Motor
70 of Preliminary

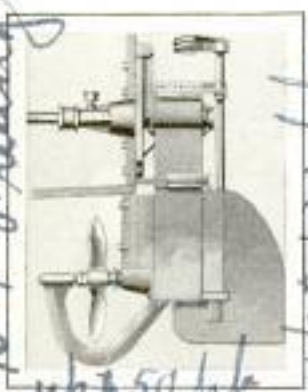
CARBOLOY-TIPPED SAWS FOR LONGER LIFE AND GREATER STRENGTH 999

Saw teeth now are being tipped with the recently developed alloy, carboloy, to increase strength and wearing qualities. Tungsten carbide has been known for a long time as an exceedingly hard material, but it was not suited for saws because it was not strong enough to withstand vibration. With the addition of cobalt to the tungsten and carbon, however, the resulting product was found to be about half as strong as high-speed steel, and hard enough to scratch a sapphire. Saw teeth tipped with carboloy have shown an efficiency increase of as much as 7,000 per cent in cutting asbestos pipe covering, as compared with a standard saw, and over high-speed steel an increase of 5,100 per cent in the cutting of casein-glued plywood.



Puralite
 Drawing Showing How Small Pipe Line Supplies Enough Water to Operate Hydroelectric Plant

TILTING DRIVE FOR OUTBOARD HELPS PROTECT PROPELLER 1954



Easily attached to the boat, a drive assembly for the outboard motor can be tilted up to a nearly horizontal position for beaching the craft or for passing through shallow water. A chain drive gives efficient power with almost no noise, and when the drive is tilted, the propellers can be changed with little trouble.

MIDGET WATER-POWER PLANT LIGHTS FARM HOMES 1911

Light and power for the farm home or country estate are supplied from a compact hydroelectric plant that requires a comparatively small volume of water and is easily installed. For instance, the smallest size, with a fall of forty feet, will generate enough current to keep thirty-

five lamps of twenty-five-watt capacity burning, although the water that drives the wheel passes through an aperture only two and one-half inches in diameter. A special feature of the outfit, and one that is said to make it more efficient than former units of its kind, is the automatic governing device combined with a load-change balancer which make possible practically constant voltage.

LIGHT SOCKET EASILY APPLIED TO INSULATED WIRES 1963

Electric-light sockets now can be attached directly to the strands of a cord connected with an electric circuit without stripping the insulated covering from the wires. These sockets, requiring neither tape nor solder for a connection, consist of two pieces and are screwed together.



One section contains grooves in which the wires are placed. When the cap is screwed to this section, two strong pins pierce the insulation and make contact with the conductor. They are weather-proof and are particularly convenient in making illuminating display sets.

Fitz Water Wheel Co. Hanover, Pa.
Union Insulating Co. Parkersburg, W. Va.

296 Broadway New York City

1893 Earl W. Isage
Ashville, N.Y.



Thrills of the

"JUMP for your life!" cries the boss of the log-driving crew, as three of his bold river "cow-boys" are threatened with destruction before the avalanche of tumbling, jerking, churning logs riding on the lap of a river rushing at flood-tide.

Only by the narrowest margin did these river hogs escape death as they danced across the bobbing, slippery, barkless logs for the shore.

The first big thaw in the northern forests witnesses the most thrilling and spectacular event of



Above, a River Logging Scene in Northern Quebec; Below, a Tractor Hauling a Train of Logs through the Northern Forest to Have Them, in Readiness for the First Thaw of Early Spring

Spring Log Drive



Another River Logging Scene of the North Woods, Showing the Intrepid Lumberjacks Riding the Twisting Mass of Lumber with the Sure-Footed Assurance of a Mountain Goat

the year—the annual log drive. Bands of lumberjacks, way back in the heart of the wilderness, become feverish with enthusiasm as they await the signal, “The river is breaking up!”

Driving the millions of logs down the rivers of the north, now swollen to a mad turbulence by the accumulated snows of winter, and riding the slippery mass on the lap of the flood, requires rare skill and superhuman endurance.

For sheer daring, attained only by years of experience, these rivermen are unparalleled. Whether you watch the big show from a safe vantage point on the bank or get out on the spinning, slippery sticks and flirt with disaster in a hand-to-hand combat with death, you are sure to agree there’s nothing like “herding” logs.

Although the mechanical age has contributed greatly to elimination of drudgery in the big woods, by providing powerful track-laying tractors which snake trains of logs from the heart of the forest to the river bank, and a multiplicity of other devices, still the log drive provides

the cheapest way of delivering the season’s cut to the mills.

The biggest task of the log harvest is performed in the very teeth of bleak winter. Driven by whining gales from the Arctic, the snow in the forest drifts deeper and deeper until it becomes necessary to keep the powerful snowplows moving daily to blaze a way for the log trains. The river, down which the big drive will be made, has frozen with a mantle two or three feet thick. Even at high noon, when it is supposed to warm up a bit, the thermometer seldom registers above zero and often it settles at ten, twenty and sometimes thirty degrees below.

But the enthusiasm of the crews does not lag. If anything, the tempo of the camp seems to increase, since now man and beast alike must work fast to keep from freezing. The crew hop out at four o’clock in the morning; when they reach the scene of the log harvest, it is often too dark to see. They work steadily, with only an occasional intermission for the hastily snatched lunch and repeated



One of the Sorting Gaps in a Quebec Lumber Camp, Where Over 250,000 Logs Are Handled Daily by Experienced Workmen

mugs of boiling-hot coffee. Just as soon as the ice has become thick enough on the river to carry the heavy loads of logs, tractors and teams start transferring timbers from the heart of the forest skidways to the banking grounds on the river ice, where they are carried away by spring freshets. This log-transporting task is not the least dangerous of the many adventures of the lumberjacks.

The logs are loaded on low bobsleds in great pyramidal piles. A layer of six huge timbers is placed on the trucks. Five smaller logs are piled across these to form the next layer; then three, then two, and finally a single log poised precariously on the top. Each timber weighs from 1,000 to 2,000 pounds; each is a potential man killer if improperly handled. The logs are snaked to their place on the pile by block and tackle, assisted by the daring canthook man. The hoisting of each log is a separate problem in applied mechanics in which the slightest miscalculation may result in the crushing out of a human life, or maiming for life. Yet the lumberjacks swarm over the huge piles, active as ants, and the work progresses with sur-

prising speed, without thought for dangers involved.

Once the logs are heaped in place, the sled loads are lashed with great iron chains, and then the teamsters; perched on the top log, skillfully guide their four and six-horse teams to the banking grounds, where the chains are released and the sleds unloaded by gravity.

The picturesque horse is fast giving way to the more powerful and dependable track-laying tractor in most parts of the big woods. This mechanical giant, capable of laying down and picking up its track as it travels through deep snow, is a traveling locomotive which may be operated without construct-

ing a railway to the scene of logging. By means of a windlass, which works as an auxiliary to the tractor motor, logs are picked up and laid down where wanted, and thus the machine plays a dual role in logging operations, introducing a new device and saving human life.

At best, every detail of logging is fraught with peril. Every man knows well that his life depends, not alone on his own watchfulness and dexterity, but also upon the care and skill of his fellows. Even where horses are used, they must be trained to perform their tasks with a high degree of co-ordination.

A sudden, unexpected lurch of one of the block-and-tackle outfits on the loading pile may easily claim the lives of five or six men. The lumberjacks must be on guard every moment of the day. As the result of experience, the members of the crew respond to the commands of the bosses with the alacrity of performers. And the most interesting members are the canthook men, who work in pairs and usually are "bunkies." They must have mutual confidence when the miscalculation of two inches in the swerve of a spin-



Above, a Logging Train in British Columbia Hauling the Fallen Giants to the River; Right, a "Wooden River" during the Annual Pulpwood Drive in Quebec, the Waters Jammed with Countless Thousands of Logs Which Are on Their Way to Be Converted into Paper; Below, Loggers Working at a Sorting Gap Where One False Step May Spell Disaster for the Lumberjack



ning log may smash a comrade like a fly.

Teamsters and tractor operators are at the mercy of the loaders. If the pyramid of logs on which they are perched is improperly loaded, the slightest jolt will cause it to "spraddle out," snapping the heaviest chains like thread, and crushing the unfortunate driver. An equal responsibility rests on the roadbuilders. The slightest inequality may capsize one of the towering top-heavy loads. Water-sprinkling outfits keep the roads as smooth as a parlor floor, with a mantle of crystal ice several inches thick. On the grades, sand is scattered to aid in braking the heavy loads, and often it is necessary to ease loads down steep slopes by use of a steel cable, attached to tree or stump.

All the delicate, dangerous, complicated operations of the log harvest are carried on by the hurrying crew in a freezing temperature. The men are hoisting uneven logs, often coated with ice. Frequently they are half blinded by flurrying gusts of surface snow. That several accidents mark each season's cut is inevitable; in fact, it is miraculous to the layman that the whole crew is not killed.

Then—three wild cheers—comes the day, late in winter, when the warm sun starts melting the ice and snow. Long, slippery, barkless logs, are rolled down to the river.

Out on the icy surface other teamsters, assisted by canthook crews, snake the logs into high piles with their long steel chains and pulleys. Soon the banking grounds are buried twenty to thirty feet deep with these great piles of logs, packed almost as tightly and evenly as matches in a box.

When the thawing ice finally collapses under this mighty weight, it dams the flow of the river behind the logs until the high water floats the entire mass, when it starts grinding downstream like a mammoth glacier, filling the river from bank to bank. This "wooden river" is the typical American spring log drive, and the most critical of the many processes involved in harvesting our timber supply.

Abruptly narrowing banks or rocky gorges are likely to cause jams, unless the attending river hogs work feverishly to break the tangle before the pressure from behind piles the heavy logs thirty, forty,

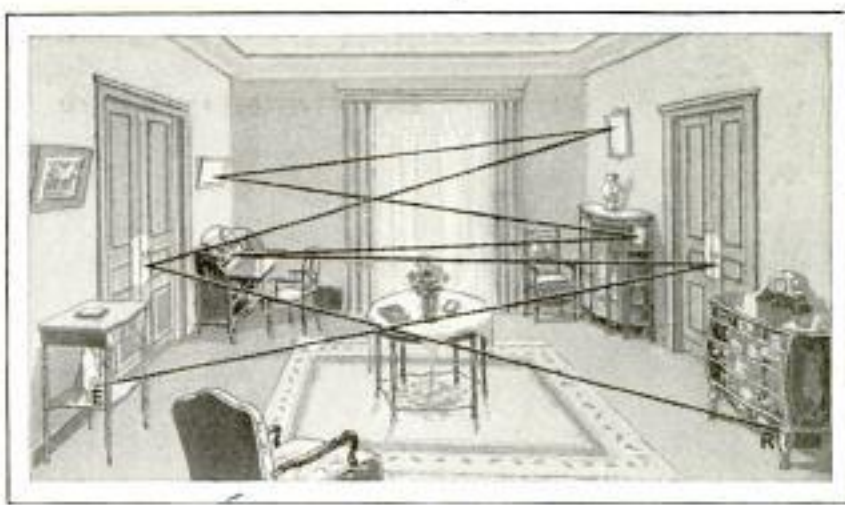


A Sorting Boom at Windago, Que.: This Work of Separating the Logs Is Child's Play Compared with the Task of Preventing a Jam and Keeping the Mass Moving

1873

1970. Electronics
November, 1930

even fifty feet high in an interlocking mass. If the "key log" is pulled out, the jam is suddenly released and will go its way. In olden days, rivermen seemed to have a sixth sense that enabled them to select that key log after an instant's inspection in a rapidly forming jam where the delay of a few seconds might be fatal. If they could pull that log out, they did so, if not, dynamite was used to dislodge it.



Drawing Showing How Invisible Beam of Light, Crisscrossed by Reflectors, Can Be Used to Guard Entire Room

INVISIBLE CRISSCROSS LIGHT SAFEGUARDS WHOLE ROOM

Crisscross beams of invisible infra-red light are being tested by the French police as a means of protecting an entire room against entry by burglars. A direct beam of the light has been used with success to protect a safe or other place where valuables are kept, but by reflecting the beam back and forth across a room at various angles before it falls on a photo-electric cell, it is possible to guard the whole room instead of a small part of it, as no intruder can enter without intercepting the reflected light at some point, causing the photo-electric cell to close a current which in turn rings a bell or sets off some other kind of alarm.

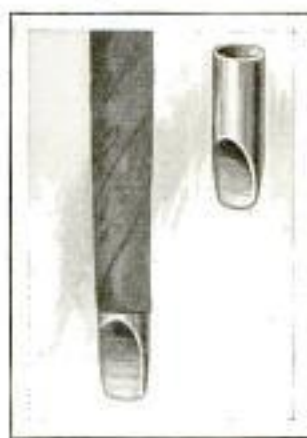
Only the most skilled river riders are given the post of honor—and of danger, too—at the vanguard of a drive. It is the duty of these men to guard against jams, or, if they are inevitable, to break them up before the entire drive becomes hopelessly stranded. This is the hardest sort of work. Often the men toil knee and hip-deep in icy water all day.

Experienced log drivers, possessed of the sure-footed agility of the mountain goat, are able to dodge out of danger, even when it sweeps close. Toiling diligently until the last possible moment to break the jam, they wait until the cracking of wood tells them the face of the jam is about to collapse, and then they jump from one floating timber to the next, and finally ride triumphantly ahead of the released flood, thick with tossing logs.

Driving the billions of feet of pulpwood—four-foot lengths of spruce—down the Canadian streams to feed the world news-hungry presses, demands an entirely different type of work than log driving. During the winter, windrows of pulpwood are built up along the streams. When the first thaw melts the snows, these piles are dumped into the raging waters and shot downstream to the paper mills, as toothpicks would hob on angry waters.

Gangs of rivermen follow the drive and keep narrow gorges and rocky projections free from accumulations of small logs. The daring and carefree French-Canadians continually flirt with danger, as they keep the "sticks" moving, and many casualties testify that this is not the safest job in the industrial world.

WOOD MOUTHPIECE FOR CIGAR OFFERS MILDER SMOKE



To provide a milder smoke and prevent the tobacco from coming in contact with the mouth, cigars are now offered with wooden mouthpieces attached. The holder and cigar are made in one unit by inserting the partly rolled cigar

in it, and inclosing the holder tip in the outer wrapping.

*Havatainsa Cigar Co
Tampa, Fla.*

*Brittain, chas
3937 Belmont Ave
Chicago
Infra. red, ray bulbs
Ultra Violet Ray
Lerner*

*1873
1970
1930*

Burke & James Photo Supply
248
1925
225 W. Madison
Chicago

Ant R & Chute Box
407, Route 4
Hayward, Calif

POPULAR MECHANICS

TREASURES OF GLASS SOUGHT
IN OLD GOLD CAMPS

White Henry Powell 648 & 817th
California and Bay



Squeegee Plates, for Drying Glossy Prints, Coated with Chromium for Greater Durability

PLATES FOR DRYING PICTURES
COATED WITH CHROMIUM

Chromium is now being employed as a coating for the squeegee plates used in drying glossy prints, taking the place of the old ferrotype plates. Heavy-gauge spring metal is given a triple coat of chromium. Plates so treated are not affected by heat, fumes, acid or hot water, and once polished with a solution to prevent the prints from sticking, they need no further attention. They give the prints an exceptionally high gloss and are not easily scratched by rough handling.

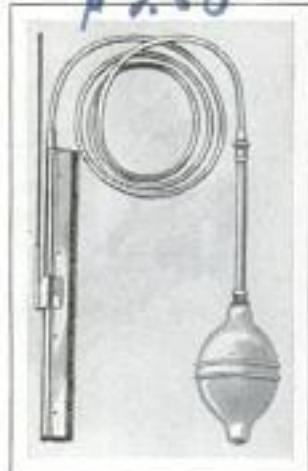
FOUR-SECOND PLANE TAKE-OFF
SETS FIELD RECORD

One of the fastest take-offs for airplanes was registered at Roosevelt field recently when Lieut. Alford J. Williams lifted his navy-type Curtiss "Hawk" ship off the ground in less than four seconds after a run of less than 100 feet. His performance beat that of an autogyro, the "windmill" plane, noted for its maneuverability in small spaces. Lieutenant Williams held the brakes on and blew the tail off the ground by directing the blast from the propeller at full speed to lift the rear part of the plane. The ship was the same in which he made his remarkable demonstrations at the air races in Chicago.

Along the trails and in the camps of prospectors and miners who roamed the California and Nevada deserts fifty years ago seeking gold, other searchers today are finding new treasures in the form of old sun-baked glassware, transmuted to objects of art by the alchemy of the sun. As a result of long years of exposure to the sunlight, common glass, hand-blown half a century ago, has been found to acquire a delicacy of tinting in mauve and purple that is considered superior to any manufactured product. Some specimens are delicately etched by wind and sand, and old dump heaps in the back of long-forgotten towns are being searched for well-colored and intact specimens of bottles, dishes and jars. Chemists declare that it is the reaction of impure chemicals in the sand used in making the glass which causes the product to take on the rare tints when exposed to the sun's rays, but it takes at least twenty years for the tints to appear, and only glass made by the old process seems to color. After fifty or sixty years, the colors fail to grow deeper.

WINDSHIELD FREED OF SNOW
WITH ALCOHOL WIPER

To keep the windshield clear of sleet and snow in winter, a wiper now is available that uses alcohol for the purpose. The wiper is equipped with a rubber bulb which is filled with denatured alcohol. A slight pressure on the bulb fills a tube which is part of the wiper, the alcohol then saturating a double thickness of felt and melting the snow. One saturation lasts for fifteen minutes in a storm, and the bulb holds a day's supply. In summer, the bulb is filled with water which is sprayed on the felt to wash the glass automatically. For rain it is used like an ordinary wiper.



\$2.50

1905
Ny. James
12/10/25

575 hp. Wright
Cyclone engine

Richland Auto
Parts Co. Inc.
mansfield, O.



Airplane with Wing and Vertical Rudder in the Rear and Elevators in Front; Its Odd Design Gives It the Appearance of Flying Backward; the Ship Has Several Unusual Safety Features

Wide World

PLANE THAT FLIES BACKWARD CALLED SAFEST CRAFT

Of such odd and unconventional appearance that it seems to be flying backward when in the air, an airplane built and tested by a Bremen inventor is provided with many unusual safety features. The ship's wing and vertical rudder are in the rear, but the elevators are in the front with the pilot facing them, thus giving the deceptive appearance of backward flight. The inventor claims the craft is almost foolproof.

Germany

Heinrich Focke

WATER TANK THAT STAYS HOT FOR INDEFINITE PERIOD

Insulated so thoroughly that it retains heat indefinitely, an electric water heater, once warmed, will keep its contents hot for several days. The water tank is contained in a sheet-iron shell, the space between the shell and the copper tank being filled with layers of asbestos, while spaces at the top and bottom are packed with mineral wool. In tests, water heated to 150 degrees had dropped to only 112 de-

1956

Williams



\$60.00

*Straus Electric Appliances Co
Waukegan Ill*

grees after forty-eight hours. The heating unit is placed in the middle of the tank so that the heat is transferred directly to the water, there being no radiation loss. This arrangement and the insulation both cut down the cost of heating.

CARD-A-MINUTE PRICE WRITER SAVES TIME AND EXPENSE

For the use of stores and shops, a compact price-card writer now is available capable of turning out sixty or more printed display cards an hour. Spacing and inking are automatic, and it prints numerals one inch high and unit characters, such as yard, dozen or gallon, in proportionately smaller type. There is no type or ink to handle, the printer being adjusted by dials to write the required price and unit of measure when a crank is turned.

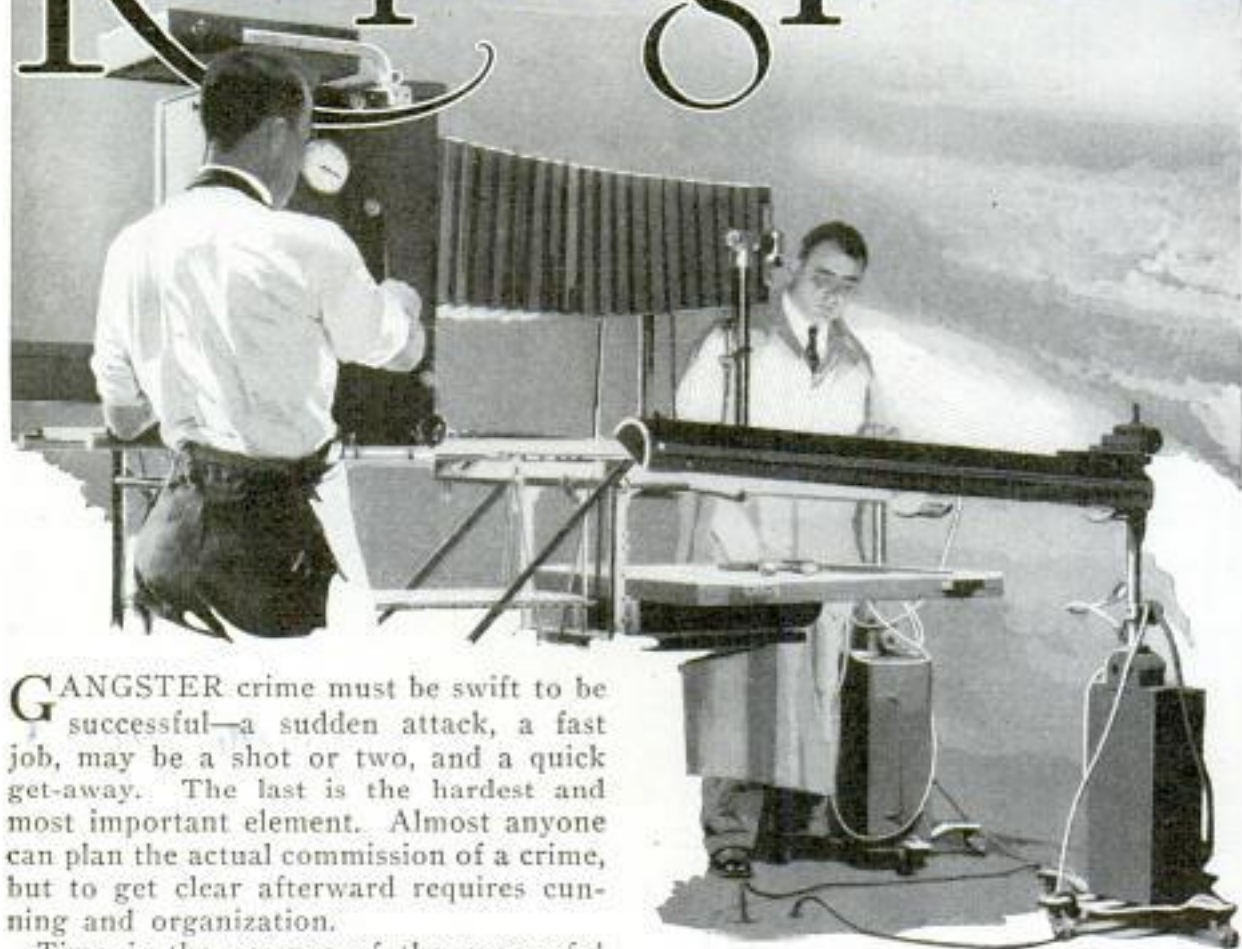
*1925
American Castings Co. Inc.
Price Writer Corp.
683 1st Street Chicago*

*Price Writer Corp
621 S. Kolmar
Chicago*

1930

Cont. John L. Cogswell,
16, Edgemour Road
Belmont, Mass

Keeping Pace



GANGSTER crime must be swift to be successful—a sudden attack, a fast job, may be a shot or two, and a quick get-away. The last is the hardest and most important element. Almost anyone can plan the actual commission of a crime, but to get clear afterward requires cunning and organization.

Time is the essence of the successful get-away. One acknowledged gangster was heard to boast that, given one half-hour's time of police inaction after a job, all the officers in the state couldn't capture him. Very likely, he could make good on the boast, but it's mighty seldom now that a well-organized department gives the gangster that half hour.

Almost daily, the police are cutting down the interval between the crime and the moment when every last member of the force has been put on his toes by being informed of the crime and for whom to look. A cold trail is a long one, the police know, but the end of a hot trail is soon reached. Machines adapted from commercial use are shortening the trail.

Three o'clock in the morning in a quiet section of an eastern city, Patrolman Donovan, swinging down his beat, sees two skulking figures leave a parked automobile. After a short questioning, he decides to take the prowlers to the station.

Rectigraph Camera Reproducing Fingerprints from Revolver Found near Scene of a Crime

He is prodding them into the car, when a shot bangs out from a dark doorway. He had missed seeing one thug.

The officer goes down, shot clean through the body. A peculiar shot that. The course of the bullet was just forward of the spine, yet far enough back to miss vital organs; the wound wasn't even dangerous, aside from the shock and loss of blood. As he fell, Donovan jerked his own gun.

His first shot scored a bull's-eye, smash in the center of a gunman's chest. Two more shots, fired as his companions threw the limp form of the wounded man into the car and sped down the street, missed their mark. But Donovan had taken the number of the car's registration plate. The officer from the next beat came running. A householder across the street threw up his window.

with the Gangsters



Accurate Shooting on the Fly Is Required of Officers Who Pursue Gangsters, and Here Is a Mounted Policeman at Target Practice

"Get police headquarters on the phone," Donovan directed the inquisitive citizen. "Tell them to get three guns making their get-away in car, license — —. One of them is wounded. Have them send an ambulance for me."

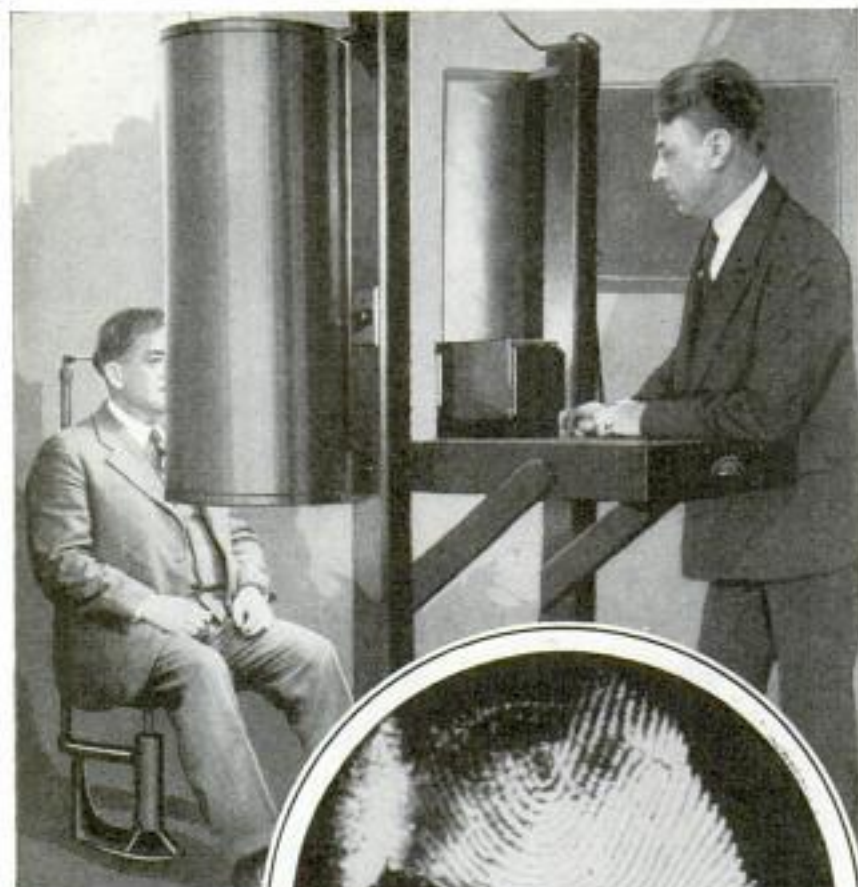
The receipt of the phone call spelled action at headquarters. Instantly, three inside officers stepped to a like number of teletype machines. A teletype looks and is somewhat like a large typewriter; any message typed out on its keyboard is instantly recorded on paper rolls in receiving machines, no matter how far distant, connected to it by electric circuits.

In less than five minutes after the shot had been fired, the twenty-one police stations in the city, headquarters stations in nineteen surrounding towns and eight state-police headquarters had the number of the gangster machine. Thirty seconds later, the blinking of red lights above police boxes all over the city started patrolmen toward them to be given the information. While the net was being spread, twenty motorcycle officers roared out of headquarters to take up the chase.

In the ambulance, on the way to the hospital, Donovan gave his brother officer a description of his assailants. The officer dropped off and telephoned the descriptions to headquarters. Again the teletypes spelled out their messages, and



A Copying Camera Which Is In General Use by Police Bureaus for Duplicating Important Records



Above, Latest Apparatus for Photographing Criminal Suspects, the Flood-lights Making Clear Pictures a Certainty; Right, Picture of a Fingerprint Sent by Telephone from San Francisco to New York



again the red lights above the boxes blinked.

Twenty minutes later, a motorcycle officer found the bandit car abandoned, its radiator still hot. From the nearest pull box—all boxes are connected with the district station by telephone—he reported the find. Immediately four fast automobiles, loaded with heavily armed officers, streaked out of headquarters to scour the section. While they were on their way, the motorcycle officer started a tour of the surrounding several blocks.

A patrolman stepped from a doorway and hailed him. Three men, one supported by his comrades, had gone into a rooming house down the street a few minutes before. Leaving the motorcycle officer on guard at the front door, the

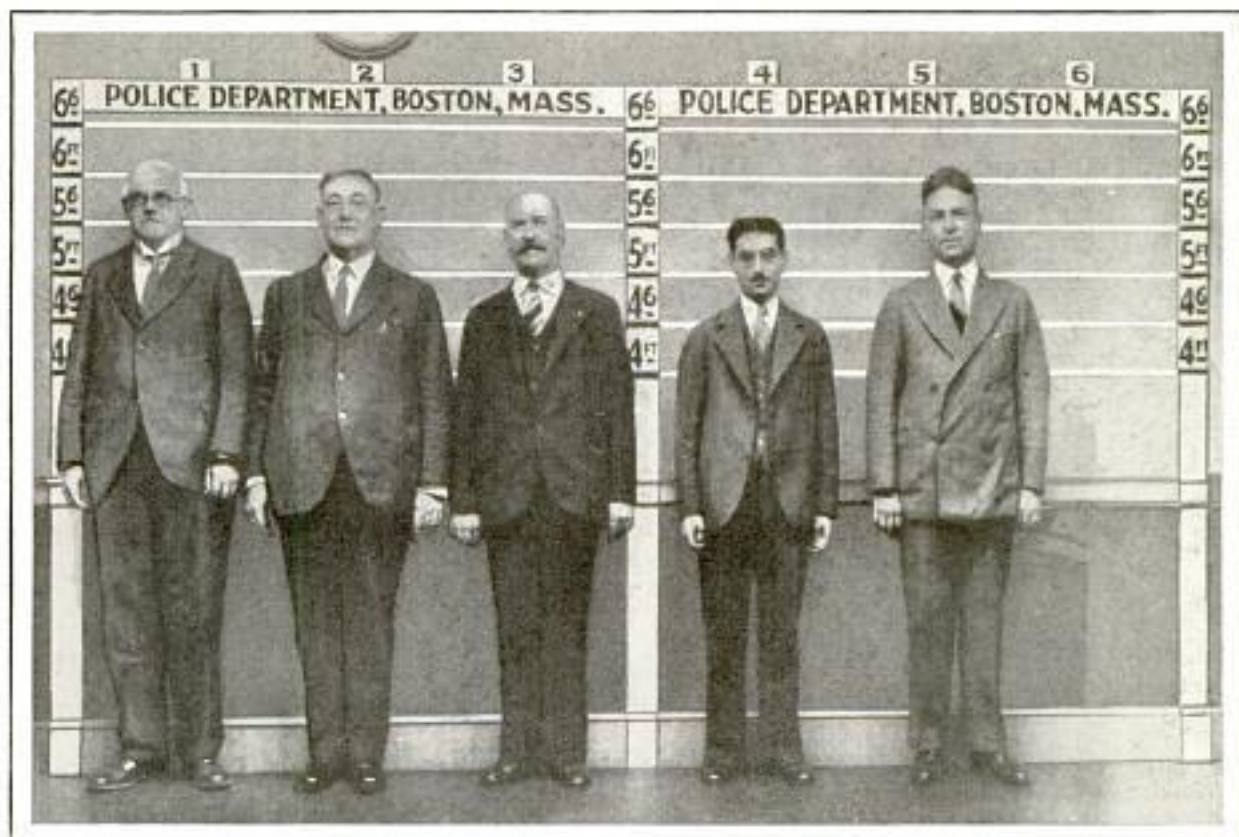
patrolman went to the rear entrance and stayed on watch there.

In a few minutes, one of the patrol cars passed and was hailed. The officers entered the house and found the three men, one dangerously wounded, all of whom proved to have long records for gangster crimes. The elapsed time between the shooting of Donovan and the taking of the trio into custody, was a little over thirty-five minutes.

The teletype is but one of many business machines that the police have seized upon in the effort to keep pace with the gangster criminal. Speed, and then more speed, is their aim; speed in spreading the dragnet; speed in collecting clues; speed in putting the clues in such shape that they will be useful; speed in giving every man on the force complete descriptions of wanted criminals.

Speed! At nine o'clock one morning, without warning, a newspaper reporter telephoned Boston police headquarters that he was somewhere in the city with a red-covered book under his arm; that was the only mark of identification given. He wanted to be shown how soon they could catch him. In twenty-five minutes, by virtue of the teletype, the call-box lights and a score of motorcycle officers, capture of no less than four young men carrying red books was reported from widely separated sections of the city. It turned out that the first one spotted was the reporter.

The telegraph, the telephone, the radio, the automobile and the motorcycle—every one of the familiar means of fast communication and conveyance—were quickly adopted by police departments the country over as they came into general use. The gangsters, of course, use



Boston Police Executives Demonstrating Method by Which Entire Gangs Are Photographed in Groups against a Background Marked in Feet, to Show the Approximate Height of Each One

them too. Radio is being used constantly both by the forces of law and order and their enemies. Rum runners keep in touch with their ships by radio; the coast guard uses the same means to detect landings.

All these aids to speed are spectacular. Behind the scenes operate a number of machines, not so impressive to the layman, but no less efficient for that. The newest of these is the rectigraph camera, which, upon investigation, turns out to be simply a greatly improved form of a machine long of great usefulness in commercial and legal pursuits—the photostat. Watch it function in practical police work.

The police of a New Jersey city caught one of a gang operating in their town. The man had no record there, but the officers found his picture, description and fingerprints in their files on a record card sent to them by the Boston department. A telegram asked for information regarding pals of the jailed gangster. In their index, the Boston police found that the man, besides his individual listing, was shown in a panel photograph with six other suspects known to operate with him. Whenever possible, such gangs are

photographed in a group; it makes for speedier work when one mobster is captured and his associates are wanted.

A passenger plane was scheduled to leave East Boston airport for Newark in exactly fifty minutes. The fastest motorcycle driver on the force could make the airport from headquarters in twenty minutes. There was but a half hour in which to make copies of the record cards. The task would have been impossible with the old-style copying camera, still in use at most headquarters bureaus. The rectigraph camera—installations have been made in the Boston, New York and Los Angeles departments—completed the job with time to spare. Instead of using plates or films, that have to be developed, dried and printed as in the copying camera, the rectigraph machine copies directly upon a roll of sensitized paper. The first copy is ready ten minutes after the operation starts.

Large gatherings are the favorite hunting grounds of professional pickpockets. When the big American Legion parade was held in Boston last October, plainclothes detectives were brought in from cities as far away as Chicago. Naturally,



Working in Pairs, Motorcycle Officers Are Trained to Take No Chances in Stopping a Car Believed to Carry Gangsters; While One Investigates, the Other Stands Ready for Trouble

these officers were unacquainted with the faces of the best known Hub "dips," a severe handicap to their usefulness.

In twelve hours, the rectigraph camera turned out 3,800 complete copies of both sides of the record cards of twenty-five pickpockets likely to be operating among the crowds along the parade route. Each outside officer carried with him photographs and full descriptions of the men he might expect to find plying their criminal specialty.

Police departments have been quick to seize upon the transmission of photographs over telephone wires as a means for the speedy distribution of complete descriptions, photographs and fingerprints of wanted men. A robbery was committed in Cleveland. After several hours, the police pinned the crime upon a certain burglar. In the meantime, the criminal had departed on an eastbound train that split at Albany, part of the cars going to New York and the rest to Boston.

Of course, the fugitive might leave the train at any of several large cities where stops were scheduled. The Cleveland bureau turned out a combination photograph of both sides of the burglar's record card and transmitted it by telephone to all these cities. As the criminal left the train

at New York, he was picked up on the platform by a detective carrying the telephoned photograph.

1980.

WINDMILL IS MOVING HAZARD FOR SMALL GOLF COURSE

Timing of shots becomes an important element in playing one hole of a miniature golf course equipped with a moving hazard in the form of a small Dutch windmill. The object is to shoot the ball through an opening in the mill and to time the shot so that none of the revolving vanes of the little mill is in front of the opening when the ball approaches.



Moving hazards also are being supplied in the form of pivoted or swinging bridges, jack-knife bridges, rotating lighthouses, moving or rotating cups, moving dragon mouths and rotating tenpins. Motion is supplied by

a slow-speed motor, giving about nine rotations or movements per minute.

J. R. Moffat Co.
Bethlehem Pa.

Letter to Zalesch
gets no reply.

1997

The Johnson
mfg. Co
Racine, Wis

O. C. Zalesch

SHOW WINDOWS ARE LIGHTED BY THE PASSER-BY 2019

Shop windows in Paris now are fitted with automatic systems for display lighting, which are operated unwittingly by the passer-by as he nears the display. The system not only attracts wide attention, as the pedestrian usually stops to stare when a dark window suddenly is illuminated as he passes, but also effects a large saving in light bills since the display remains dark except when someone is present to gaze at it.

EGG SEPARATOR SORTS YOLKS AND WHITES RAPIDLY 1991

Handling sixty broken eggs a minute, an egg separator sorts whites and yolks, or delivers the two together with the yolks unbroken. The eggs are fed into the machine and are delivered from a skeletonized rotating platform, the automatic motion, supplied by a small motor, being changed instantly by the operator to a particular action for an individual egg, or any egg can be taken from the machine without interference with its motion. A current of fresh air flows gently over the broken eggs toward the operator, who thus is enabled to detect a spoiled egg. The apparatus is simple to operate, and will effect labor saving in ice cream, candy and other industries.



Egg Separator That Sorts Whites and Yolks at the Rate of More Than Sixty a Minute



Portable Electric Paint Mixer That Stirs a Five-Gallon Can of Paint in a Few Seconds

ELECTRIC PAINT MIXER SAVES TIME AND MATERIAL

Effecting a saving in time, labor and material, a portable electric paint mixer can be used both in the shop and on the job. Old paint that ordinarily would be thrown away can be reclaimed with the mixer, which tints a five-gallon pail in half a minute, mixes any ordinary paint in one-fourth the time, or breaks up and mixes white lead in one-third the time ordinarily required. The mixer with its small motor is light in weight, and is supplied with two brackets, one of which is for the purpose of installation on the wall in the shop, while the other is a portable bracket which can be fitted on a five-gallon pail to hold the mixer.

¶ We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

The Egg Machinery Co. Inc.
11 Orange St. Bloomfield, N.J.

1919

"WINDMILL" PLANE PROMISES VERTICAL FLIGHT



Airplane with Whirling Wings That Are Expected to Act as a Balancing Gyroscope and Lifting Propeller, and Also to Serve as a Sort of Parachute for Descending

Another attempted solution of vertical flight has been offered in a plane with whirling wings that are intended to perform the functions of a regular wing, a balancing gyroscope and a propeller. These wings, four in number, are made of steel cables and covered with airplane linen. They radiate from a central shaft, which is turned by the same engine that operates the regulation nose propeller on the craft, and are connected at the tips by a circular band that surrounds the entire assembly like a tire. According to reports of a test with the experimental machine, it ascended vertically and descended, with power off, at a very slow rate, the whirling wings serving as a parachute in somewhat the same manner as do the rotating blades on the autogyro.

restore circulation, but with this particular well truckload after truckload of material was dumped into the hole before the task was accomplished. The difficulty was encountered at 4,000 feet, and a theory was advanced that it was due to the proximity of many wells, the earth formation being greatly disturbed by the thousands of barrels of oil being pumped out daily.

GOLF SCORE CARD ON PUTTER AND PENCIL ON SHAFT

To aid the golfer in keeping count of his strokes, a score card is offered which can be attached to the back of the club head, while a pencil fits in a receptacle in the shaft near the head. The cards are intended particularly for putters, since ordinarily this is the club used in completing the hole. For miniature golf



courses, putters with a recess in the backs of the heads to hold the card are used, while ordinary clubs can be altered to hold the scorers by placing a small band on the head. The cards can be obtained with the par for each hole printed on them, and with scoring space for two persons.

SAWDUST AND SAND RESTORE OIL-WELL PRODUCTION

Ten thousand tons of sand, 700 sacks of sawdust and 700 bags of cement were poured into a well at the Huntington Beach, Calif., oil field when the well's production ceased due to what is known as lost circulation, which means that the bit has encountered a cavern or porous formation permitting the free flow of mud and water away from the drill hole. This mud and water keeps the drill bit cool, and without it, drilling cannot continue. Ordinarily when such a cavity is encountered, a few sacks of cement or sawdust

restore circulation, but with this particular well truckload after truckload of material was dumped into the hole before the task was accomplished. The difficulty was encountered at 4,000 feet, and a theory was advanced that it was due to the proximity of many wells, the earth formation being greatly disturbed by the thousands of barrels of oil being pumped out daily.

1991

Wardward

Comd Neil Stanley
1457 Orange Ave
Santa Ana Calif

Wm J. W. Langdon
180 E. Chestnut
Cleveland, Ohio

Copyrighted material

OIL IS SALVAGED FROM WATER WITH 'VACUUM CLEANER'

One ship on the Pacific coast is fitted with an apparatus to remove and salvage oil from the surface of water in harbors and about piers. It consists principally of an air compressor, several large vacuum tanks, a separator and hundreds of feet of pipe and hose. The vessel sucks in the oil through a hose with an attachment somewhat like the business end of a vacuum sweeper, the entire apparatus working on the principle of the ordinary vacuum cleaner. The oil is separated from the water and used by the vessel for fuel. The ship with its outfit has found particular use in pumping the bilge water from other vessels and in freeing tankers of oil sludge and gas.

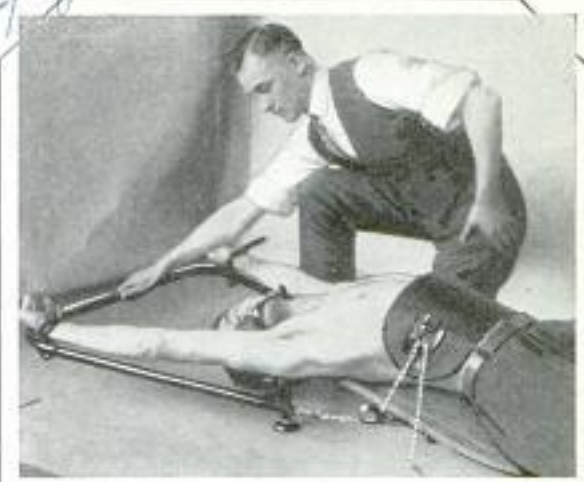
NOW YOU CAN TEST YOUR OWN AUTOMOBILE BRAKES

Motorists now can examine their own brakes with a tester which indicates defects on a gauge, making the process almost as simple as determining tire pressure. The wheel is jacked up and the brake tester attached to it by four clamps. The indicator bar is set in its slot and the wheel turned in a forward direction, the gauge reading being taken and referred to a table provided with the tester. This table, together with the knowledge of relative pressure on front and rear wheels as recommended by the maker of the car, shows what is required.



One-Man Brake Tester Which Indicates Defects on a Gauge When Applied to Auto Wheel

Badger Brake Tester Mfg Co 311 Racine, Wis.



Frame Which Makes Easy the Inducing of Artificial Respiration in Victims of Electric Shock

FRAME TO INDUCE BREATHING AIDS SHOCK VICTIMS

Inducing artificial breathing by the old method of placing the victim of drowning or electric shock on his back and producing inhalation and exhalation by alternate pressure and relaxation is hard work, even for an experienced person. A German inventor has made a metal frame which can be operated for hours to restore breathing without undue fatigue, even by unskilled individuals. The victim is placed on the frame which is fitted with a headpiece and a movable section in which the arms are strapped. Then it is only necessary to raise and lower the arm section to induce breathing. In the case of victims of electric shock, where there is risk of heart tremor, the use of a stomach girdle also produces heart massage.

Soap was first used to make the hair more attractive, and not for cleanliness.

Baker Block

Inhabitant. Uses my b. H. Karlstrasse 19.9. Berlin. & U. 6. Germany
 No 4 Sargent Street

1759

Comd. Andrew R. Boone
613 S. Preckles Theatre Bldg
San Diego, Calif

Up Through *the*



By E. L. REMELIN
Night Air-Mail Pilot

NORTH from Fresno roars the night-mail plane, blue flames streaking from the exhausts. Beneath the plane, increasing in thickness, a white mantle of fog hung low over the ground.

The pilot, having set his course for Oakland, held the ship's nose on a line for the airdrome. Meantime, through the earphones attached to his leather helmet, came signals, voice signals, informing him of the weather ahead.

"Heavy fog, ceiling 400 feet," the voice told him.

This was nothing new. The pilot continued on his course. Weather conditions at Oakland did not change. Little more than an hour after the plane had left Fresno, the voice from the ground came through even more clearly. The plane was approaching the airport, separated from the ground by an "ocean cloud," as weathermen term the fogs that roll in from the Pacific, 5,000 feet thick.

These heavy fogs hold no terrors for the night-mail pilots now. We have radio sets through which an observer on the ground can direct our movements as safely

as though we were gliding down to the field on a sunlit afternoon.

"How's the ceiling?" the pilot asked.

"Ceiling 400 feet, visibility good," the lookout replied.

"Be there in six minutes," the pilot said.

Six minutes later the lookout heard the plane's 525-horsepower motor roar over hangar five, as the plane flew west toward San Francisco bay.

"You're directly overhead," spoke the lookout into an ordinary telephone transmitter. And through the fog and into the pilot's earphones came the report.

"Okay," he replied.

Then the pilot flew nearly seven miles due west, the wheels of his plane clipping the top of the fog bank. At that point he banked and circled, pointing his propeller directly toward the field. Down he glided, and a few minutes later his ship became etched against the lower edge of the fog as brilliant lights swept the field. Through the mile-thick fog, led by the voice from the ground, he had guided the mail plane with a clear space only 400 feet

Soup



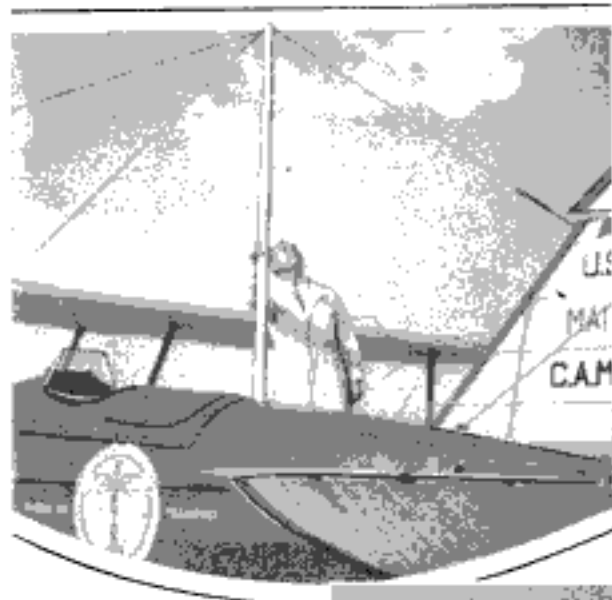
deep in which to maneuver for a landing. While not all our flying is done under these conditions, occasionally this scene is re-enacted.

Ten months ago not even a night pilot—one of the species popularly thought to dare anything—would have attempted this feat. Today it has become routine flying. Up through the “soup,” sometimes hundreds of miles without sighting land, down through a thick fog to land safely and surely at midnight on a smooth, brilliantly lighted runway, we fly.

Right around the clock, so perfectly do our two receivers and one transmitting set on each plane perform, the pilots talk with the ground stations. The sets are located in a storage compartment im-



Above, Co-Pilot of an Airliner Using Microphone and Earphones to Receive Directions for Landing in Fog from Ground Man, Below



Above, Mast on Plane with Wires Leading to Wings over Which Pilots Talk: Right, Air-Mail Course Laid Out in Sectors to Simplify Location

mediately behind the cockpit. We tune them by turning "coffee-grinder" dials that are connected with the sets. Earphones and mouthpieces are strapped to our helmets.

Every ten minutes, fog or no fog, we "ring in." Each pilot is allotted a certain time, and he must be ready on the second to talk; otherwise he may interfere with another pilot somewhere between San Diego and Seattle and Aurora, Ill. Across the continent, in both directions, pilots regularly report their positions and safety.

Along the Pacific coast we can hear the ground stations from Chicago to Canada. The pilots' calls can be heard 200 miles away. Each plane carries two receiving sets, one to hear company stations and one to get weather reports.

Suppose you fly up the coast with me in the plane "Baker." I take off from San Diego at 10:15 p.m. Two minutes later comes my turn to report. I'm on the air: "Remelin northbound, Baker, calling San Diego. Over Ryan field."

"Okay," sings the operator on the ground below.

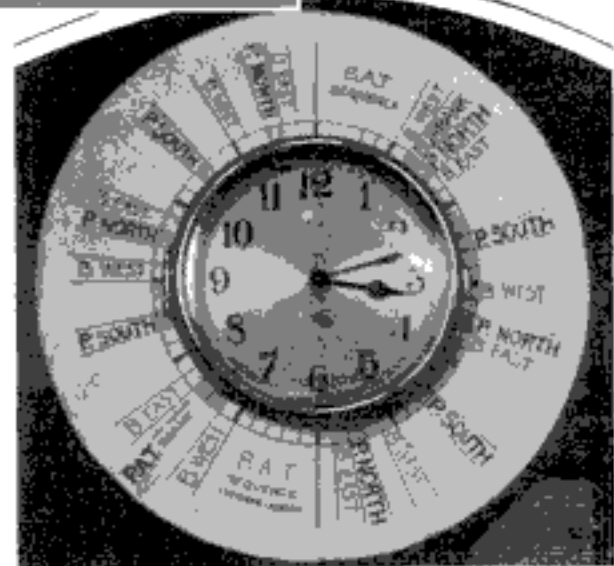
Ten minutes later, I am due again on the air. Here it goes: "Remelin northbound, Baker, calling San Diego. Fifty-five hundred feet over Miramar beach. On top of fog. Okay."

But, wait. This has been changed. Sometimes messages such as this become "mushy." Miramar might sound like any of a dozen small towns in southern California. Radio is sound and efficient, but vowels and consonants often are garbled. We pilots have become human buzzers.

Let's go on north of Los Angeles. I take off from the airport at Burbank, and sail toward Bakersfield. Regularly I report until, some forty minutes later, interference garbles my message. Then: "Remelin northbound, Baker, pause dah dah dah pause dah dah okay."

What do these dahs mean? Two things: transmission poor and I'm ten miles east of my course at Lebec.

C. Eugene Johnson, pioneer mail pilot and opera-



Synchronized Clock Showing Time at Which Various Pilots Are Ordered to Report Location

1759

tions manager for Pacific Air Transport, recently worked out a system of reporting by sectors. Along the entire route from Los Angeles to Seattle the line is laid out in squares. When transmission is bad and dispatchers cannot understand the pilot, he sings his dahs into the mike. Thus Willows, Winters and Williams, three small towns in the same vicin-



Above, Earphones and Mouthpiece Built in Helmet; Left, a Mail Plane in Fog over Oakland



ity, will not be misunderstood. Each sector is ten miles square. Lebec is the center of No. 6. The first number reported refers to the main on-the-line sector, while the second one refers to an off-the-line position, another ten-mile square paralleling the main line. Thus "dah dah pause dah" means the plane is ten miles west of sector No. 2, while "dah dah pause dah dah" means it is ten miles east of sector No. 2. Evens are east and odds west. Very simple and easy to work.

And so, on through the night until the plane reaches its terminus, pilots may report by sectors and no one possibly can misunderstand their positions. Should one go down or become lost, the dispatcher will know within five miles of where he disappeared.

Flying up and down through fog, guided by the unseen hand of radio, is an un-

usual feat but not at all sensational. We think nothing of this form of flying now. In the west we have no radio range beacons to guide us accurately from field to field. We must navigate with our instruments, then follow a voice as its messages sing in our ears.

We rely implicitly on the judgment and advice of the ground man. Recently Harry Crandall, flying south from Seattle, was heard at the Oakland airport when he was four miles southeast of the field. High above the fog he had overshot. Little wonder, with a 4,000-foot fog blanket shutting off ground lights. During the last four or five ten-minute sequences, the ground observer had told him the exact conditions at the field. When finally the plane's engine was heard, Crandall was told to turn back in the direction whence he had come. At last he was heard over the radio hangar. As he flew directly overhead, the voice from the ground reported, "over hangar five." Then he flew west far enough to insure a proper gliding angle back to the field, and plunged into the midst of the thick fog. Down he came, crossing the port line two minutes later.

What's next in radio for fog flying? We now carry three sets, and a fourth for another wavelength is planned. In 1,250,000 miles of flying, our planes have had only four forced landings, caused by mechanical troubles. We're safer than those who stay at home.

Philadelphia

*Chicago. 218 W. Superior
No. 1111 N. Dearborn
5/19/31*



Slot Machine Which Delivers Ice Cream When Coin Is Deposited; Electricity Keeps It Cool

ROBOT DISPENSES ICE CREAM WHEN COIN IS DROPPED

Coin-in-the-slot ice-cream machines that are electrically refrigerated have been installed in some New York skyscrapers. Instead of making a trip to the street for refreshments, office workers need only walk into the hall, drop a coin in the slot machine and receive a wrapped carton containing the cream and a spoon.

INSECTS FLY IN "REVERSE GEAR" GO SIDEWISE AND HOVER

Dragonflies, bees and other insects can fly backward without altering the position of their bodies, they can dart to the right or to the left in a horizontal plane or remain stationary in the air, even against a slight breeze, hovering in perfect balance by rapid motions of their wings. Man has been able to surpass the birds in some respects in his flying, but the mystery of insect flight remains a baffling one and some experts have suggested that discovery of the secrets of the dragonflies, and other species, might aid aviation. How do the insects keep their balance? In certain varieties with limited flying ability, sense organs that doubtless aid them in keeping their equilibrium, have been found, but no such organs have been

*2075
in paper. Howdman
July 4
R. E. Snodgrass, Bureau of
Entomology, Dept. of Agriculture*

discovered in some of the more expert flyers. It also has been suggested that an automatic balance is achieved in some way through the eyes, but a butterfly whose eyes had been blinded by a coating of glue and powdered charcoal, had no difficulty in flying on an even keel, while another butterfly of the same species, the swallowtail variety, flew evenly after its head had been amputated. In hovering, it is believed that an insect must move its wings approximately in a horizontal plane, creating a region of decreased air pressure above the body but not in front of it.

TRACTOR USED TO TRIM TREES WITH EXTENSION SAW

Tractors are used to perform many farm jobs, but an Iowa farmer recently found his useful in trimming 100 maple trees. With odds and ends of machinery he constructed an extension sawing rig with which he was able to top a tree ten inches in diameter and seventeen feet from the ground in about a minute and a half. When trees were straight, a rope was tied about the portion to be cut so it could be pulled away from the tractor,

*J. C. Beatty, Lynnville
Iowa*



Tractor and an Extension Saw Being Used to Trim Trees; the Outfit Does the Work Speedily

but when the trees leaned, this was not necessary.



Students of School to Train Gas Fighters Rescuing Dummies and Invading Gas-Filled Rooms

SCHOOL TRAINS GAS FIGHTERS FOR MINE RESCUES

Recent mine disasters in Germany have lost so many lives that makers of gas masks have turned their attention to improving the safety masks to meet the varying hazards of modern industrial life. At one factory near Berlin, a school has been opened to train rescue crews in invading gas-infested chambers to aid the victims of such accidents. Experiments are made under varying conditions, different types of masks being worn by the operators in the tests, which include the rescue of dummies from rooms filled with poisonous vapors.

METAL RARER THAN PLATINUM OBTAINED BY ELECTRICITY

One pound of indium, one of the rarest of metals, has been produced at Cleveland by an electric process. This amount is valued at \$7,000, nearly ten times as much as platinum. It is a white lustrous metal, very soft and ductile, slightly heavier than zinc, and can be melted with a match.

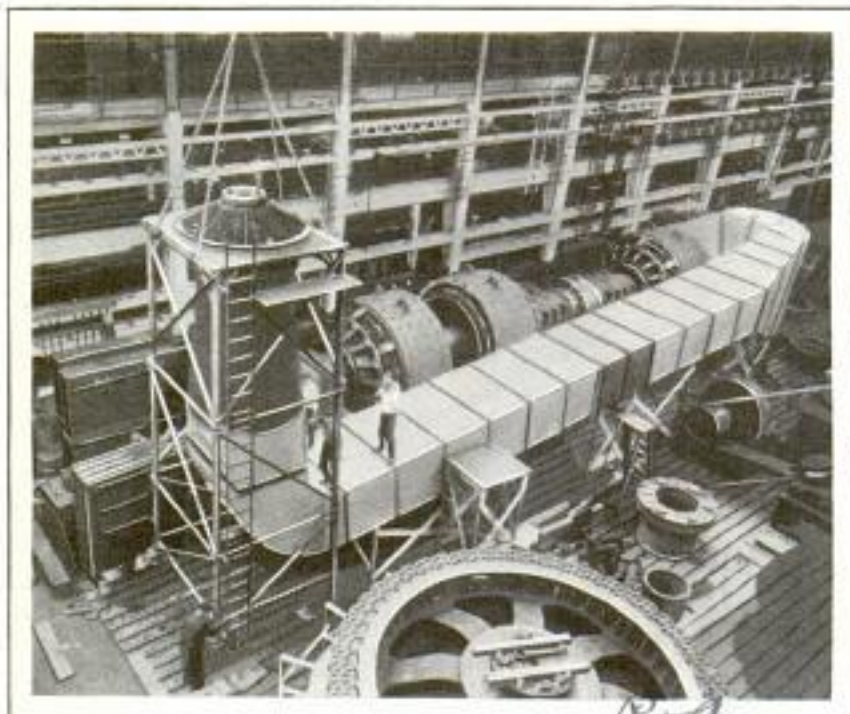
Hitherto it has been mostly a laboratory curiosity, because it was so expensive to produce, but metallurgists now predict that commercial uses will be found for it, and it has already been employed as a bearing metal, and has been mixed with another metal, gallium, to make an alloy for fused-quartz thermometers measuring temperatures up to about 1,800 degrees Fahrenheit. Indium is obtained by electrolysis, a current being run through a solution containing it and causing it to separate. Accurate temperature controls and the use of proper kinds of electrodes are essential. The first pound of the metal came from many carloads of crude ore. It is rather widely distributed in minute amounts in most zinc blends, and in some tin ores.

One-fourth of the workers in the United States are engaged in lines of industry and service that were not known thirty years ago.

Israsselli Chemical Co
Guardian Bldg. Cleveland, O

reports American Electric Chem. Co. Wash. D.C.

*Jack Hill
Stockyard
A. Hill*



Giant Fan Which Shoots a Blast of Air Equivalent to That Displaced by Ten-Car Train; It Is Being Used in a Steelmill

is directed according to the number and size of the openings in the sides and the manner in which the reflector is turned, thus permitting the light to be directed toward any point where it may be most desired.

CONDITION OF BONE TELLS QUALITY OF STEAK

2092

Tender steak can be selected by the appearance of the bone. If the bone is smooth and hard, the steak is from a cow, and if it is largely honey-combed, with much gristle, it is from a young animal. The chine or backbone, when split in

A TRAINLOAD OF AIR A MINUTE COOLS POWERFUL MOTORS

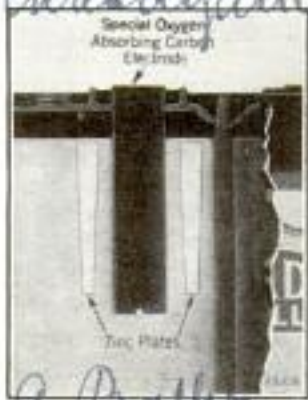
Principles developed from a study of aerodynamics are incorporated in a giant fan completed recently at the Westinghouse Electric plant in Pittsburgh. When lowered into an air duct and connected, the blower can shoot a blast of air equivalent to that displaced by a speeding ten-car train. During tests this rush of air cooled the most powerful motors ever applied to a single pair of rolls in a steelmill. The practical application of facts learned from a study of airplanes nearly cut in half the power required to force this quantity of air through the duct.

half, is the best indicator of age. Up to a year it is practically all gristle, but as the animal grows older, the gristle changes and after four years becomes smooth on the split.

AIR-CELL BATTERY FOR RADIO HAS CONSTANT VOLTAGE

2036

Air-cell A-batteries for the radio offer several advantages over dry cells, one cell under test giving the equivalent services of thirty-six dry-cell batteries. The air cell also maintains a practically constant voltage throughout its life, and receivers, designed to use the new battery, require no filament rheostats or other voltage-regulating devices. Such a battery will operate for 1,000 hours or more, the voltage delivered to the tubes through a fixed, non-adjustable resistor remaining within the narrow ideal operating range for this entire period. Heretofore oxygen has been supplied to batteries by adding chemicals to the cells.



REFLECTOR CASTS LIGHT RAYS WITHOUT SHADOWS

2041



Permitting the regulation of light to the side walls of narrow halls and corridors without a glare in the eyes, a reflector with a perforated reflecting surface now is available. Light

receivers, designed to use the new battery, require no filament rheostats or other voltage-regulating devices. Such a battery will operate for 1,000 hours or more, the voltage delivered to the tubes through a fixed, non-adjustable resistor remaining within the narrow ideal operating range for this entire period. Heretofore oxygen has been supplied to batteries by adding chemicals to the cells.

*Sinead & Co.
96 Pine, Jersey City, N.J.*

*National Carbon Co.
30 E 42nd New York*

*ready-made cell
A-Battery
Copyrighted material*

Major Edward J. Abbott

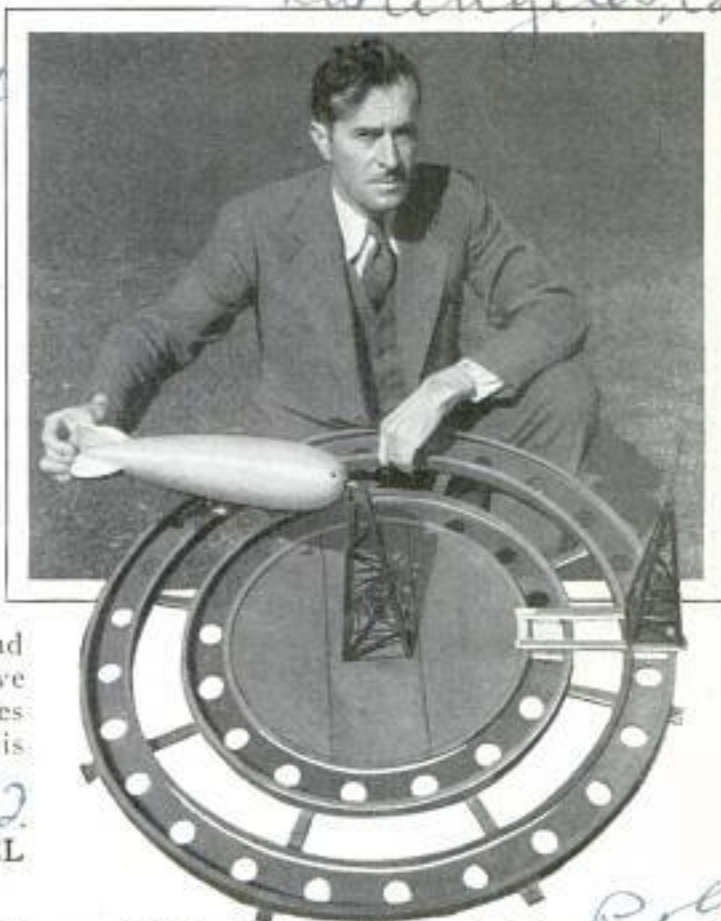
2013 d no. Mr. Alfred Lee Wilkes
Los Angeles, Calif

IS IMPROPER DIET CAUSE OF ATHLETES' SHORTER LIFE SPAN?

Eating the wrong kinds of food, not strenuous exercise, is the chief reason why some college athletes do not live as long as their more sedentary brothers, according to an eastern authority. In his opinion, athletes, through application of better knowledge as to the effects of various kinds of food and by carefully regulated diet habits, will live even longer than the average person. In general, reduction but not exclusion of highly concentrated foods, especially starches and sugars, and the use of more vegetables and fruits, are practices that will improve the health and increase the chances for long life of most individuals, this authority believes.

Wade's book

2094



Model of Fore-and-Aft Mooring Mast, One Section Moving on a Track; Its Height Is Adjustable

FORE-AND-AFT MOORING MAST FOR BIG DIRIGIBLES

Using a system of fore-and-aft fastening, a working model of an electrically operated mooring mast for dirigibles was demonstrated recently by its Los Angeles inventor. One of the masts moves on a circular track and is controlled by a vane which keeps the ship's nose into the wind. Adjustable masts allow the ship to be lowered or raised.

MORE DURABLE COVER FOR NAVY AIRSHIP

Fabric covering for the giant dirigible "ZRS-4," being constructed for the navy, will be about the same as that used on the "Los Angeles," which, after seven years' service is seventy-two per cent intact. Certain recent developments will be employed to produce what is expected to be an even more durable envelope.

Ms. Daily 12/3/20

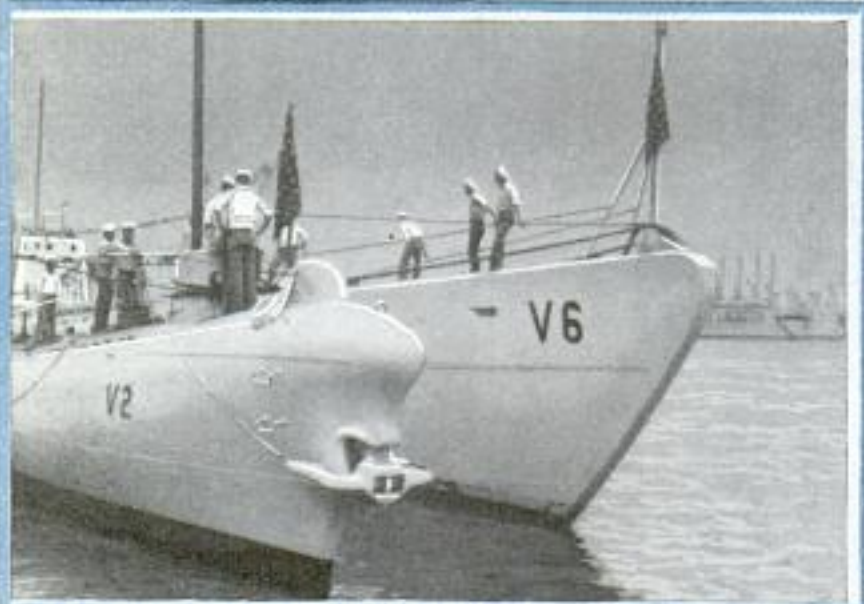


The Wheels of This Truck Accommodate Themselves to Uneven Road Surfaces While the Body Remains Always Level

maker unknown

Lighter than Air Section
Bureau of Aeronautics
Naval Dept

BATTLESHIPS



Top, Comparison of Prow Construction of "V-2" and "V-6"; Both Are Built to Withstand Shocks

By **ANDREW R. BOONE**

ON THE BRIDGE of the "V-4," one of Uncle Sam's new giant submarines and only underwater mine layer in the American navy, Lieut. Com. W. M. Quigley was bringing the big boat into harbor.

"Ahead two thirds," he called to the quartermasters.

"Starboard engine ahead two thirds, sir," sang the first.

"Port engine ahead two thirds, sir," echoed the second.

Silence as the behemoth slipped through



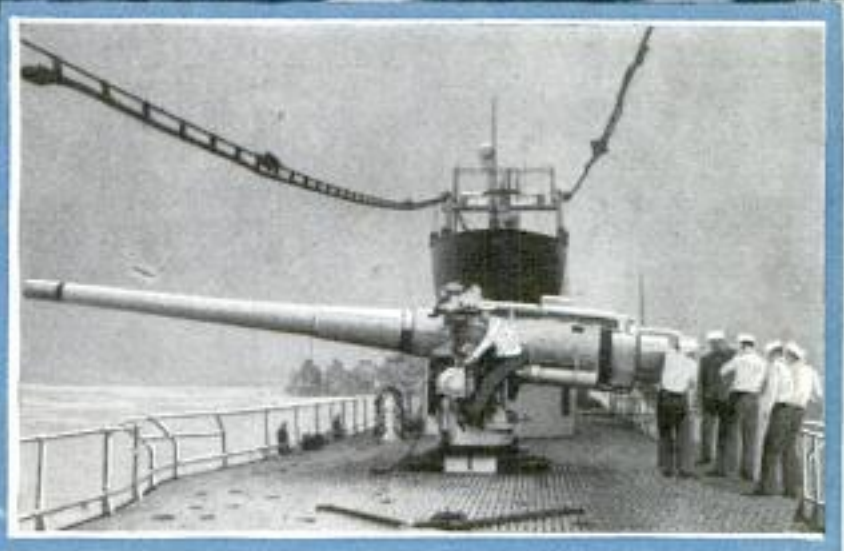
Looking Aft from Conning Tower of "V-4"; Cable at Right Protects Tower from Nets in Ocean

6138 prechels Theatre Bldg. San Diego, Calif.

Waver's Corp

1800

under the SEA



the water. The captain kept his eyes trained on other vessels as the "V-4" moved toward her berth.

"Ahead one-third," he directed a few minutes later. Again came echoes as the quartermasters turned knobs that sent electrical signals to the engine room, and the helmsman turned the wheel that sent the big sub in a new direction.

Ahead and behind the conning tower, the broad deck stretched, giving to one standing beside the captain the impression of a battleship's deck, so long and so broad is the sub. Two guns, ready to shoot six-inch shells at a target, point for-

When on the Surface, the "V" Boats Are Equipped to Put Up a Real Fight; Two Six-Inch Guns Are Mounted on Deck

ward and aft from mounts on the deck. Again all was silent until Commander Quigley gave the final order "stop!" and sailors on deck passed lines to other sailors on the "V-6," largest of Uncle Sam's underwater fleet. The submarine had come to rest alongside another, both of which nestled near the bosom of their mother ship, the U. S. S. "Argonne."

These new giant subs, 380 feet long,

1800

POPULAR MECHANICS

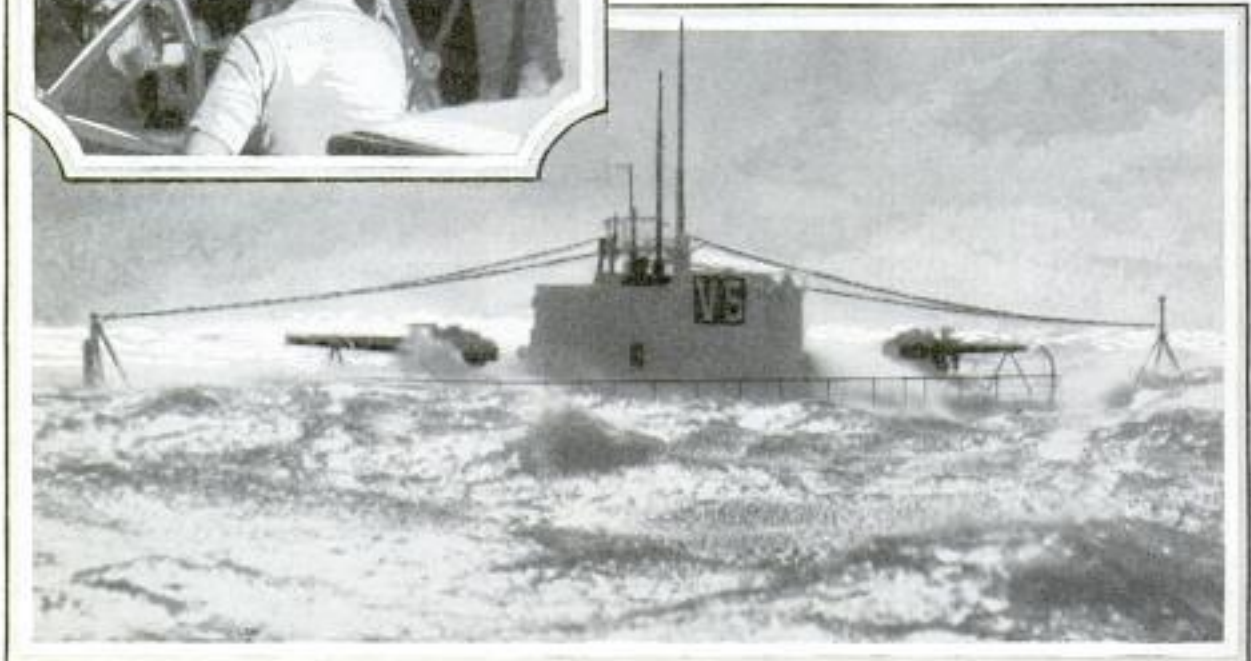


perform silently as they go about their peace-time business of training crews for emergencies. They practice alone and with the battle fleet, firing dummy torpedoes, dropping globular mines from the stern while only periscopes break the surface of the Pacific with tiny ripples, and again training the powerful deck guns on moving targets to test the skill of the gun crews.

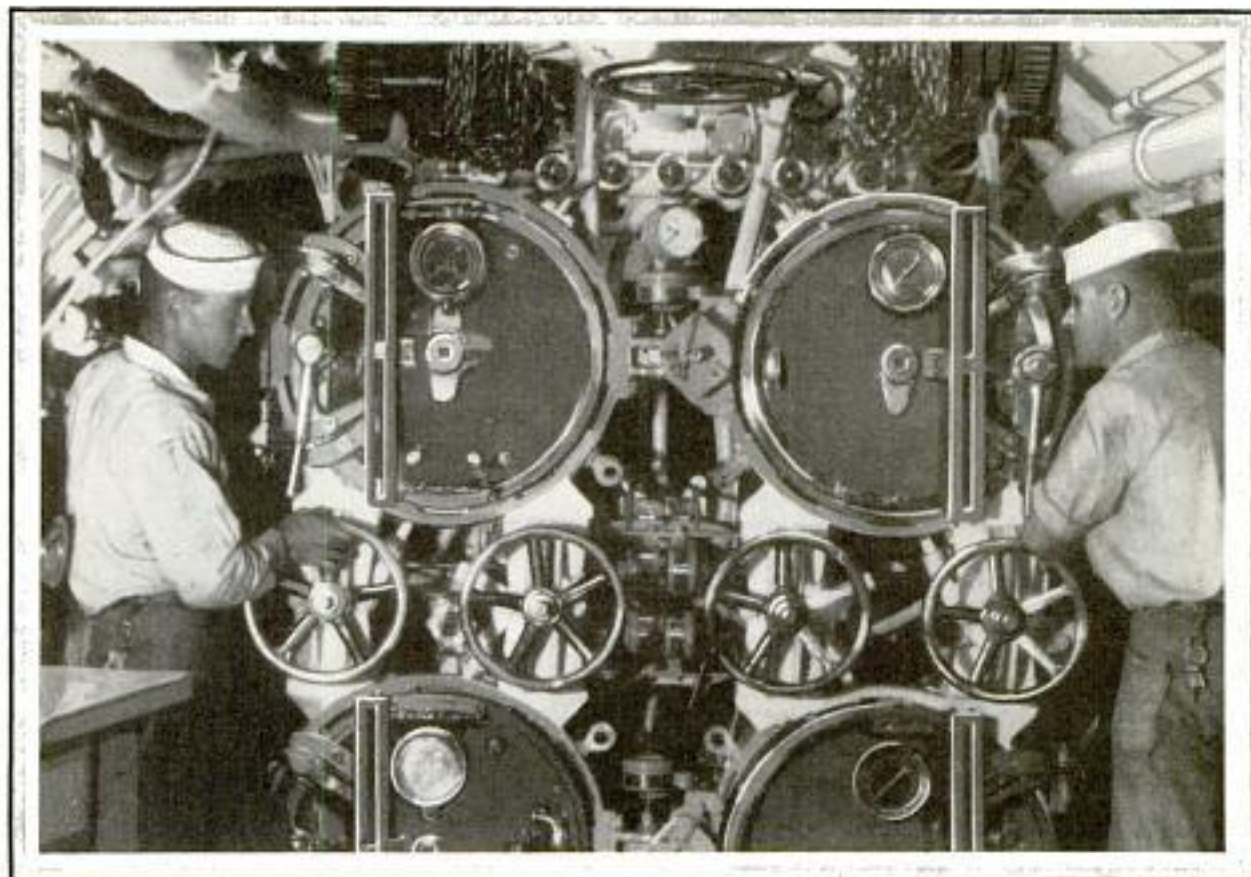
When these "V" boats—of which there are now six—leave harbor, they run on the surface until ready for "war games." Such is their size and weight that two officers and four men normally stand in the conning

tower to direct their movements.

Powerful Diesel engines connected with twin propellers drive these boats along the surface while storage batteries containing 240 cells—each cell weighs a ton—furnish electricity to propel them when submerged. The "V" boats dive just as do other submarines, excepting that all valves for flooding the tanks and expelling



Top, Looking through Periscope of American Submarine; Center, Intimate View of Depth Gauge during a Dive; Below, Conning Tower and Guns of "V-5," Just as the Boat Was Going Down



This Is a View of the Business End of the Torpedo Tubes of One of the Large Submersible Boats; This Intricate Machinery Contains Four Torpedoes in Position to Be Fired

water from them, may be turned by a single officer in the control room, and so swiftly do they operate that in one minute 270,000 gallons of water may be forced into the two main tanks as the sub disappears beneath the waves.

In these "disappearing battleships," as some of the crew call them, the sailors find luxuries and spaciousness of which none on the older and smaller boats had dared to dream. Three decks—the bridge deck, superstructure or gun deck, and the main deck, on which are located the living space and all operating stations except the torpedo room—permit them to move around with the ease of a battleship crew.

Nothing is left to chance in forcing a "V" boat under the ocean. Signals indicate the angle of descent, lights on a panel inform the diving officer whether all of the hatches are closed, an automobile horn warns the crew when a dive or descent is about to commence, and electric signals carry orders constantly from bow to stern.

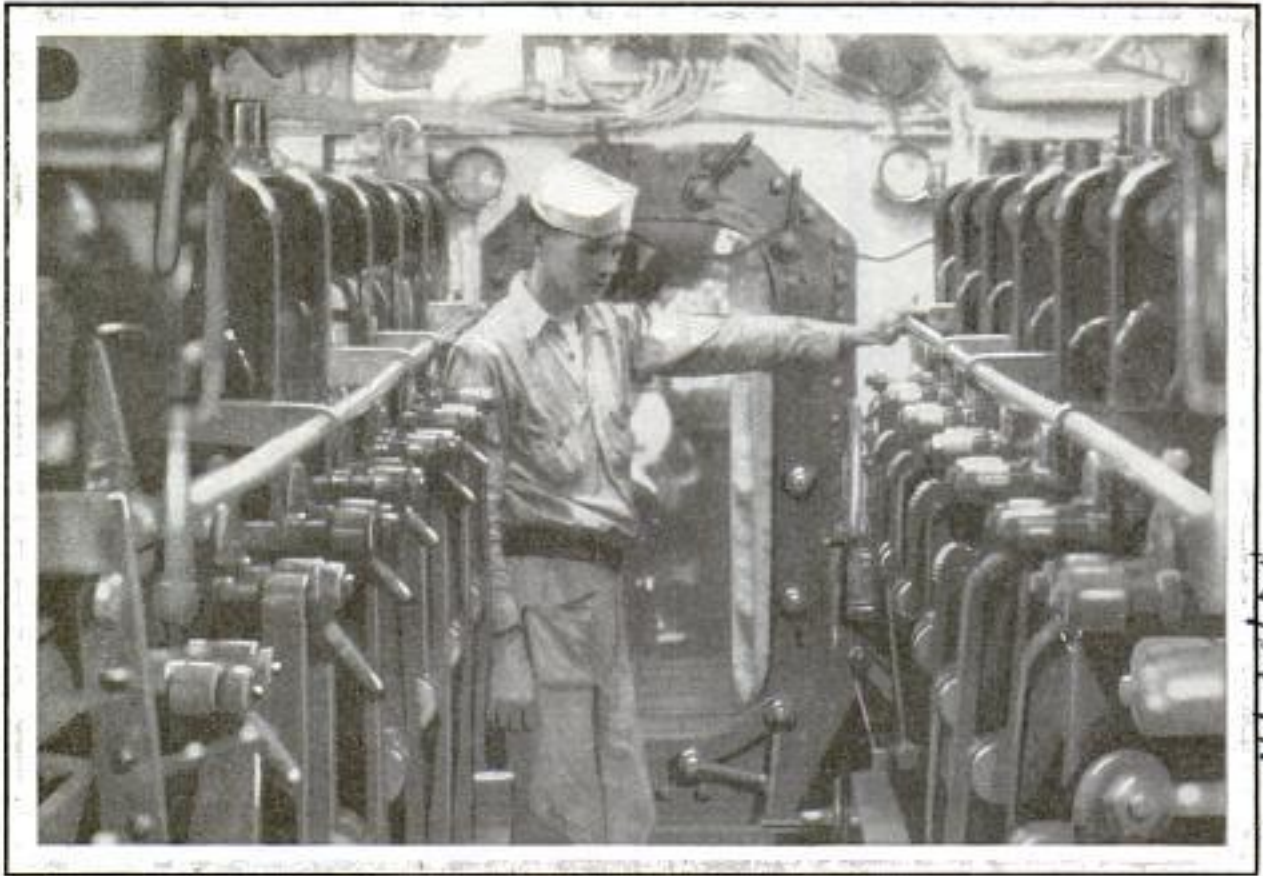
Navy experts long had dreamed of a submarine that could take its place as an arm of the fleet and operate with the fleet

on even the longest cruises. This has been achieved through recent increases in speed and range applied to the "V" boats. The thought of submarines being attached to the fleet is not new. However, until recently they have been unable to operate with the battle fleet. The new underwater battle cruisers can make a speed of twenty-one knots, which rivals that of the U. S. S. "California," flagship. German submarines during the war reached a maximum speed of eighteen knots.

The chief development in American submarines since 1918 has been in reliability. Recently the "V-5" demonstrated it could descend safely to a depth of 332 feet, a record for even the biggest subs. The "V" boats carry five or six-inch guns, two to each boat. While the submarines are battleships under the sea in that they carry great destructive power in the form of torpedoes and mines, on the surface a single shot would render one useless.

The early ideas of submarines were conceived in foreign countries, but in reality the submarine is an American invention. In 1776, David Bushnell, a Yale undergraduate, constructed his "turtle boat."

1800
270



Here Is a Close-Up of the Heart of a Large Submarine; in the Cramped Engine Room These Giant Diesel Engines Propel the Craft When Running on the Surface

Herald Tribune 11/13/32

It held only one man who acted as captain, crew and power plant. The boat's offensive power consisted of a torpedo which was merely an oak block containing 150 pounds of black powder exploded by clock mechanism. The operator had the simple task of propelling his vessel to the target, screwing the torpedo to the wooden hull, setting the firing mechanism and withdrawing to safety.

From the chaos of chronic disappointment sprang the first practical submarine torpedo boat, the "Holland." This fifty-three-foot boat, powered with a fifty-horsepower gasoline engine, appeared in the late seventies. Since the days of the "Holland," submarine progress has been slow but definite. Today's craft can carry a crew of 100 men from San Francisco through the Panama canal to New York and back again without assistance.

country unless some measures are taken to protect them from electric wires and power lines where thousands of them are electrocuted. Often flocks of birds are found dead under these wires, many of the larger ones being killed when a hasty landing sways one wire against another. The greater toll is being taken where electric wires have not been placed underground.

**BUG TRAP WITH GLASS SIDES
SKIDS INSECTS INTO OIL**

2012



Insects are caught at night in large numbers in a recently invented bug trap that skids them into an oil bath. The trap consists of a wire frame in which four panes of glass are set at an angle. Inside the glass inclosure is a light to attract

**ELECTRIC WIRES KILL BIRDS
IN INCREASING NUMBERS**

French bird lovers are predicting the gradual extinction of bird life in that

2091

Jacques Hekamain
French writer

Chas. Wm. Ol.
Swathmey
Quark U.S.
Copyrighted material

the insects, and below is a pan containing crude oil or some other liquid to kill them. The bugs fly toward the light and are caught on the panes of glass, skidding downward into the oil when they lose flying speed.

Atlantic Refining Co
ELECTRIC EAR DETECTS KNOCK IN AUTOMOBILE MOTOR

2039
 Radio is now helping control the anti-knock qualities of gasoline. A microphone and vacuum tubes, magnifying sounds a hundredfold, have been combined with other delicate instruments to form an electrical ear that detects the faintest knock in a motor, yet remains deaf to other engine noises. The apparatus was developed in the course of research for a new type of gasoline when scientists were unable to find a sufficiently delicate instrument capable of interpreting engine sounds. In operation, the microphone is suspended from coiled springs near the engine. Sounds that could not be heard by the human ear are picked up by the electric one, then the rest of the apparatus selects and magnifies the knock and registers the sound intensity on the dial of a meter. Filters screen out the ordinary engine noises, allowing only the knock to pass through the vacuum tubes.



Using the Electric "Ear" to Test a Motor: It Picks Up the Knock but Cuts Out Other Noise



Copyright, Doc Schurmacher
 Folding Boat for Outboard Motor; the Craft Is Light in Weight and Fits on Side of an Auto

FOLDING BOAT FOR OUTBOARD IS EASILY CARRIED

For the motorist who would like to take a power boat along on a trip, but does not care to be bothered with a trailer or cradle, a collapsible craft with detachable outboard motor has been made. It is of mahogany plywood, and the seams are a double layer of impregnated canvas. The boat is in one piece and the sides fold down upon the bottom, making it flat for carrying purposes. The craft for two persons weighs only about 100 pounds and, folded, can be carried on the running board of the car, the outboard motor being stored on the luggage rack or wherever convenient. The seats open on hinges, help to hold the sides in place when the boat is folded, and brace them when in the water. The craft, with folded sides, can be employed as an aquaplane, and is also used as a service boat for seaplanes and as a tender for a larger boat.

Underground water in the earth equals nearly one-third the water in the oceans.

Developed by Mr. D. S. Delbridge and inventors of the Atlantic Refining Co. 260 Broad St. Phila.

about \$50.00

NY

*Atlantic Refining Co
 260 Broad St. Phila*

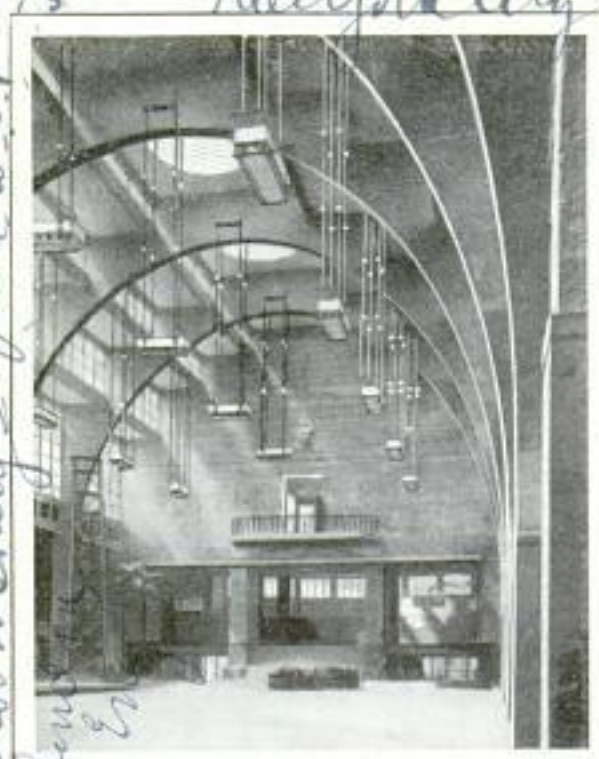
272
2015
New York City

Garrod & Baum.
1350 Broadway.
New York City

Spind near
Singapore

POPULAR MECHANICS

Mr. Richard Crittall & Co.
43 Bloomsbury Square W.C.1



An Example of Panel Heating, Hot-Water Coils Being Concealed in Dome of This Structure

PIPES CONCEALED IN PLASTER HEAT BUILDING

Concealed heating is one of the unusual features of the recently completed British embassy in Washington. This system, in which hot-water coils are imbedded and completely hidden in the ceilings and walls, is known as panel heating, and has been employed in England for some time. Numerous advantages are claimed, including a large saving in fuel, since a room at a temperature of sixty-five degrees with the panel heat feels as comfortable as one ten degrees warmer with ordinary forms of heating, because the humidity of the air is higher. This system, aside from offering moist air, eliminates radiators or registers, and delivers only radiant heat in contrast with the ordinary radiator which delivers about two-thirds of its heat by convection as air flows upward in contact with the coils. In principle, it operates like a brilliant light streaming through a frosted glass ceiling, radiating beams into every part of the room. A plaster which will not crack is used.

SHARK FOUND IN FRESH WATER MAY AID WAR ON DISEASE

2087
Man-eating sharks and sawfish found in the fresh waters of rivers near Singapore may aid man in fighting kidney diseases. Dr. Homer W. Smith, New York University physiologist, who discovered that these species of sea life ascend the tropical rivers, set up a laboratory in the Malaya to study them and found quantities of urea in the blood. This substance is formed by the combination of protein in the body and in other animals is excreted by the kidneys, failure to throw it off resulting in the disease known as uremia. Scientists are working on a theory that the presence of urea in these fishes is found necessary for them to live in salt water, and hope that a further study may throw light on obscure points regarding the function of the human kidney.

Chicago Daily News 12/4/30

LIGHT UNDER INSPECTION BELT

2029 SHOWS FLAWS IN MICA

In searching for an economical method for examining mica used to make electrical apparatus, engineers devised a system that can also be applied to other forms of industry calling for careful scrutiny of material or finished articles. A moving translucent belt was made, the pieces of mica passing along the belt which in turn moved over strong lights. Dirt, metal fragments and imperfect pieces thus are quickly spotted by inspectors watching the belt with the lights shining through it.

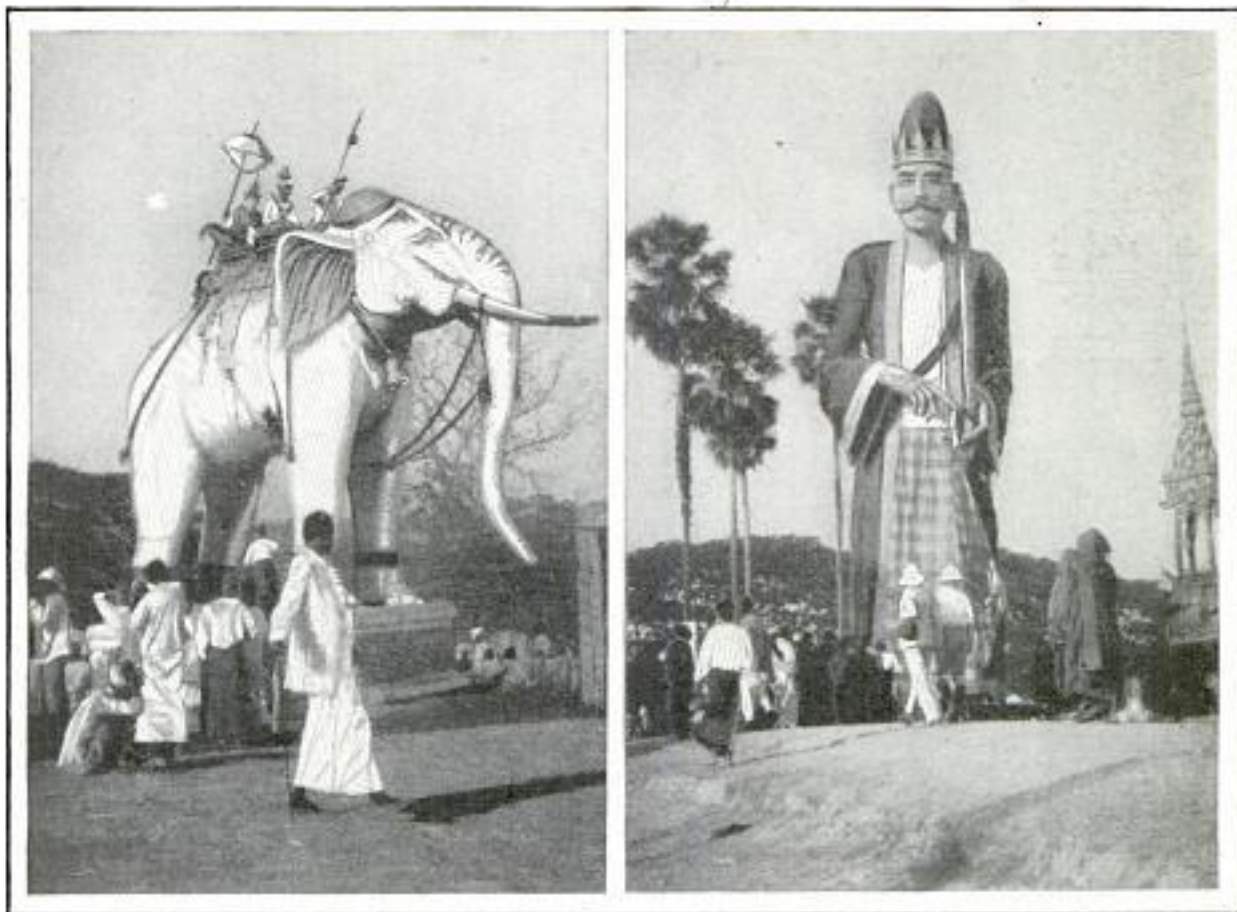


Inspecting Mica Which Is Moving on a Translucent Belt with Electric Light beneath It

Cont. Carl W. Esage
Ashville, NY

Vertical handwritten notes on the right margin, including "Chicago Daily News 12/4/30" and "2029 SHOWS FLAWS IN MICA".

GIANT FIGURES ARE PART OF RELIGIOUS CEREMONY



Huge White Elephant and a Forty-Foot Man Used by Buddhist Burmans in Their Religious Rites; the Man's Figure Is Constructed over Two Palm Trees and Is Garbed in Real Cloth

Built of bamboo, paper and plaster of Paris, a forty-foot figure of a man and another of a huge white elephant are used by the Buddhist Burmans to pay tribute to well-known priests during religious ceremonies. These figures are so strong that the curious can climb to their tops

and are employed as the temporary resting places for the dead. The white elephant is the mark of royalty. The man represents the figure of a historically famous priest, and during a ceremony is dressed in real cloth, which later is given to charity.

SWELLING OF CAST-IRON PARTS MAKES UP FOR ERROR

By repeated heating and cooling in a furnace, cast-iron can be increased in size as much as forty per cent without changing its metallic properties, although there is a reduction in strength of the swollen castings, but in cast iron this is not always important. Cast-iron bars, it has been found, must be heated to 1,200 degrees and cooled alternately 100 times to obtain an elongation of one inch per foot. These discoveries are being utilized commercially to correct errors made in machining.

Prof. Alexander E.
Anterbridge.

Expensive machine-worked pieces, when found to be too small, can often be expanded to a point where they can be worked down to the proper size. Tests also have disproved the old belief that cast iron becomes brittle under repeated shocks, for it actually becomes stronger by shocks. For this reason, it is better to tumble castings about in a barrel to remove foundry sand than to pickle them in acid.

ⒸA "sewing machine" for sheet steel and iron welds the parts electrically with a wire four times as fast as a skilled welder.

from *Illustrated Technik*
see June 1930-994
General Electric & Schenck
Copyrighted material



own electric power. This plant has been able to net about forty-two cents per hundredweight of pulp handled, and there are millions of pounds that go to waste yearly.

WOOD CLOTHING AND JEWELS FOR SPORTS WEAR

Wooden accessories for clothes and jewels are being used in Paris, particularly for sports wear. Belts and bracelets are composed of bright metal and wooden disks, cubes, triangles and other geometric designs. Round wooden buttons, sliced in half and sandwiched with shiny nickel, are used for sports dresses, and similar buttons appear on accessories, such as choker or purse. Wooden buttons are used on sports coats with leather button-holes, and leather belts have cut-outs in which wooden pieces of similar design have been set.



Electrically Operated Pocket Projector. Accommodating 250 Still Pictures, Which Is Ready to Operate When Plugged into Light Socket

POCKET PICTURE PROJECTOR IS AID TO SALESMEN

Intended particularly for classroom use and for salesmen, a compact projecting machine for showing still pictures is so small that it fits easily in the pocket like a small camera. It is less than seven inches long and weighs less than two pounds. Its operation is simple, as it is only necessary to place it on a desk, plug into a light socket, and turn a knob which throws bright, clear still pictures on the wall of a room. It accommodates 250 pictures and uses standard motion-picture film. A tiny fifty-watt lamp supplies the illumination.

GRAPE PULP REDUCED TO FUEL AND USEFUL CHEMICALS

Grape pulp, remaining after wine making, is being used in Italy to produce a number of by-products, including fuel and many chemicals. A factory at Modena is making from this hitherto waste product fuel bricks, alcohol, tartaric acid, cream of tartar, tannic acid and oil, using the dried pulp as fuel to create its

ELECTRIC HEAT IN AUTO ENGINE HELPS EASY STARTING

Permanently fitted to the automobile engine, a small electric heater, operated by current from a lighting socket, keeps the motor warm, when exposed or in a cold garage, so that it can easily be started. It heats the fluid in the water jacket keeping it in circulation through the motor block, is economical to operate, can easily be installed and presents no fire hazard, as the heating element is immersed in water and there is a safety fuse to prevent overheating in case the water system of the car runs dry.



Designed by J. B. Meerup

Designed by J. B. Meerup
Picture Service

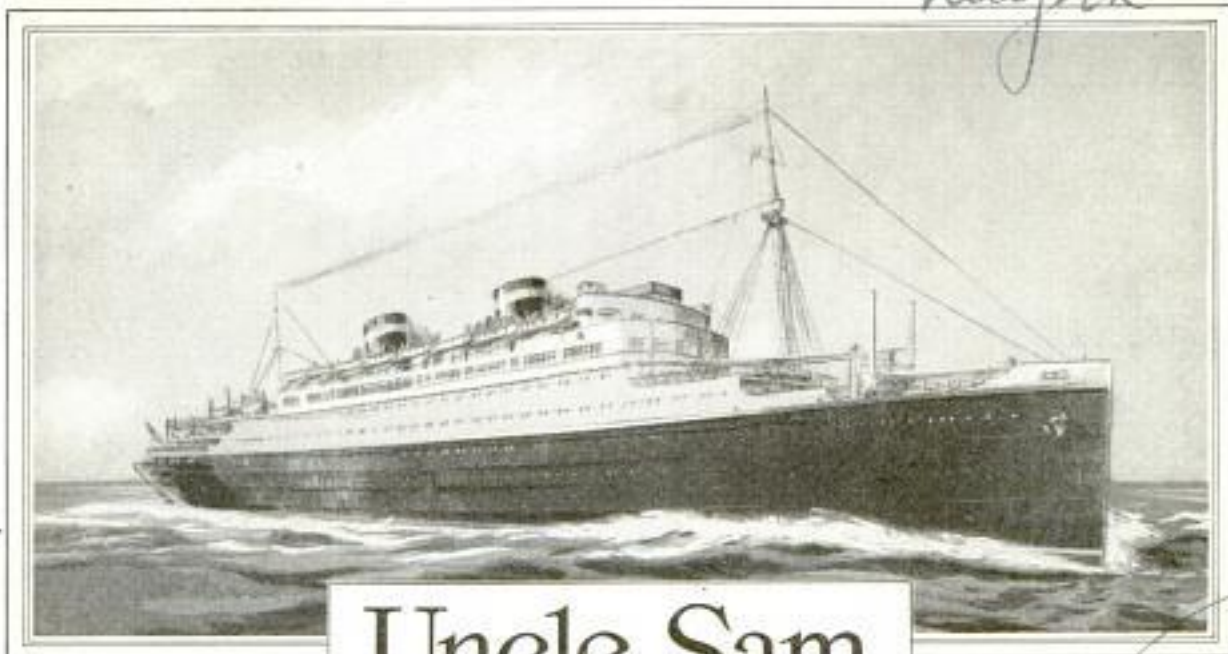
Herald Tribune
11/9/30
1920

at Modena supported by Fascist National Confederation of Agriculture

West Bend Aluminum Co. West Bend, Wis.

new York

*45 Broadway
New York*



Uncle Sam Enters Atlantic Race

RIVETERS are thundering, steam hammers sputtering and air compressors coughing at the Camden works of the New York Shipbuilding corporation, where ships' plates are fitted together like parts of a Chinese puzzle.

Derricks, tackle, hoists, overhead cranes and myriad men bend to the labor of building two 32,500-ton passenger ships, the finest examples of American marine architecture, and this country's first entries in the marathon for transatlantic supremacy.

With German ships possessed of the highest rating, with England about to lay the keels for 1,000-foot greyhounds, with France planning a 60,000-ton supership, the United States launches its five-year \$90,000,000 program for a flotilla of super-leviathans, ships whose speed and equipment will exemplify native engineering talent.

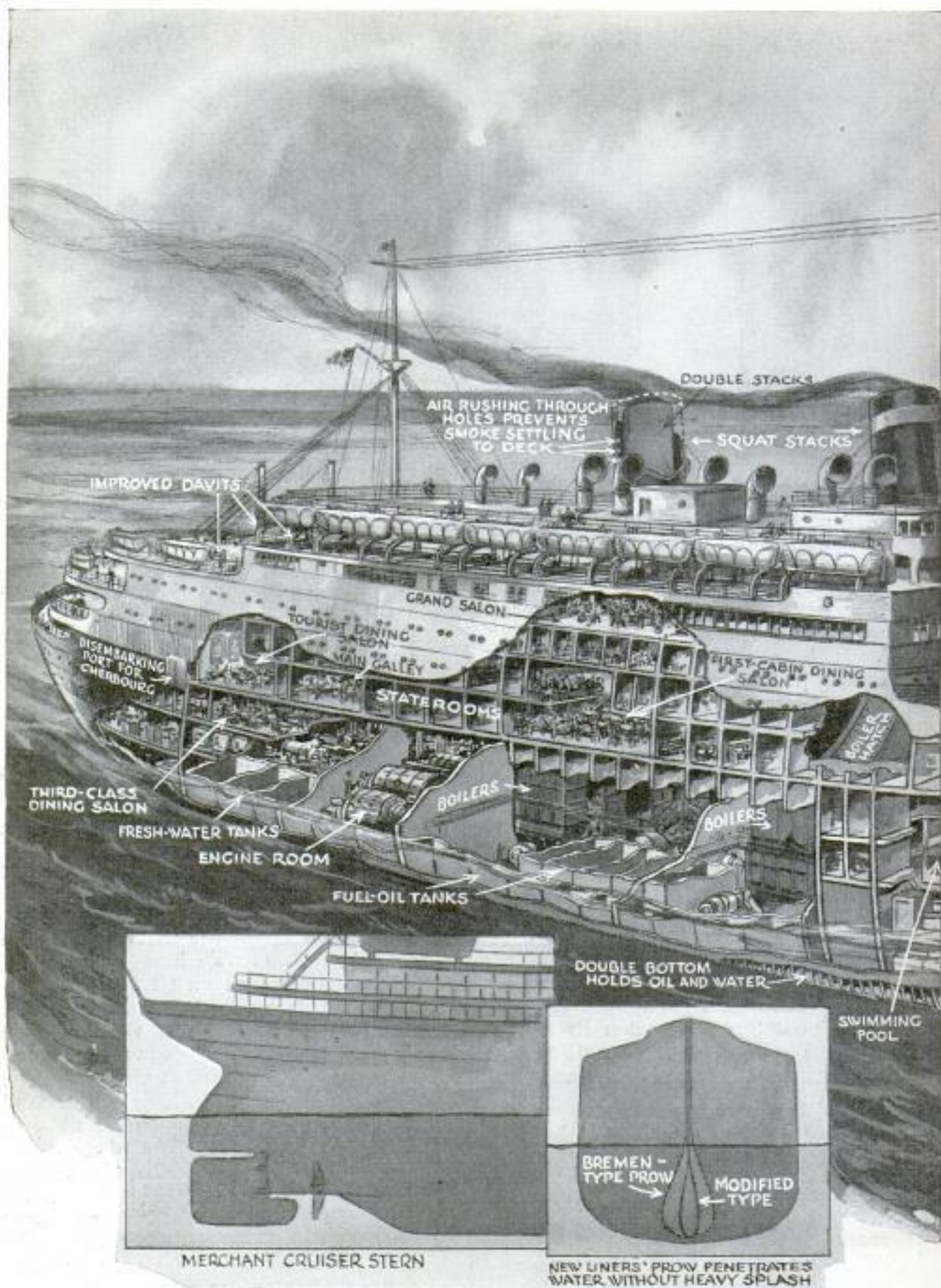
The two 32,500-ton ships now under construction are the largest and fastest passenger vessels ever built on this side of the Atlantic. They not only embody recent improvements on contemporary ships, but also introduce innovations in hull design, physical comfort and equipment. William Perrot, of the United

States Lines, said that, after exhaustive tank tests in Washington, the company had adopted a semi-bulbous bow for the first two ships, costing about \$21,000,000.

Contrary to the prevalent notion, he explained, the United States Lines is not committed to the full bulbous bow. Experience with the "Bremen" and "Europa" proves that this design impedes efficiency in rough weather. And since stormy crossings prevail on the North Atlantic ninety-two per cent of the time, the advantages of the full bulbous bow manifest themselves infrequently. Were the Atlantic ocean calm, the "Bremen's" bow would undoubtedly be copied on all new vessels. But no conclusive evidence proves that, under existing conditions, the bulbous bow can increase a vessel's average speed or efficiency. The current view in shipping circles is that the North German Lloyd will not repeat the "Bremen's" bow design on future ships. That decision is eloquent testimony on behalf of a modified bow.

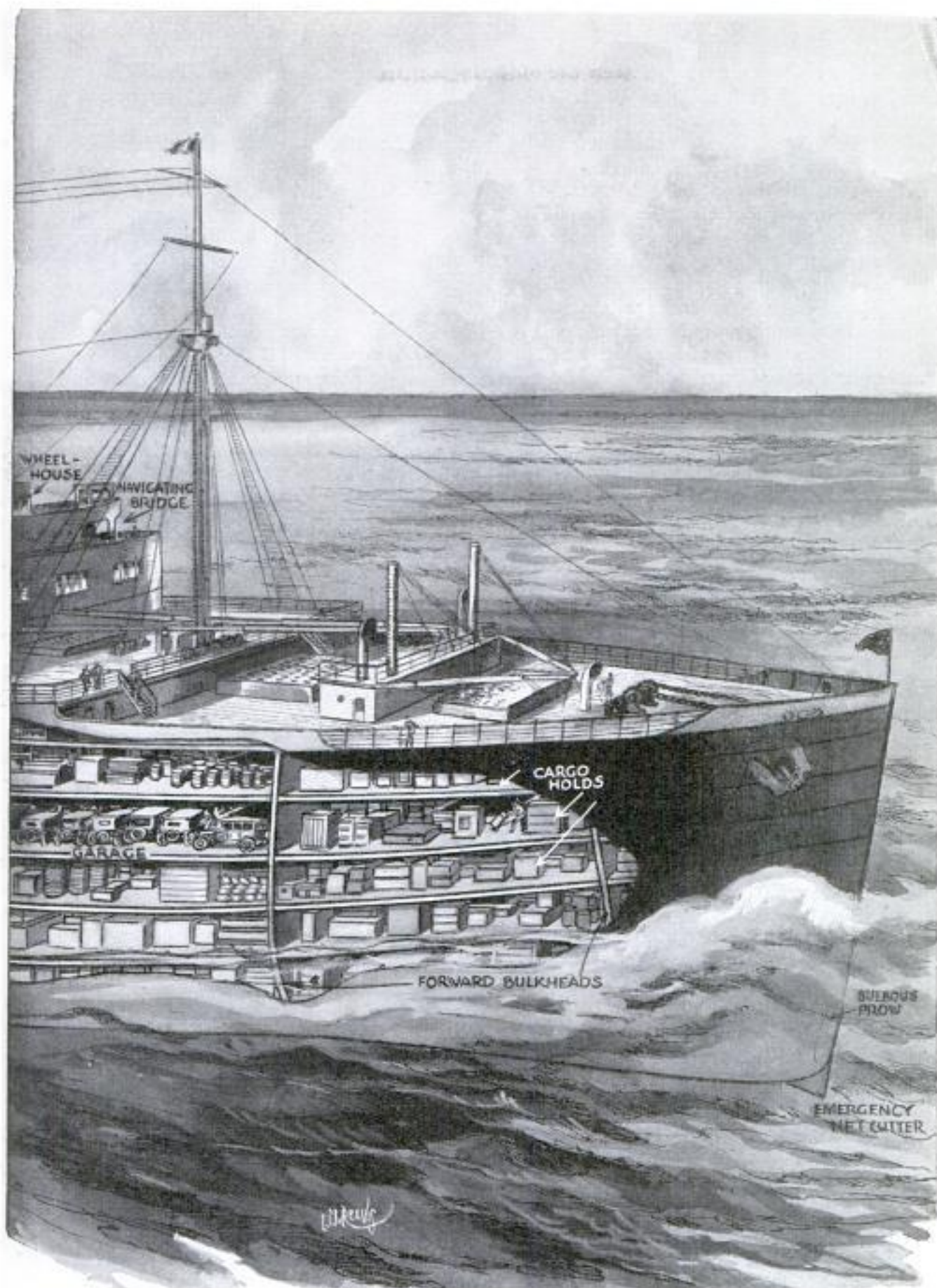
Why, then, has the United States Lines adopted the semi-bulbous bow? Solely to increase a ship's safety factor, says Mr. Perrot: that means, to make possible the strongest kind of riveting in the stem bow,

Manager of Construction



Diagrammatic Drawing of One of the 32,500-Ton Ships Now under Construction at the Camden Works of the
Exterior Features; the Ships Will Have an Over-All Length of

1857



New York Shipbuilding Corporation; a Semi-Bulbous Bow and Improved Streamline Design Are Important 705 Feet and an Average Speed of Twenty-One Knots

where stresses and strains tax the steel work. Hence, the hulls on America's two new ships will be a cross between the old knife-edge and full bulbous bows. The feasibility of this design will be judged when the first twin is in operation, July, 1932. Extraordinary safety is the quality stressed by the American architects. The ship's metacentric height—equivalent to low center of gravity in an automobile—is such that, under no conditions, will it be possible to capsize her. Were she tossed free of the water, she would regain equilibrium and resume normal floating position. Such poise is rarely attained in marine construction.

Installation of the first cooling system on a commercial passenger vessel will insure maximum comfort. On sultry days, when temperatures range around ninety degrees, refrigerated air will be forced through ducts, and the indoor heat reduced to seventy degrees. Likewise, every stateroom and public room will be ventilated, heated or cooled as desired.

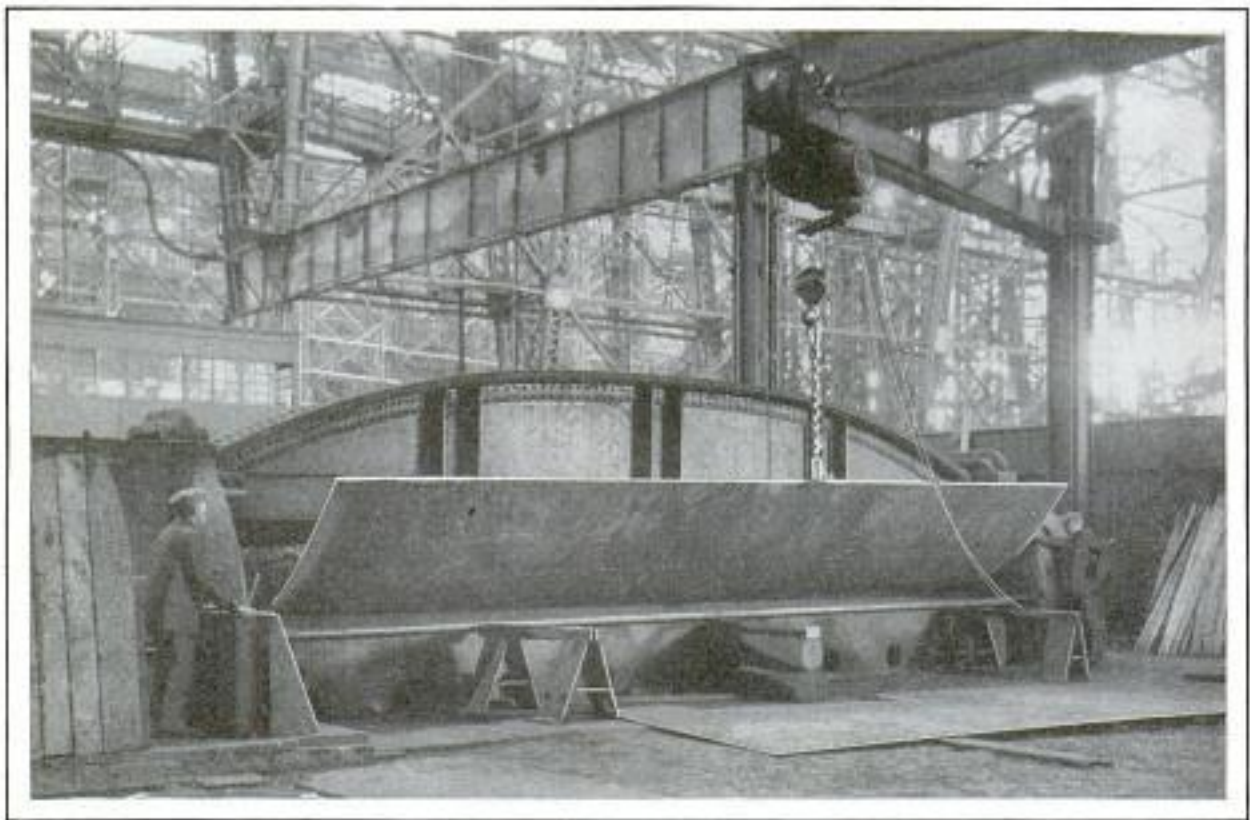
Outboard designs of the two vessels, as yet unnamed, will correspond to the "Leviathan." These three ships will enable the company to maintain year-round

weekly sailing schedules on the New York-Cherbourg-Southampton run, pending construction of two superliners which will consummate the five-year program. After the last twins are launched, the 32,500-ton vessels will be transferred to the New York-Hamburg run.

Each ship will have an over-all length of 705 feet; length on waterline 685 feet; length between perpendiculars 666 feet, beam molded eighty-six feet, and depth to promenade deck seventy-five feet. Specifications call for twin-screw first-cabin cargo ships, accommodating 600 first-cabin, 490 tourist and 200 third-class passengers, and a crew of 400. Raked stem and cruiser stern will enhance the streamline effect. The superstructure will consist of three decks, with a fourth deck fore and aft of the machinery spaces.

Interiors will be more palatial than the "Leviathan's." Several decks will have verandah cafes. The swimming pool will be finished in tile and marble. Modern barber shops, hairdressing and manicure parlors will be distributed about the ship. Children's playrooms, gymnasiums, and a complete printing plant are also specified.

The radio and telephone systems will



Bending a Big Steel Plate for One of the New Vessels Which Are to Enter the International Contest for Commercial Supremacy on the Atlantic

1955 A.C. Horn Co

Horn Blvd 279

Long Island City

N.Y.

Power Lubrication Gun

embody the latest improvements. Tele-phones will be available in each cabin. The Radiomarine corporation of America is building the wireless receivers and transmitters. One transmitter is to have 750-watt antenna capacity, and there will also be an auxiliary transmitter of the panel type and one short-wave transmitter for long-distance communication, by which the ship is enabled to maintain communication with both sides of the Atlantic.

These vessels will be the first built in this country with 400 pounds of steam pressure on the boilers and a 650-degree Fahrenheit superheat. The six drum-type boilers will have a total heating surface of 63,000 square feet. The boilers will be arranged for burning oil under forced draft with closed firerooms. The turbines will have a speed of approximately 1,800 revolutions per minute for the high-power and intermediate power, and 1,500 revolutions per minute for the low power. The propeller shafts will turn 125 revolutions per minute. The maximum ahead shaft-horsepower will be 30,000, equally divided between the two sets of turbines.

An average speed of about twenty-one knots will make these the fastest passenger ships ever constructed in this country.



Pressure Gun Being Used for Calking; Usually It Is Operated with Liquid Carbon Dioxide

CALKING WITH PRESSURE GUN SPEEDS UP WORK

Caliking and other similar operations now may be done with a pressure gun having no compressors, generators or motors to get out of order. The machine consists of a steel vessel containing the rubberlike caliking material in plastic form, a valve, air hose with fittings and

delivery hose with nozzle, as well as a pressure-relief valve. Liquid carbon dioxide is the gas commonly used with the guns. The equipment can be used for rapid caliking between masonry and wooden parts, for pointing up brick, stone and terra-cotta joints, for filling expansion joints in masonry and concrete, and for imbedding glass in skylights.

PORTABLE FLOURMILL COMES TO FARMER ON TRUCK

Instead of the farmer going to the mill, as he has since the day when the process of turning grain into flour and feed by machinery was instituted, the grist-mill on wheels is now coming to the farmer. A portable flour mill mounted on a truck carries its own electric motor and is equipped to grind all kinds of feed. The mill goes to a farm, backs up to the granary and grinds the grain, saving the farmer hauling to and from the mill.



This Portable Flourmill Goes to the Farmer, Instead of the Farmer Going to Mill

Portable Milling Co.

W & L Blvd. Les Moines, Iowa

Com. Sam Brown,
151 Carhart St.
Marion Ohio

1912. Hadant here

John & Garnell Escondido
Paradise Mountain Quarry, Calif
of Dec 166
Valley Central
only



Beehive with a Glass Window in Bottom, Which Was Found to Increase the Yield of Honey

WINDOW IN BOTTOM OF HIVE INCREASES HONEY YIELD

By cutting a window in the bottom of the hives, a California beekeeper has devised a way to prevent the queen bees from leaving the colony and to increase the yield of honey. An opening, ten by fifteen inches in size, was made and a glass installed. The hive was raised a few inches above the ground and white paper spread under it to reflect the light into the brood combs. With this device, it was unnecessary to use a queen excluder, and the keeper found that hives equipped with the window yielded from 200 to 250 pounds of honey, while the others, not so equipped, had from thirty to fifty pounds.

RUNWAYS OF GLOWING STONE TO AID NIGHT FLYERS

Runways of glowing stone, visible to aviators at night without the need of floodlights, may be the answer to the landing-field illumination problem. An experiment with a stone of this kind is to be tried at the Akron municipal airport.

B. E. Dutton, manager

1935

Ohio

1950 near Carey, Ohio DYNAMITE IS REPLACED BY AIR TO RAZE CONCRETE

By means of a hydraulic-pressure method developed in England, concrete walls, rocks and other materials are broken up without the use of dynamite, thus reducing noise, dust and danger. A hole is drilled into the mass as for blasting, and a hydraulic cartridge is inserted. By means of hand-pump pressure, dozens of small levers are released from the cartridge, pushing against the material on every side. Pressure of seven tons per square inch can be exerted. At first, nothing happens, then suddenly the mass cracks without endangering the workers or jarring the surrounding area. The system is especially adapted to wrecking jobs where the use of dynamite is impractical. The material can be broken into almost any size from chunks weighing several tons to pieces small enough for one man to lift.



Cracking Large Block of Concrete by Hydraulic Pressure, Thus Eliminating Danger of Explosives

Hydraulic Concrete Blasting
Breaking
439 Perot Rd
Cleveland
Copyrighted material

re-aggregate
507 Superior Bldg Cleveland

426 Grand Ave. Toledo, O.
623 Beach St. Toledo, O.

1945

With the ARCTIC Air Mail



By JAMES MONTAGNES

*R-304, 465 Bay
St. Laurent Out Can*

THE WIND blows strong along the Mackenzie river. The temperature goes down with the coming of winter to stay at thirty or more below zero. Blizzards are common, lasting up to three days as a rule. Snow falls often and thick. The wind bites through everything. That is the Mackenzie river country where the farthest-north air-mail route in the world brings His Majesty's mail to the most northern Canadians.

From Fort McMurray, on the Athabasca river in northern Alberta, to the Arctic ocean, there are only two means of transportation in winter and summer. In winter the dog team has been the customary means of travel. In summer the water highway is used by all kinds of craft from canoe to steamboat, plying between McMurray and Herschel island, following the Athabasca river, Lake Athabasca, Slave river, Great Slave lake and the Mackenzie river to their destinations. And during both seasons the airplane is the only other method of travel.

The Arctic air mail is the longest and most dangerous run in Canada. Stretch-

ing for nearly 1,800 miles northward, it touches the outposts of civilization in the western Arctic where the mail used to come once a winter and not more than twice a summer. The airplane has made this difference: The farthest post on the line, Aklavik, at the mouth of the Mackenzie river, 200 miles above the Arctic circle, received eighteen mails during the first year of scheduled service, 1930, and some of the nearer posts as many as forty-one mails. Airplanes, operated by Commercial Airways, of Edmonton, have brought the far-away Arctic within mailing distance of the rest of the North American continent.

It is one thing to fly the mail along regular airways in civilized country near railways and telegraph lines, but quite another to take off at thirty below zero. There are sections along the route where flying 500 miles at 120 miles per hour constitutes a dusk-to-dusk flight. And this past summer the opposite held true. In summer, the sun shines for twenty-four hours in the Arctic. This service may seem unnecessary, but when it is learned



Left, Modern Mail Plane
beside Native Dog Sled;
Right, Midnight Sun

that upward of fourteen tons of mail have been carried during the first six months of operation, the need is brought out emphatically. The most distant points in Canada are today requiring all the latest means of transportation and communication because of their rapid development. The Arctic air mail is carried at no extra cost to sender or receiver. The regular first-class mail rates, applicable throughout Canada, are used on this route. Even newspapers and periodicals are carried at regular second-class rates, and only parcel post is expensive because the mail must guard against bulk on this northern route.

Weather forecasts are received with regularity by the pilots of this service at the various posts. The Canadian corps of signals operates for the Northwest Territories and Yukon branch of the Canadian department of the interior a chain of seven radio stations along this route. Pilots know in advance what type of weather to expect as they go ahead with the mail delivery winter and summer.



A Dog Team of Former Days with a Sled Loaded with Mail; the Scene Shows One of the Posts in the Mackenzie River Country

The reports are awaiting them at every other fort along the way, and they notify their next destination by radio when they leave. There is no other method of fast communication in the country.

Those who live in the Arctic and sub-Arctic no longer look forward to a postman who travels by dog team. Today the Canadians of the Arctic know the arrival of the mail when through the silence of winter they hear the roar of powerful engines winging the scarlet planes with their heavy load of mail to a landing on a frozen river. The Arctic air mail has emancipated the Arctic.

Quoted in Tropical Woods
Wale Univ. School of Forestry

J. H. Howes of New
Gardens

General Electric Co.
Schenectady
1917
NY

**PLANTS THAT POISON FISH AID
MAN TO CONQUER DISEASE**

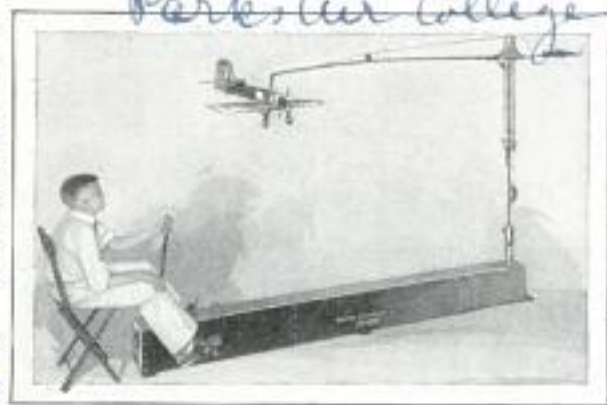
Plants poisonous to fish promise to become increasingly important to man in combating the tropical diseases caused by parasites. Some of the plants used by natives of tropical countries to daze or poison fish and make them easy to catch, also have been found potent to kill a species of fresh-water snail which harbors the parasite responsible for at least one dangerous tropical illness, known as bilharzia. There are many species of fish poison plants, and the use of some of them for insecticides has led to their cultivation.

1969
Science Service 503 E. 11/14/20

**STUDENTS ARE TAUGHT TO FLY
SEATED ON GROUND**

Student flyers of a St. Louis aviation school learn the first principles of flying by manipulating standard controls which govern the flight of a miniature airplane. The miniature ship, thirty-two inches wide and equipped with a small motor which rotates the propeller, is attached to an arm extending from a mast, the regulation controls operating through the mast and arm. The motor and propeller speed are governed by a throttle lever, and other controls operate elevators, ailerons and rudder. The plane flies in a circle about eighteen feet in diameter in either direction, and can rise to a height of about nine feet. By means of counterweights and a device for overcoming centrifugal pull, the ship in flight is virtually as free in its movements as though not connected to the mast, and thus can be caused to take off, land, rise, bank, make right or left turns, and execute other maneuvers.

Park Air College

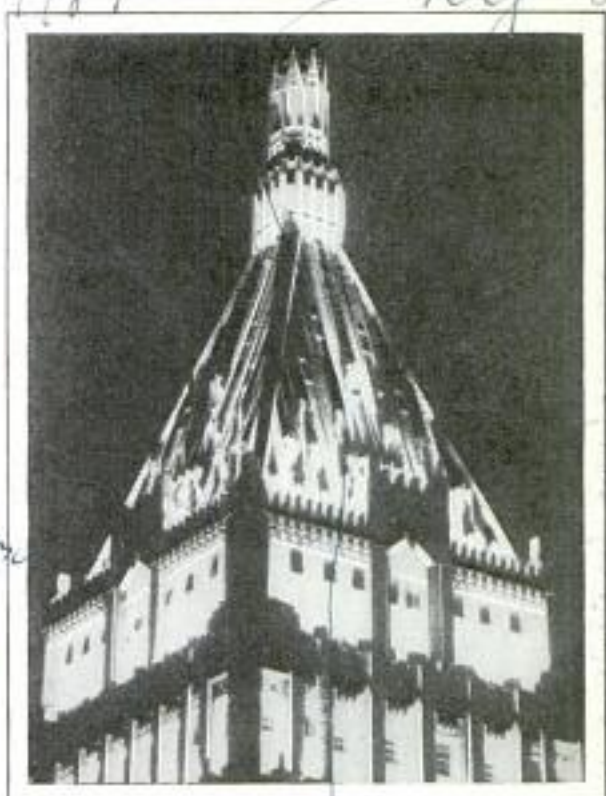


Model Plane Attached to Mast and Operated by Student Flyer through Standard Controls

6205 Lenox Ave

Geo. John Land
N. Gardner

6829 St. Charles Road, St. Louis, Mo.



Not a Big Iced Cake, but a Night View of the Flood-lighted Tower of a New York Bank

**GIANT TOWER MADE BRILLIANT
BY FLOODLIGHTS AT NIGHT**

One of the unusual effects of carefully designed floodlighting is shown by a night view of the lofty tower of the Bank of Manhattan building in New York. This tower and the spire above it are thrown into brilliant relief against night's dark background as the powerful light projectors play on it, and a photograph of the illuminated portion at night might easily be mistaken for a close-up of a gigantic frosted cake.

**CONSTANT HOT-WATER SUPPLY
FROM SMALL KETTLE**

Taking the place of an elaborate hot-water heating system for small apartments, a geyser kettle has been made to provide a constant warm-water supply at small cost. The kettle holds only a pint of water and is very shallow so that its contents, placed over a gas flame, boil almost instantaneously. As soon as the water boils, it is ejected from the spout. The tiny kettle is connected to a water supply so that cold water flows in as fast as the hot water is discharged.

Institute of Patentees

39, Victoria St. London S.W.

Cham at Cambridge
Exposition in London

ROADSIDE ARCHERY RANGES VIE WITH MIDGET GOLF



Above, Roadside Archery Range Where Many Shoot at One Time; Left, Instructor Coaching a Novice

has a number of large archery ranges where a dozen or more persons may shoot simultaneously, and one in Hollywood specializes in teaching girls how to handle bow and arrow. The ranges are vying with midget golf for public favor.

**TREATED WOOD RESISTS HEAT
1922 - LONGER THAN STEEL**

By a special process, wood is said to have been made more flame-proof and fire-resistant than other fire-resisting material without the loss of characteristics that make wood desirable for interior and exterior uses. In a recent test, a wooden door, treated with the chemicals, withstood intense heat for a longer time than one of steel. This specially fireproofed wood has been used as a fire safeguard in the tower of the Chrysler building in New York city.

Archery, one of the oldest of sports, is rapidly returning to favor, particularly as a sport for the modern girl since it is especially adapted to the development of arm and back muscles. California now

Henry Klein & Co.
40 W. 23rd St.
New York

Equipment - also information on installation and operation - Anderson Toy & Archery Corp. 210 7th Street
Cincinnati, Ohio

1922
1923
Feb 14 32 184

GUIDE MAPS ON OCEAN LINERS DIRECT PASSENGERS

Due to the necessity for economizing space in providing passenger accommodations on modern ocean liners, the interior often is more or less a maze to tourists. To keep passengers from becoming lost on such boats, the "Bremen" and "Europa" provide guide maps in the stairways connecting decks. These are arranged on top of tables and contain plans of all the decks and a list of all the public quarters and officers' cabins with a row of push buttons opposite them. To find his way from any guide map to a particular part of the ship, the passenger presses the button opposite the desired location, and the shortest route to it is lighted up on the deck plans.

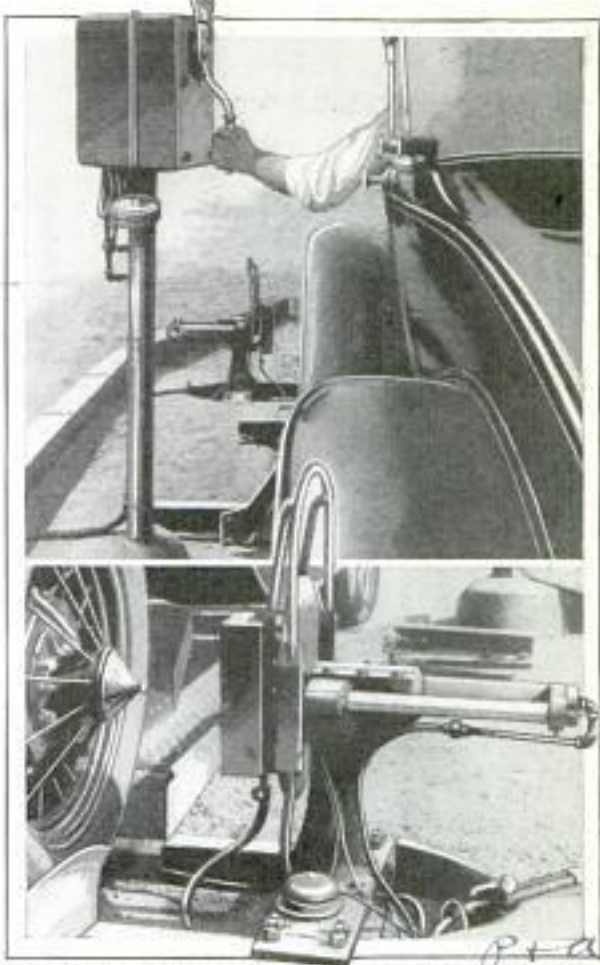
LOUD SPEAKER REPLACES HORN FOR USE OF AUTOISTS

So that the driver can call to pedestrians who thoughtlessly get in the way, a microphone and voice-amplifier set has been introduced on an English car. The system is intended to supplement the usual warning horn, which sometimes confuses persons attempting to cross the streets. With the mike the autoist can also talk to the traffic policeman or ask for directions without getting out.



Microphone for the Motorist Enabling the Driver to Use His Voice to Supplement the Horn

no information



Tire Pump Operated from the Driver's Seat; Note Special Hub-Cap Coupling Extending to Valve

AUTOIST FILLS HIS OWN TIRES WITHOUT LEAVING SEAT

Controlled by the driver without leaving his seat, an automatic tire inflator is finding favor in California. The car is driven onto a runway and the wheel to be inflated drops into a depression which closes a switch to start the automatic mechanism. The driver registers the desired pressure on a control board by simply reaching through the car window. An inflating head then advances to establish a connection with a special coupling mounted in place of the hub cap on the wheel. A hose leads from this coupling to the tire valve. The inflating head withdraws from the hub-cap coupling when the desired pressure is reached.

Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished free upon application to our Bureau of Information.

makes run-down

Los Angeles

1718

Easier Ways



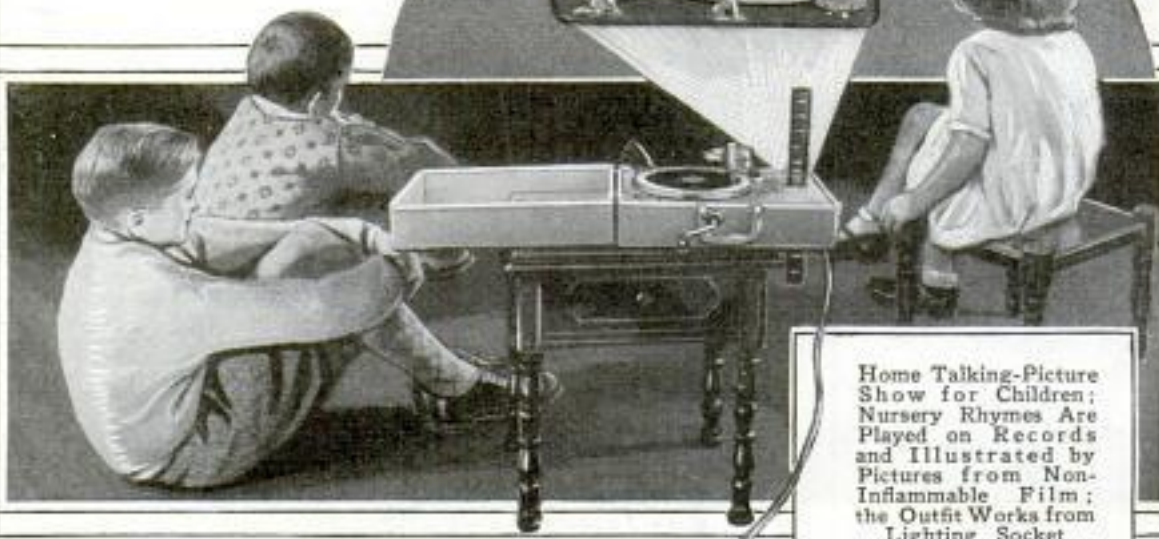
Glass and Toothbrush Are Both Kept in Sanitary Condition on This Combination Holder



Just Press Button on Bridge Table, and Hinged Section Rises, Revealing Cards, Scorers, Pencil Tray and Ash Receiver



Garment Holder with Knobs Keeps Clothes from Stretching or Falling Off; the Articles Are Easily Slipped under the Knobs; Well Suited for Bathing Outfits, Negligees and Underwear

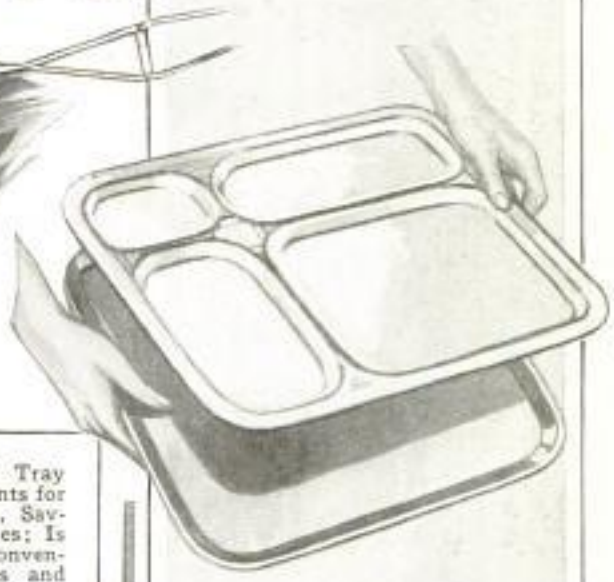


Home Talking-Picture Show for Children; Nursery Rhymes Are Played on Records and Illustrated by Pictures from Non-Inflammable Film; the Outfit Works from Lighting Socket

of Doing It



Stainless Clothesline Is Easily Connected in Sections and Needs No Clothespins



Paper Plate on Tray Has Compartments for Different Foods, Saving Use of Dishes; Is Sanitary and Convenient for Parties and Sick Rooms



Needles Can Be Threaded in the Dark with This Holder That Has Metal Prong



Right, a Handy Chart Enables Quick and Accurate Recording of Bust, Waist and Sleeve Measurements of Garments; Photograph Shows How Set Is Used

1899 Cl
1803 Larchmont Ave



Cabinet Containing Radio, Movie Projector and Phonograph, the Latter Used in Presenting Talking Pictures

TALKIES, RADIO, HOME MOVIES AND PHONOGRAPH IN ONE

Combined in a single cabinet, virtually a whole theater for the home, radio, motion pictures, talkies and the phonograph are installed together, saving room space and increasing the possibilities of home entertainment. Sixteen-millimeter film is used, the same size as is in the usual home motion-picture camera. The phonograph unit is easily synchronized so that voice records for the film may be played satisfactorily. If desired, the pictures may be shown without the records or with musical accompaniment from the phonograph or radio. Radio and phonograph combinations have been available for some time, but several obstacles had to be overcome in devising a unit that would work with a projector as well. The difficulties have been solved completely, it is reported.

HOW BOTTOM OF OCEAN LOOKS IS SHOWN BY MAP

1923

Thousands of soundings have made possible a fairly accurate contour map of the bottom of the Atlantic ocean. This work is invaluable in the laying of ocean cables. When the first submarine cable was placed, it was found that one broad section of the north Atlantic seemed to have been prepared by nature expressly for this purpose. This section is known as Telegraph plateau, and is about 400 miles in breadth, its soft, oozy bottom providing an ideal cushion for the network. Cables laid on the sea floor are subject to many perils. If suspended from point to point, they are likely to break under strain or to be chafed by the action of currents; if in too shallow water they are menaced by currents, icebergs, ships' anchors, whales, sawfish, swordfish, and even the tiny marine borers, if not coated with brass. New soundings are constantly being made, not only in the Atlantic but in all the oceans. The deepest ever recorded is 34,210 feet, near the Philippine islands. This depth of nearly six and one-half miles is almost a mile greater than the height of Mt. Everest, making the known variation in the level of the earth's crust twelve miles.



Map of Bottom of Atlantic Ocean Made After Thousands of Soundings Were Taken; the Black Lines Represent Telegraph Cables

Coast and Soundings Survey. Copyrighted material

MILLIONS IN MONEY HOARDED BY MISERS 1947

Millions in the old and larger size currency which was replaced by the smaller bills more than a year ago still are outstanding, and much of it never will be presented for redemption, treasury officials believe. The aggregate gain to the government from this money which is never likely to come back has been estimated all the way from \$10,000,000 to as much as \$70,000,000. In addition to the currency destroyed or lost, the government believes at least \$60,000,000 has been hoarded. More than \$890,000,000 of the old bills still are outstanding, and one treasury official estimates that hoarding of paper money represents at least fifty cents per capita, or about \$61,000,000, and aggregate hoarding of paper, silver and gold is estimated at \$400,000,000. This money is hoarded by an estimated 8,000 misers in the country; in children's banks; by foreigners and others who do not trust banks; by those in isolated communities without banks, and by others who keep a certain amount of money always on hand. Fire and other catastrophes destroy large amounts of paper money annually.

1937
CAMERA ATTACHED TO TRIPOD BY SELF-LOCKING DISKS



2-106
opening in the top, is screwed firmly on the tripod head and left there. Flat metal disks are then inserted into the camera mounting holes. When it is desired to fasten the camera to the tripod, one of the disks is placed in the connector socket and the rim of the connector is turned, firmly locking the camera in position. A slight turn in the opposite direction unlocks it, or it may be locked lightly at first, so that the camera can be turned.

Walloughby Camera Store
110 W. 3rd St
New York



Champion White Leghorn and Some of Her Eggs: She Missed Laying Only Eight Days in a Year

WHITE LEGHORN HEN BREAKS EGG-LAYING RECORD

Three hundred and fifty-seven eggs in 365 days was the record of a champion white-leghorn hen on an experimental farm at Agassiz, Canada. The performance broke previous world's records, according to reports, and was attributed partly to the fact that, in addition to the usual scratch grain and mash rations, the hen was given plenty of skimmed milk and green feed. The eggs averaged more than twenty-six ounces to the dozen.

FLEXIBLE SANDER FINISHES IRREGULAR WORK 1936

Reaching into the recesses on irregular-shaped work, such as hand and machine carvings, moldings, etc., a spindle sander now available reduces the time necessary for finishing operations. The sandpaper "disks" for use on the machine are cut so as to form a series of long fingers, which, while revolved at a speed sufficient to make them stand up to the work, are sufficiently flexible to follow projections and depressions of the surface closely.

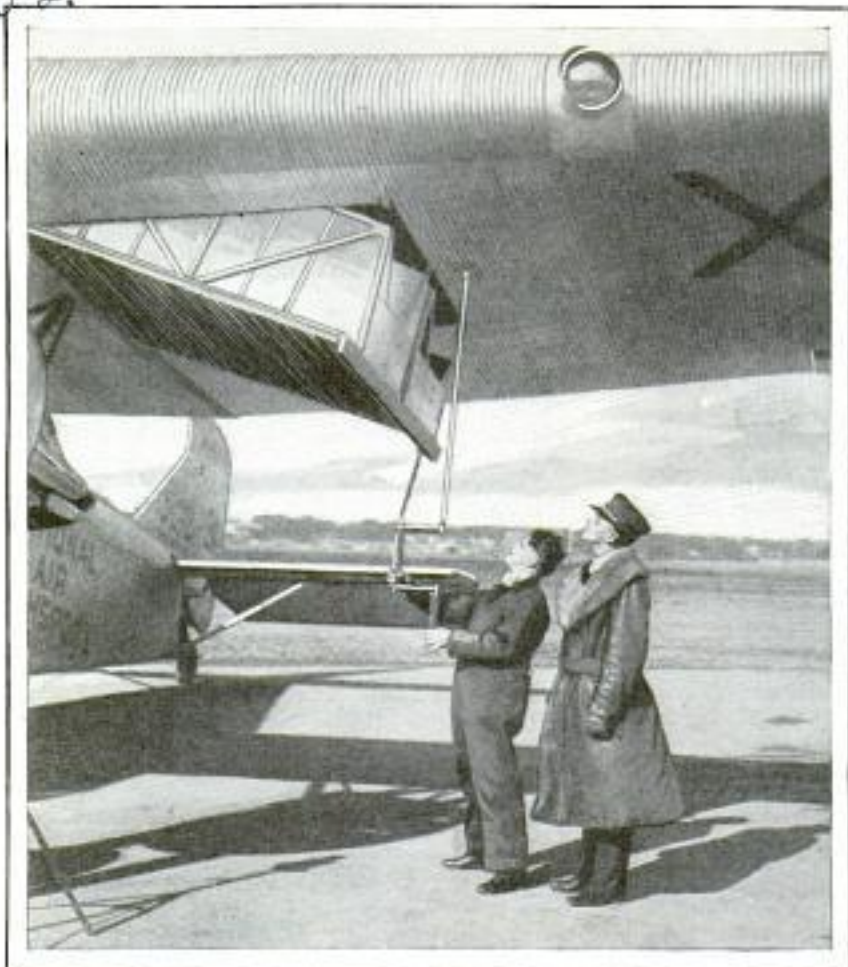


The Woodworkers Tool Works
222 Jefferson
Chicago

Owned by Mr. and Mrs. W. H. Bell

The Wram Connector

1902



Closing the Drop Section of Wing in Which Mail Is Carried in a Big Tri-Motored Ford Plane to Increase Its Capacity

PLANE CARRIES MAIL IN WING TO INCREASE LOAD

To take care of the increase of air mail, one of the large tri-motored flying post offices has been designed so that mail can be carried in its wing as well as in the regular compartments. A drop door, opened and closed from the underside of the wing, allows quick loading and unloading, and a considerable quantity of mail can be carried in the space afforded in the huge wing.

PART METALS PLAY IN DIET SHOWN BY TESTS

By feeding rats foods containing small quantities of aluminum, iron, copper and other metals, significant facts relating to the importance of these substances to the human diet have been learned at Johns Hopkins University. For instance, the tests prove that aluminum is not absorbed into the blood or tissues, and,

hence, the fears of some housewives that use of aluminum utensils is dangerous, are without foundation. One group of rats was fed milk into which lettuce ash had been mixed. The milk alone produced an anemic condition and there was little improvement when the ash, containing iron, was added, but when copper salts were introduced with the iron into the milk, there was a marked change for the better. The rats gave evidence of much greater vigor and activity.

XYLOPHONE TOY PLAYS METAL RECORDS

1926

One of the recent automatic toys is a small xylophone player. The mechanical musician strikes the proper keys through the action of a small metal record with uneven edges which serves as a cam to turn the figure to the right position so that its hands will strike the proper notes. The toy operates by winding and the records available include a number of selections, among them some of the favorite nursery rhymes.

\$ 2.50



Toy Xylophone and Player with Metal Record That Causes Different Keys to Be Struck

1891

Dr. E. V. McCollum, professor of Chemical Hygiene and Pub Health

Western Co. 1200 Western Ave. St. Louis, Mo.

1799

A Cold Wave Factory



By JOHN F. COGGSWELL

16 Edgemoope Road, Belmont Mass

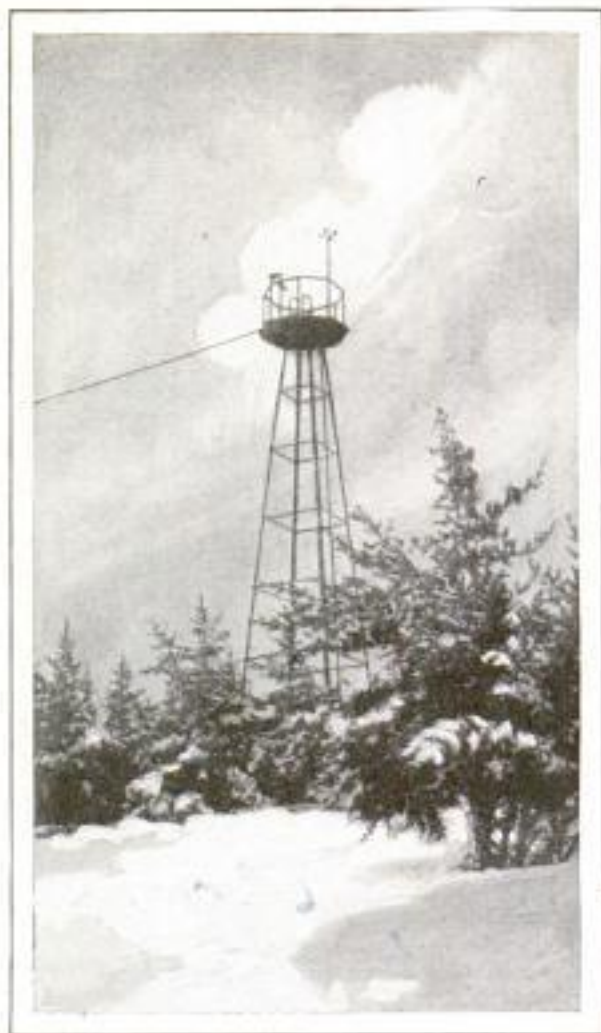
WHITE River, Ontario, is the official Canadian weather station that has come to be looked upon as the "cold-wave factory" of North America. Last winter the thermometer went to fifty degrees below zero. During January, 1930, the temperature got above the freezing point once.

Years ago, Medicine Hat, Alberta, was rated the low-temperature champion of the continent, chiefly by virtue of being the only weather station in a pretty cold district. The western Canada city never did cherish the title and, after many years' struggle succeeded in getting rid of what it considered a stigma.

There was a worthier champion, ready and willing to seize the title Medicine Hat cast aside so eagerly. White River inhabitants admit that their town is cold in the winter months. In fact, they're always-ready with a mass of statistics, to defend their right to the frigidity championship. It is a division point on the Canadian Pacific railway, situated 741 miles west of Montreal, 251 miles east of Fort William and sixty miles north of

Lake Superior. The town has a population of about 400, including Indians. White River is cold—no denying that. Consider the period starting on Feb. 11, 1930. All figures quoted are official. The temperature had been ranging along what the folks up there call just nice winter weather. February 10, the low reading was exactly zero and the high, eight above. By one minute after midnight—the first minute of the eleventh—the temperature had dropped to twenty-three below and stayed around that mark all day. At 8:00 o'clock in the evening, it was still down in the twenties below.

During the next four hours it soared up over forty degrees, to twenty-three above, and continued to rise all the next day, hitting thirty above at midnight. Twenty-four hours later, at 12:01 the morning of the fourteenth, it had taken a sheer drop of fifty-two degrees and registered twenty-two below. Gradually the temperature rose during the day and had worked back to zero at 2:00 o'clock the afternoon of the fifteenth. Then something happened. In a couple of hours, the



temperature tumbled twenty-nine degrees and kept going until it hit fifty below the next morning. Before noon it was back to the zero mark, and a few days later the district was in the midst of a most unusual February thaw, with a high mark of forty-two above.

In that spell of weather, the temperature showed a spread of eighty degrees, between high and low, in four days, and a spread of ninety-two degrees in six days. White River shows a range of over 160 degrees between the summer high and the winter low. In winter, changes of forty degrees in a few hours are common and in many full days the shift is seventy degrees and more. The record summer high temperature is ninety-three above and the lowest the thermometer has registered, during the forty years Judge Joseph Depew has been recording official weather statistics there, is sixty-eight below.

Usually the extremely low temperatures are unaccompanied by wind, and the frigid air is practically void of humidity.



Weather Tower at White River, Ontario, and Indian Squaw Leaving with a Load of Provisions for Her Husband, Who Is Tending a Trap Line in the Wilderness

Buell for Earl C. Anthony Co. Packard motor car dealer

The stranger—especially one from coast regions—always fails to realize the full extent of the cold. Three men stepped off a train one night in mid-winter to get a breath of fresh air before turning in.

"Thought this was the coldest place in the world," one remarked. "Seems just crisp and bracing to me. Guess it's a little below zero, though."

"Maybe a little more than that," a companion thought, "but it's not at all bad."

"Look out for your nose and ears, gentlemen," advised the Pullman conductor. "It's a mighty cold night."

"Cold nothing," one spoke up. "We've seen it colder back in Portland."

"Maybe you have, but I doubt it," replied the conductor. "It's forty-two below zero right now." A few minutes later, the trio knew the dry air had fooled them. When they got back into the car, they found that the toll of the frost was three frozen noses, six nipped ears and two had frost-bitten cheeks. They had been out less than ten minutes.

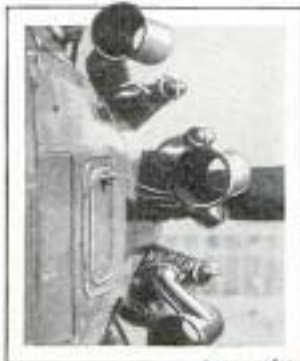
tional wheels, half the ordinary size, have no power of their own, but are employed



Motorcycle with Two Auxiliary Wheels, Which, When Lowered, Allow Towing behind Auto

1965
COOL AIRPLANE ENGINE VALVES WITH "FREEZING" TUBE

San Diego Calif
To keep airplane engine valves from becoming overheated, a western engineer has applied one of the principles of refrigeration in such a way that the valves are not only kept cool but the weight of the engine fittings is reduced. Venturi tubes are adjusted on each valve, permitting a



u x u
strong flow of air to enter a narrow passage as the plane flies and to leave by a larger opening. As the air emerges, it expands, thereby cooling the valves.

to elevate the rear wheel of the motorcycle. Motorcycles so equipped are being used by garages in sending one man to call for or deliver a car, a task that formerly required the services of two men. The motorcycle, with its spare wheels folded, is used to reach the car, and then the outfit, as a trailer, is attached behind the auto and towed back to the garage.

23rd Michigan Ave.
MEDDLE-PROOF CASH REGISTER HAS COMBINATION LOCK *1961*

Cash registers now are being made with combination locks, affording the store or shop owner the same personal, private control over register records as though they were locked in a safe. More than 1,000 possible combinations are available with this type of lock, which, besides preventing manipulation of figures, does away with the annoyance from losing or forgetting keys.



1973
MOTORCYCLE USED AS TRAILER HAS AUXILIARY WHEELS

Two auxiliary wheels for a standard motorcycle, when lowered to meet the ground, permit the vehicle to be towed behind an automobile, but fold up out of the way when not in use. The addi-

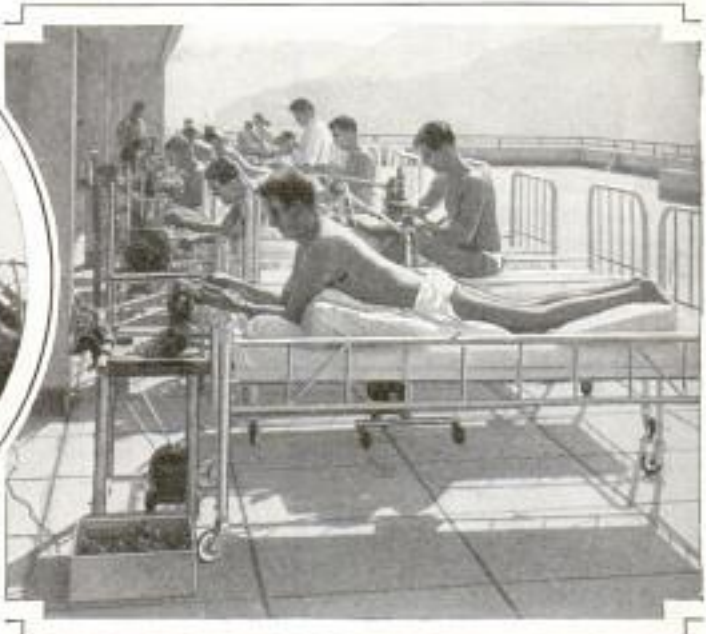
Cyclotron Company Los Angeles Calif.

National Cash Register Co., Dayton, Ohio.

Mr. A. Rolber, Leycein, Switzerland

1927

CRAFTSMANSHIP TAUGHT IN SANITARIUM AIDS CURE



Views of Swiss Sanitarium in Which Some of the Patients Are Able to Work at Useful Tasks While Taking Sun Treatments



Inmates of a Swiss sanitarium defray part of their expenses and receive beneficial exercise by doing remunerative tasks even while they are confined to their beds. Electrical connections have been arranged so that small lathes and other machines can be operated, and as the patients receive their sun and other treatments for tuberculosis and other ailments, they turn out parts of watches or other instruments, perform small machine operations and other tasks, for which they are paid. The physicians in charge have found that the exercise stimulates circulation, helps strengthen muscles and is especially helpful in keeping the sufferers in a more cheerful frame of mind than they would be if they had nothing to do. A special bed, which can be turned into a workbench with little difficulty, is one of the

devices that has made it possible to carry out the idea. The "work while being treated" system is applied to women as well as to the men. They operate knitting machines, do needlework or help manufacture small objects. All the work is under the close supervision of the doctors, and hours are carefully arranged in order to avoid undue fatigue.

NUT INSPECTOR RAISES QUALITY OF IMPORTATIONS

One of the odd government jobs in the winter is that of nut inspector. He operates under the food and drug administration and inspects foreign nuts imported into the United States. Last year, the eastern district of the administration examined about 600 importations amounting to over 21,000,000 pounds, including almonds, Brazil nuts, cashew nuts, filberts, peanuts, pistachios and walnuts. Inspection has resulted in improved quality of imported nuts and has increased public confidence in them as a food.

Contrib. John S. County
714 Jefferson, U. N. C.
Washington, D. C.

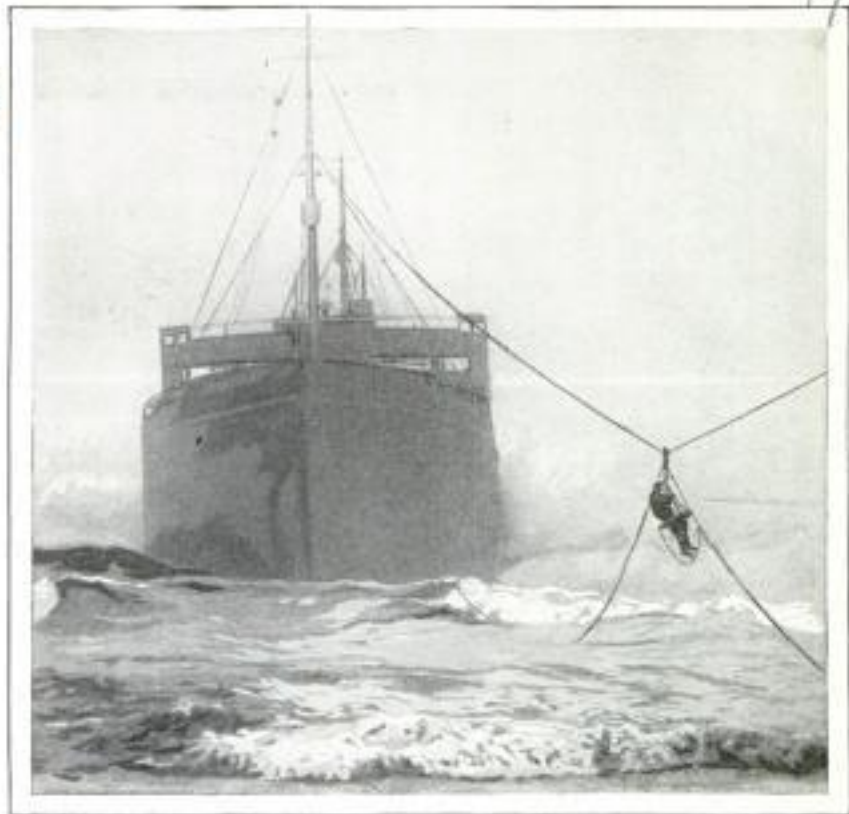
1941

TOUGHER PAPER FOR NOTES IS SOUGHT

1934

U.S. Steady 11/8/30

The small-size paper currency lasts longer than the former size, treasury officials have found, but a still better grade of paper is being sought, for the increased life of the new bills is not quite up to expectations. One-dollar notes of the large size lasted about nine months while the five-dollar denomination was good for a year or more. The average life of the new bills is only a few days longer. What is needed is a paper that will withstand much folding without breaking the grain, one that can be laundered, and yet will take the special inks required and be practical to manufacture. The new bills are not as easily counterfeited as the old, treasury officials are convinced, and the cost of circulating them has been reduced by one-third, largely because of the decrease in size and weight.



Coast Guard Coming Ashore by Means of Breeches Buoy from Ship Grounded on a Rocky Reef off the Pacific Coast

BREECHES BUOY SAVES CREW OF GROUNDED SHIP

When the tanker "Tamiahua" went on the rocks on a reef fifty miles south of San Francisco, the coast guard quickly established communication with the vessel by means of a breeches buoy. Over the cable connection from ship to shore a quartermaster with three broken ribs was carried to land for hospital treatment.

STENCIL SET FOR SHOWCARDS SAVES TIME AND MONEY

1939

Attractive signs are easily made with the help of a stencil set that produces solid characters of a number of different styles. Little or no skill is required to operate the outfit which can be used as a money maker for spare-time work.



Stencil Set Especially Adapted for Making Showcards and Sample of the Solid Letters It Prints

CONCRETE ROAD ON FLYWHEEL TESTS AUTO TIRES

1885

Automobile tires are tested under conditions approximating those met in actual service through the use of a machine on which tires are run for hundreds of miles over "roads" without leaving the laboratory. The rims of two cast-iron flywheels, eight feet in diameter, are filled with concrete. A chassis is placed in such a way that the tires rest on the concrete rims and the car is weighted to approximate a loaded auto. The driving force is applied through the rear end with the result that the tires, in revolving the concrete wheels on which they rest, encounter a resistance giving the effect of steady uphill climbing.

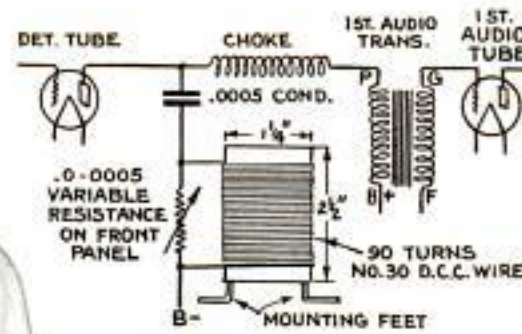
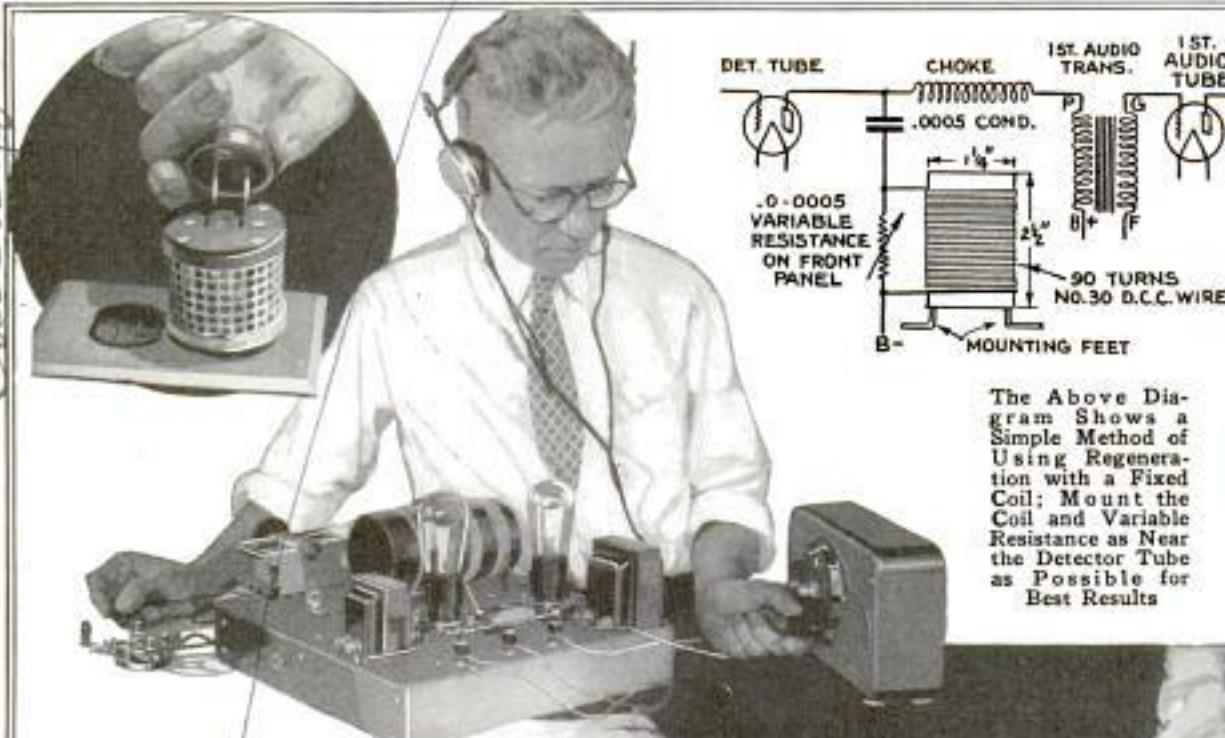
Ford Motor Co

Showcarder, Inc.
2324 University Ave. St. Paul, Minn.

TESTED TIPS FOR THE RADIO EXPERIMENTER

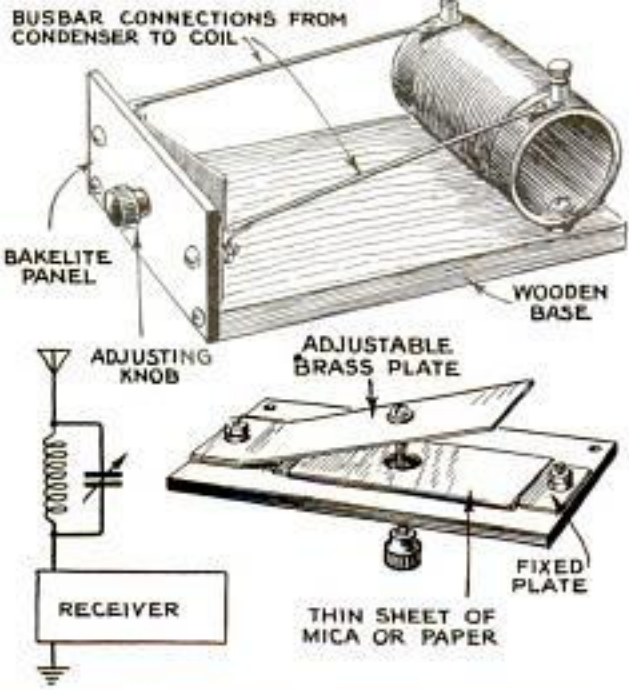
Aero Products, 4611 Ravenswood Chicago

International Resistance
Co. 2006 Chestnut
St. Paul



The Above Diagram Shows a Simple Method of Using Regeneration with a Fixed Coil; Mount the Coil and Variable Resistance as Near the Detector Tube as Possible for Best Results

Upper Left, Line-Voltage Control Device in Which the Resistance Varies in Keeping with the Fluctuating Line Voltage Instead of Employing the Usual Fixed Resistance; Above, Adjusting S-W Transmitter with a Monitor to Give Clearest Signal and Prevent Unnecessary Interference; This Device is Also Desirable to Keep Transmission within the Allotted Amateur Wave Bands and Consists of an Oscillator Employing a Type-199 Tube



Above, a Loose Outlet Plug Causing Crackling Noises in the Receiver May Be Tightened by Bending Out One Prong as Shown; Left, an Inexpensive Wavetrap or Sensitivity Control; the Coil Consists of 180 Turns of No. 30 Enamel Wire Wound on a Fiber Tube, 1 1/2 In. in Diameter and 3 1/2 In. Long; the Adjusting Screw for Moving the Condenser Plate is Threaded through the Bakelite Panel, and the Plates Approach Each Other but Never Touch, Owing to the Mica Sheet; the Brass Plates are 7/8 In. Wide and 2 1/2 In. Long; the Device is Connected in Series with the Antenna Lead to the Set as Shown; Right, Spade Lug Soldered to a Length of Busbar Wire Holds Machine Screw in Locations That are Difficult to Reach



LUG SOLDERED TO BUS WIRE

Jenkins Television Corp

370 Claremont Ave
Jersey City
N.J.

Shorter Antennas for Screen-Grid Tubes

The screen-grid tube is largely responsible for the change in antenna requirements. Many modern receivers employing these tubes are capable of receiving local programs without an antenna, or with a few feet of wire at most. These receivers, operating from a light-socket antenna plug of good design, generally have a good wide reception range.

Effect of One Bad Radio Tube

There is an erroneous impression that one or more worn-out radio tubes will have a very serious detrimental effect on transformers. This is not true, tube engineers say. They point out, however, that one or two worn-out tubes will mar the performance of the receiver, and in battery-operated sets, will adversely affect the good tubes. In these receivers, volume control is obtained largely by means of the filament rheostat. When sufficient volume is not obtained, owing to one or more poor tubes, the filament rheostat is turned up higher. This procedure increases the voltage on the good tubes and shortens their period of life. In a.c. operated sets, a somewhat different condition exists. The voltage applied to the tubes is taken care of in the design of the receiver, and the volume is controlled independently of the filament circuit. In such receivers a poor tube affects the performance, but usually does not influence the other tubes detrimentally.

Rheostat Controls Television Motor

The power rheostat shown in the photo is of the graphite compression type and is designed for providing a "stepless" control for scanning-disk motors, transmitting-tube filaments and other apparatus requiring a variable heavy-duty resistance. It is rated at 75 watts for continuous operation, and the resistance range is from 4 to 150 ohms.



Allen Bradley Mfg Co
494 Reed St
Milwaukee, Wis



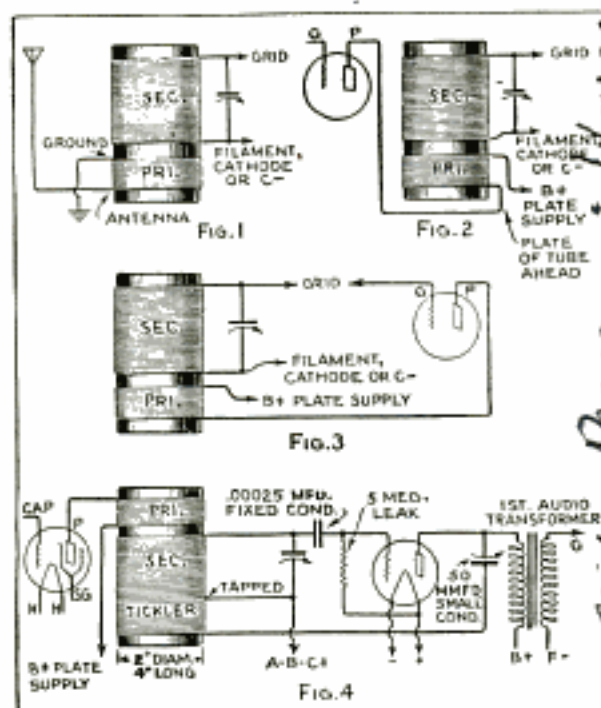
View of Completed Televisor from the Front, but without the Magnifying Lens

Home Televisor in Kit Form

For those desiring to build a radiovisor or television device, a kit now available contains all the necessary parts of the scanning unit ready for assembling and wiring, except the wood pieces for the base and the bakelite panel for the platform on which the unit is mounted. The completed televisor includes a Faraday induction motor which drives the scanning disk at synchronous speed, a motor-control rheostat, and a housing for the neon bulb. The scanning disk is obtainable in the 48, 60, 24 and 45-hole types, with corresponding rotors for the desired number of pictures per second. When employed on an a.c. power system in common with the television transmitter, practically automatic synchronization is obtained. When employed on a separate a.c. power system, this result may be achieved by manual adjustment in a relatively simple manner.

Increasing Tungar-Charger Rates

The rate of tungar, or any of the 2-amp. tube chargers, can be increased to slightly over three amperes by removing the outer shield around the transformer. This shield absorbs considerable energy, and to give your A-battery a much quicker charge, simply remove this cover and note the increase in the charging rate.—D. A. Brown, Marion, Ohio.



Correct Coil Connections for Various Purposes

Correct Connections for Homemade Coils

Winding your own coils is a simple matter, but many experimenters are puzzled when the time comes for connecting them in the circuit, and very few diagrams show this detail clearly. Fig. 1 shows the connections for the usual type of antenna coil. In Fig. 2, giving the correct connections for an r.f. transformer, it should be noted that the plate and grid connections are always on the opposite ends of the coil. When the r.f. transformer is to be used as an oscillator, the connections are made as shown in Fig. 3. To connect a coil using regeneration with a fixed tickler, follow the hookup given in Fig. 4. To make coils of this type for a .00035-mfd. condenser, use No. 28 d.c.c. wire, the primary consisting of 40 turns and the secondary of 118 turns. Tap the secondary at the 78th turn, thus making a fixed tickler coil of 40 turns. For a .0005-mfd. condenser the primary should be 40 turns and the secondary 100 turns, tapped at the 60th turn to provide a tickler coil of 40 turns. In this coil, as well as in the other coils, all windings run the same way.—Henry Laraby, New Haven, Conn.

☐ For further information on any radio construction article write to the radio department; this service is free.

*Isuarantee Radio
Isods Co
143 W. 45th St. N.Y.C.
Dynamotor Operates from Battery*

Radio owners living in rural districts where farm-lighting plants are employed have a handy means of charging A-batteries but usually depend on B-batteries for their plate supply. This group may be interested in the new dynamotors. These machines operate from a 12-volt storage battery and deliver 220 volts of direct current suitable for the operation of many standard receivers. All objectionable commutator ripple and noise are eliminated by a filter. The entire unit occupies a space less than six inches square, and the weight is correspondingly low. It is of particular value where light and power are not available.

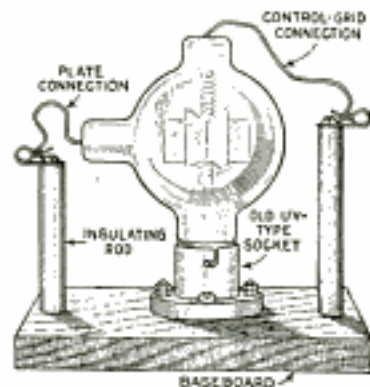
*Electrical Specialty
Co. Stamford, Conn.*

Charging the Battery While in Use

Many users of battery-type radios have discovered that they may charge the storage A-battery while the radio is in use, the only difference being a hum from the loud speaker. This practice is permissible only in cases of emergency, however. The reason for this is that if one of the battery clips develops a loose or high-resistance connection, the charger is left directly connected to the tubes and subjects them to its maximum voltage, which is too high for the tubes.

Mounting 860-Tubes

An old UV-type socket provides the necessary support for the rather large 860-tube now commonly used in many amateur radiophone sets. The socket is mounted on the baseboard in the usual manner. Fabnestock-clip connections are mounted on fiber or bakelite rods, as shown, at suitable heights for control-grid and plate leads. The filament connections are made in the socket. The grid terminal on the socket serves for the usual screen-grid connection, but the plate terminal is not used.



BUILDING PORTABLE S-W TRANSMITTER

By GILSON V. WILLETS

PART I

BEING a traveling salesman, and also an amateur wireless operator, W6EEZ, I have taught my wife the code and sufficient practical knowledge to operate a short-wave station in my home at Long Beach. Each night when I am on the road up and down the Pacific coast, I connect up a portable radio transmitter and communicate with my wife. We maintain a regular schedule and may be heard almost any evening around 7:00 p.m. (Pacific standard time) discussing family affairs.

We have started a new fad among amateur radio operators, resulting in a growing demand for efficient portable transmitters. Traveling men are usually some place where an a.c. source of supply is available; therefore, a compact portable transmitter operating from an ordinary electric-light socket is desirable. The portable set to be described is the original referred to above; the compact design is original and the assembly embodies several unique features.

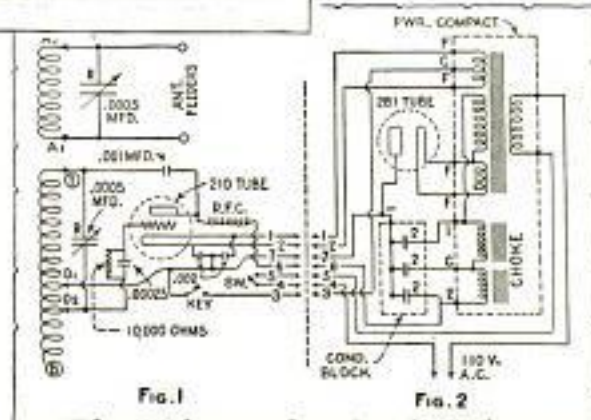
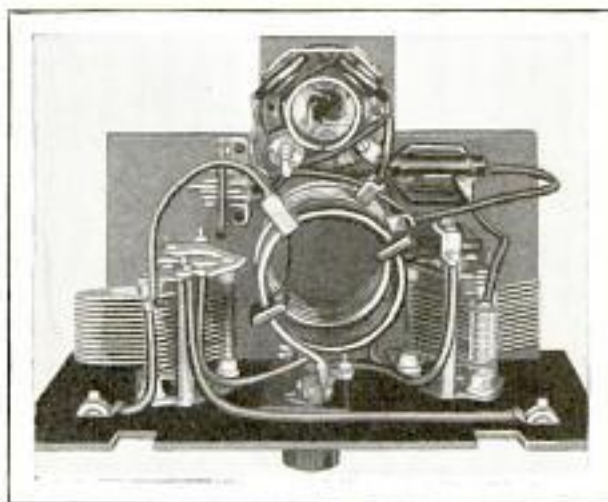
All parts are standard and easily available at a very reasonable cost. The outstanding feature of this midget transmitter is the method of dividing the power and oscillatory circuits in two separate



Mr. Willets, W6EEZ, at the Key of the Portable S-W Transmitter Described in This Article

units, either of which may be quickly removed for repairs. These units are mounted on bases of soft white-pine board, and may be instantly connected or disconnected by means of a standard 7-wire cable, plug and receptacle. The details of both units and the method of connecting are clearly shown in the photos and diagrams.

The complete transmitter is housed in a Philco



turn with it. The strip of bakelite, upon which the primary coil is mounted in a stationary position, extends up back of the rotor-coil mounting, and this assembly is held to the back of the front panel with short machine screws, terminating in stops on the front panel for the knob and pointer. The details are clearly shown in Fig. 3, but need not be followed if the builder can hit on some simpler plan.

The oscillator inductance or primary is the lower coil, shown in the simplified wiring diagram, and the lower terminal of this coil, indicated as B, is the dead end. The top terminal T is also connected by a flexible lead to the rotor

of the variable condenser. The other flexible leads terminate in clips O_1 and O_2 on this coil. Clip O_1 will go to the turn next to the top on this coil and the position of O_2 will vary somewhat near the center of the coil. These adjustments are found when tuning.

The two .002-mfd. by-pass condensers are mounted vertically with brackets directly on the filament terminals of the large UX-type socket for the type-210 tube, and are connected at the top with a narrow strip of brass, the center tap between the two being taken from the top condenser lug at the left. The grid-condenser and gridleak assembly is mounted horizontally near one side of the socket and is connected to the grid terminal of the socket with a thin strip of brass. The .001-mfd. plate-blocking condenser is mounted on the back of the .0005-mfd. oscillator-tuning condenser on the rotor side.

The r.f. choke coil is homemade and consists of about 200 turns of No. 30 s.c.c. wire wound on a small wooden bobbin, which is mounted on, and connected to, the plate terminal of the tube socket.

The 110-volt supply is controlled by a snap switch which is mounted on

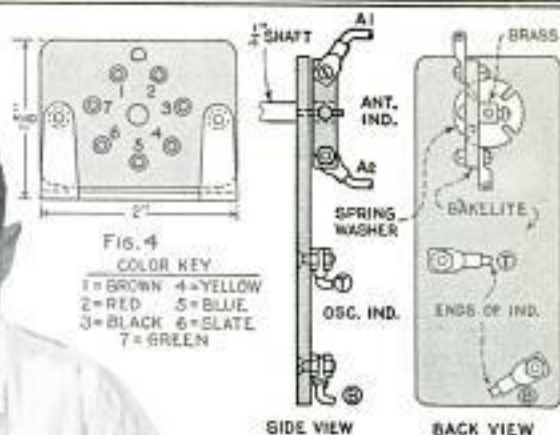


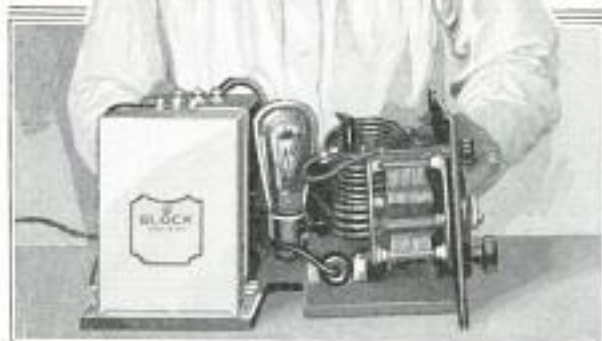
Fig. 3



FIG. 4

COLOR KEY

1 = BROWN 4 = YELLOW
2 = RED 5 = BLUE
3 = BLACK 6 = SLATE
7 = GREEN



the front panel, and two vernier dials take care of the necessary tuning.

One difficulty encountered after constructing the oscillator unit was

a vibrating of the secondary coil. To overcome this, strips of bakelite were mounted on either side of the secondary coil and firmly strapped in place. This eliminated the trouble and gave a steady signal. The strips will be noted in the simplified diagram on page 300.

The construction of the power unit is very simple; the power compact is an R210-type, and the filter block is the standard type designed for it and known as the R210-type also. This unit was chosen because it is very compact and delivers about 600 volts for the plate supply and $7\frac{1}{2}$ volts a.c. at $1\frac{1}{4}$ amp. for the rectifier filament, as well as $7\frac{1}{2}$ volts for the oscillator filament. It also contains 2 chokes rated at 30 henries each. The entire compact is indicated within the dotted lines in Fig. 2, and the condenser block is also in dotted lines in the same diagram, the negative-B terminal being common to each of the three 2-mfd. capacities.

(To Be Continued)

❑ If the volume control makes a crackling noise when adjusted, it may be quieted by rubbing a soft lead pencil over the wire and turning the knob in order to distribute the lead evenly.

Wired Pole Aids Stringing of Antenna



How the Wire Is Threaded through the Pulley to Raise the Fallen Antenna

When the rope or wire threaded through a pulley for supporting the antenna breaks, and the mast is of the usual type shown in the sketch, the owner can save himself time and labor with a simple device. Instead of dismantling the mast to get the rope back through the pulley, a light pole is provided with screweyes, spaced as shown in the sketch, and used as a guide. A fairly stiff wire is threaded through the eyes and fed through the pulley, then fastened to the rope which is pulled through and the job is completed. —E. Moffat, Van Nuys, Calif.

Testing the Selectivity of a Set

Anyone can quickly test the selectivity of a receiver by tuning in the nearest high-power local broadcasting station and observing the effect of slight detuning upon volume. For example, tune a single-control receiver to the greatest volume with the dial set exactly at the station's transmitting frequency in kilocycles (say 950) then turn the control knob right and left so that the scale reads 10 kilocycles

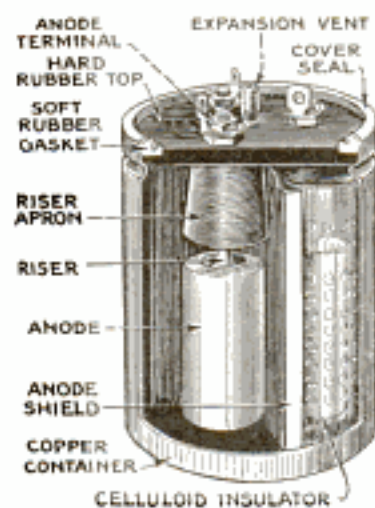
above and below that figure. If this is sufficient to tune out the local station, or to reduce its volume substantially, it indicates that the receiver is highly selective. A receiver of fair selectivity will tune out powerful stations 20 kilocycles above and below the station frequency, while a receiver which requires tuning 30 kilocycles above and below to tune out the local, would be lacking in selectivity and useless in the immediate vicinity of such stations.

Spreaders for Zeppelin Antenna

Very efficient spreaders for a Zeppelin-type transmitting antenna, can be made from glass towel rods. The small rods, about 10 in. long, that may be obtained from the 5 and 10-cent stores serve the purpose. One end of these rods is already flattened slightly; the other end may be heated with a blowtorch or over a Bunsen burner and flattened in the same manner. The rods are fastened to the feeder wires with short pieces of wire or inserted between the strands, if the usual stranded antenna wire is used and then held in position with a loop of wire twisted around the feeder above and below the rod.

This Condenser Repairs Itself

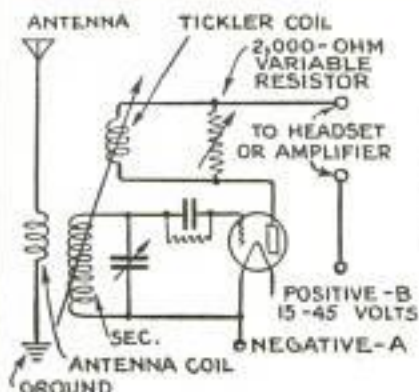
The sketch shows a sectional view of an electrolytic condenser now available for use in filter circuits which is immune to damage from high-voltage surges. Because of its large capacity, this type of filter condenser improves the filtering



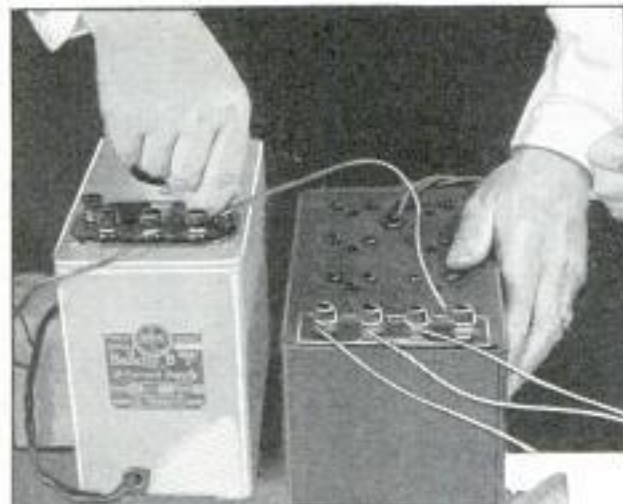
of the power pack, which results in a considerable reduction of hum. Single units have positive terminals at the top or bottom as desired, with capacities of 8 or 18 mfd. Multiple units have positive terminals at the top and may be obtained in either double or triple-unit styles.

*Amrad Corp
Medford Hillside
Mass*

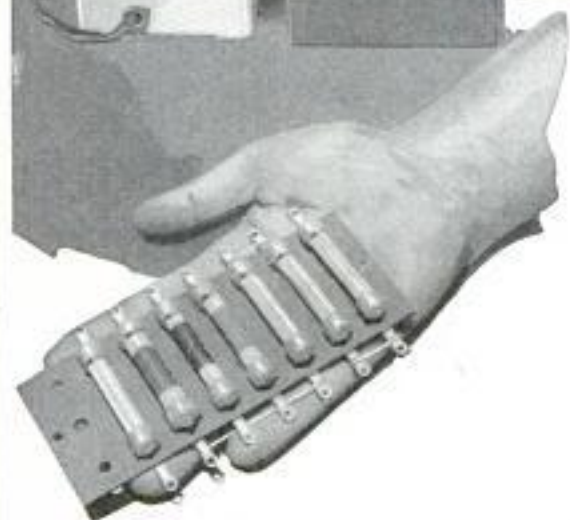
HELPFUL HINTS AND KINKS FROM THE RADIO LAB.



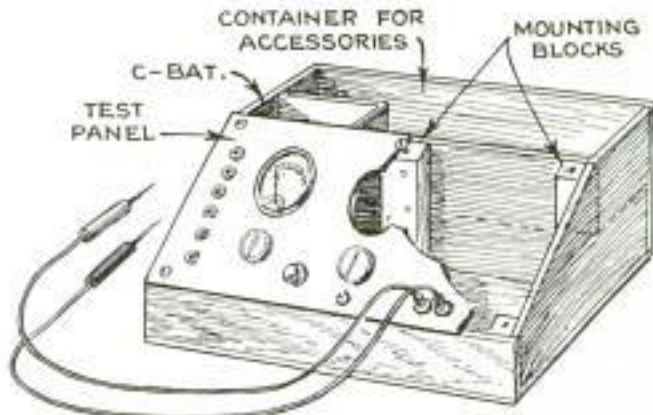
Above, a Simple Regeneration Control for Short-Wave Receivers That Consists of a Non-Inductive 2,000-Ohm Variable Resistance Connected Directly across the Tickler Coil as Shown; a Graphite or Carbon Resistance Unit Is Best for This Purpose and Provides a Smooth and Non-Critical Adjustment; This Does Away with the Usual Variable Tickler, Which Does Not Maintain Its Adjustment



Above, Midget Dynamic Speakers Are Now Available for Use in Mantel-Type and Auto Receivers or Any Installation Requiring a Small Unit with a High Degree of Efficiency; Standard Types Are Supplied with Push-Pull Transformer and for 90 to 110-Volt Direct-Current Operation; Left, Connecting Two B-Eliminators in Series to Obtain Higher Voltages; the Positive Terminal of One Is Connected to the Negative of the Next, and the Maximum Voltage Is Then Obtained from the Negative of the First and the High Positive of the Second; Check with a High-Resistance Voltmeter before Making Connections to the Receiver



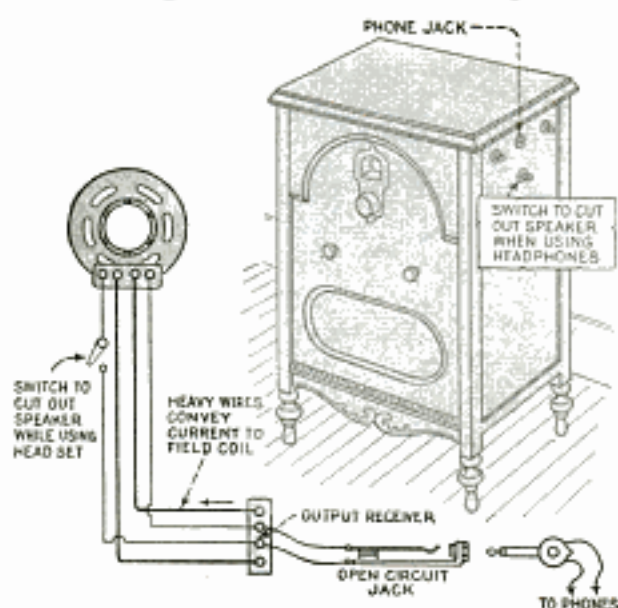
Above, Gang Type-Resistors for Use Where Compact Construction Is Required; Right, a Homemade Test Case for the Bench with Compartments for Tools and Accessories; the Dimensions Are Not Given as They Will Vary with Individual Requirements



International Radio Co.
 Malden, Mass.
 6607
 J. Laromie, Chicago

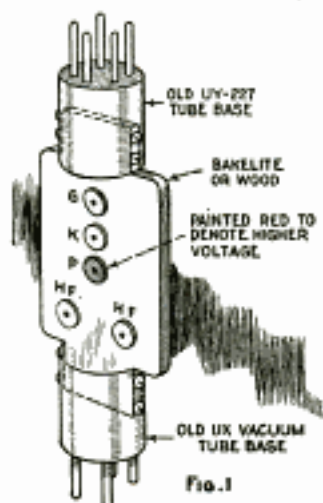
International Resistance Co.
 2006 Chestnut, Philadelphia

Connecting Phones or Remote Speakers



Left, Wiring Diagram between Set Output and Speaker; Right, Jack and Switch Mounted on Cabinet

A very simple method of connecting phones or remote speakers, and one that may be easily altered to suit receivers employing dynamic speakers, is shown in the sketch at the left. First locate the output terminal strip on the chassis. The correct terminal to which the phone jack should be connected, is quickly found with headphones while the set is in operation. The open-circuit jack is then connected across these posts without disturbing the original wiring. In most cases these terminals will have black wires connected to them. Trace one of these wires to a point near where it is connected to the speaker and cut the lead for a small switch to be used to cut out the speaker when the headphones are to be employed. The heavy wires indicated in the diagram are usually red and convey current to the speaker field coil. These are not disturbed. The switch and phone jack are mounted on the side of the cabinet, as shown at the left. Those desiring an additional speaker in another room need only



Left, Testing Device Showing Method of Mounting the Tube Bases; Right, Diagram of Connections

plug such speakers into the jack and extend the leads as required.—Robert Macgregor, Bridgeport, Conn.

Black-and-White Television Pictures

Instead of pink-and-black images, which some seem to find objectionable, the latest television development from the DeForest laboratories is black-and-white pictures, produced by a new type of gas-filled, highly responsive source of white light. Not only are these pictures said to be more realistic, but, due to the greater contrast between shadows and high lights, far better detail is obtained.

Handy Universal Trouble Finder

This testing device is well worth the few minutes it takes to make it. As a universal trouble finder, the writer has found it very useful. The terminals mounted on the wood or bakelite form (see Fig. 1) may be either binding posts or midget jacks of the cord-tip type, and are connected as shown in Fig. 2. For testing voltages in the different stages of the set, remove the tube from the socket and plug in either the UX or UY-end according to the type of tube employed; for grid-voltage test, connect the voltmeter from G to F posts in d.c. sets and G to K in a.c. sets. For testing plate voltage, connect from P to F in d.c. sets or P to K in a.c. sets for type-227 tubes. For filament voltage, test from HF to HF, using either a d.c. or a.c. meter according to the type of tube. To test the audio-amplification stages, connect headphones from G to F in a d.c. set or G to K in a set

where the type-227 tube is used. If the audio circuits are all right thus far, the normal signal will be heard in the phones, and if no sound is heard there is an open in between. Tests may be made in the first audio-tube socket and all succeeding stages.—Ross J. Plaisted, Brecksville, Ohio.

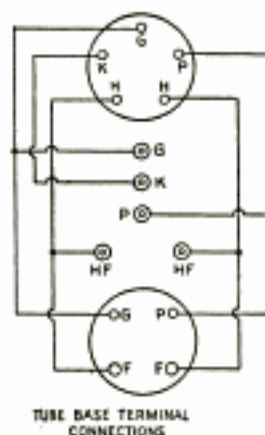


Fig. 2

A Compact Speaker For Your Car

By Henry Hoyle

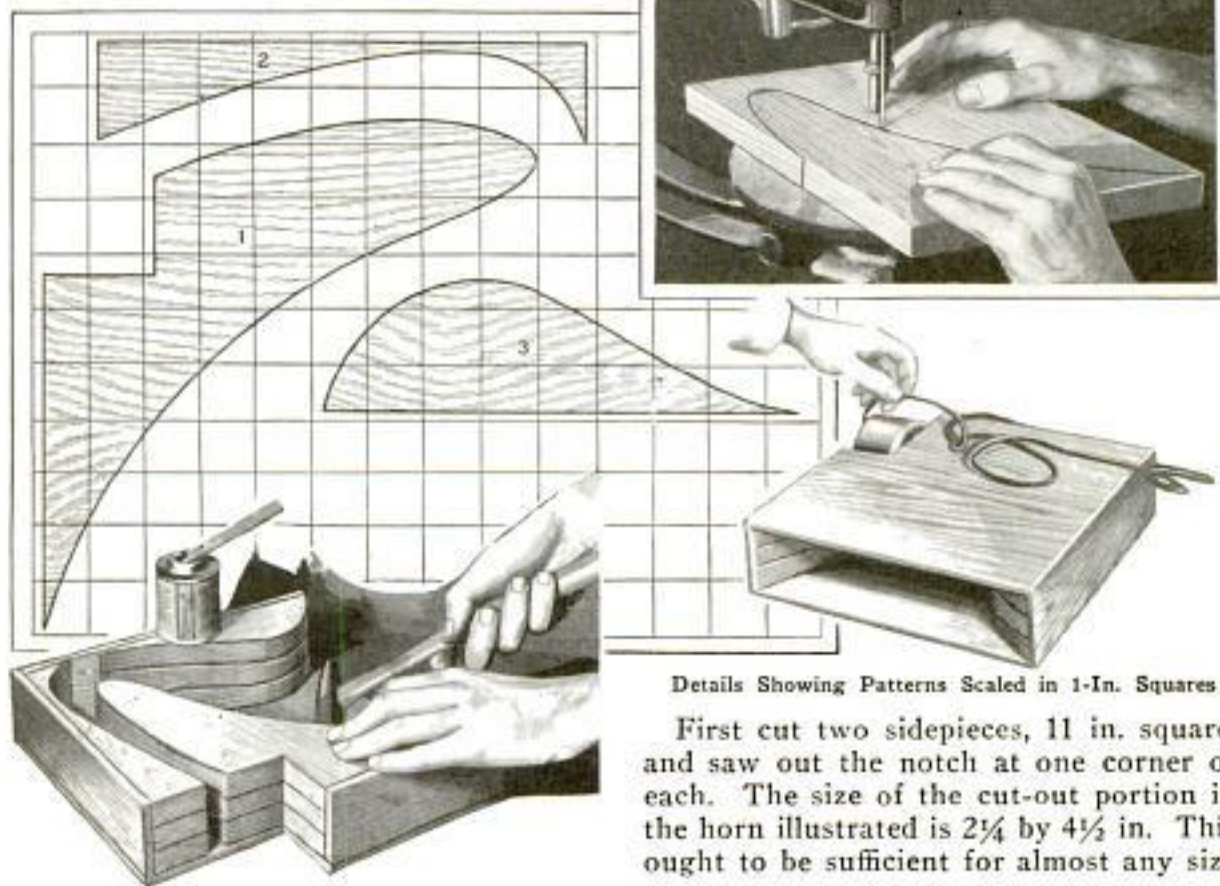
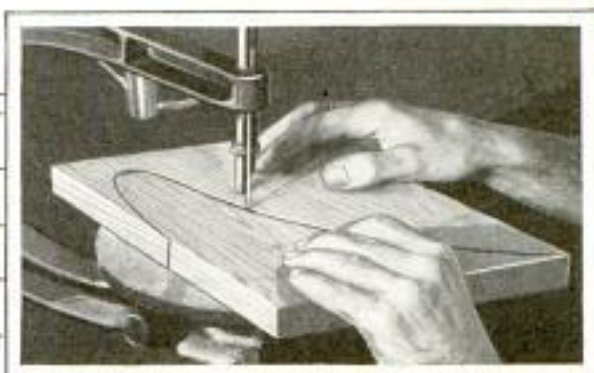
NOW that automobile radio receivers and other small portable or semi-portable sets are gaining in popularity, the problem of providing a loud speaker that is satisfactory from a quality standpoint, and at the same time is of small size, becomes important.

A cone speaker can be used in connection with an automobile set, but often the change of humidity of the air plays tricks with it. A horn is immune to moisture, and is at the same time inexpensive, the unit being the principal item of cost, that is, if you build your own horn—a task not at all difficult.

The speaker illustrated was built for use in the space behind the dashboard of a car. It consists of a balanced-armature

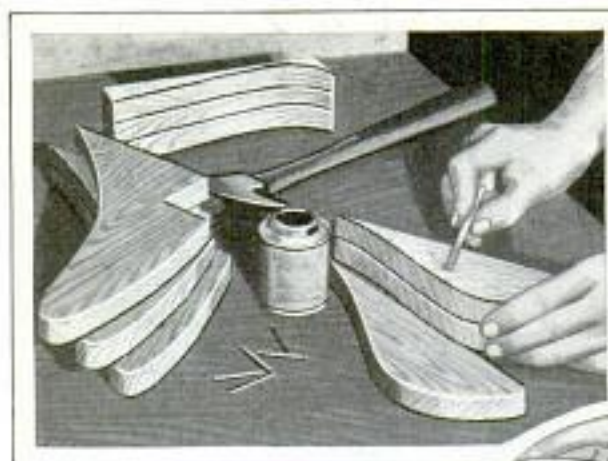


horn unit, and a curved exponential, or air-column, horn built up of pieces of wood cut to shape on a jig or band saw. Outside dimensions of the horn are approximately 11 by 11 by 3 $\frac{3}{8}$ in. A notch is formed at one corner to receive the speaker unit, although this can be omitted and the unit fastened to the outside surface.



Details Showing Patterns Scaled in 1-In. Squares

First cut two sidepieces, 11 in. square, and saw out the notch at one corner of each. The size of the cut-out portion in the horn illustrated is 2 $\frac{1}{4}$ by 4 $\frac{1}{2}$ in. This ought to be sufficient for almost any size



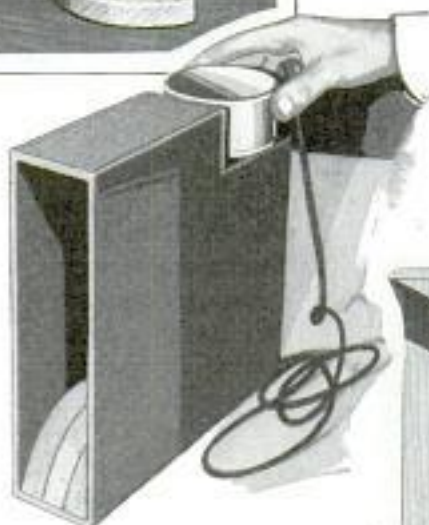
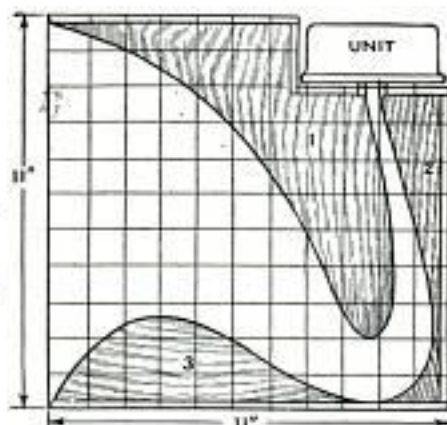
of speaker unit. Next lay out the irregular-shaped patterns on the stock from which they are to be cut. There are three of these pieces, shown in Figs. 1, 2, and 3, page 305. If you have facilities and material, you can cut each from one thickness of wood.

But more likely you will have to form them from 1-in. stock, three or four layers being necessary, depending on the ultimate thickness of the horn. Cut one piece first, and then use it as a pattern for marking and cutting the remainder. Or you can glue the stock together and make but one cut, this being the better method if you have the tools to do it properly.

If you have cut the sections from 1-in. material, assemble the piles by gluing and nailing. In fact, as you put the speaker together, glue and nail firmly each joint, so that possibility of vibration in the wrong place will be avoided.

Sandpaper the curved surfaces of the built-up horn sections, and give each two or three coats of shellac, sandpapering between each. Next cut the strips that form the edge of the box, leaving, of course, one side open for a sound outlet. These pieces can be $\frac{1}{4}$ in. thick and as wide as the built-up irregular pieces are thick. Glue and nail the strips to one of the square sides, and then fasten the three built-up blocks in place so that they form the horn. Shellac the surface of each of the two

sidepieces where they cover the horn space. In the larger piece of wood that covers the surface of the notch, bore a hole of sufficient size to allow the loud-speaker unit to be screwed into it, the



Assembly Details and Photo of Completed Speaker Ready for Installing in the Auto

threads engaging the wood sufficiently to hold the unit firmly. Be sure that this hole comes opposite the small end of the horn. Finally, fasten the remaining side in place, and finish the entire speaker by painting, lacquering or covering with leatherette or similar material.

This speaker will work nicely with a simple well-shielded auto receiver, employing the new 2-volt tubes and additional features that will appear in early issues of Popular Mechanics Magazine. The sound is clear-cut, and the tone-range, while not including the extremely low notes because of the restricted size, satisfactory. In fact, a speaker of this rather high-pitched type gives better results in a car because the upholstery and limited air space have the effect of lowering the tone to a more natural pitch.

AMATEUR MECHANICS



Artistic Wall Plaques of Hammered Brass

By A. C. ULLRICH

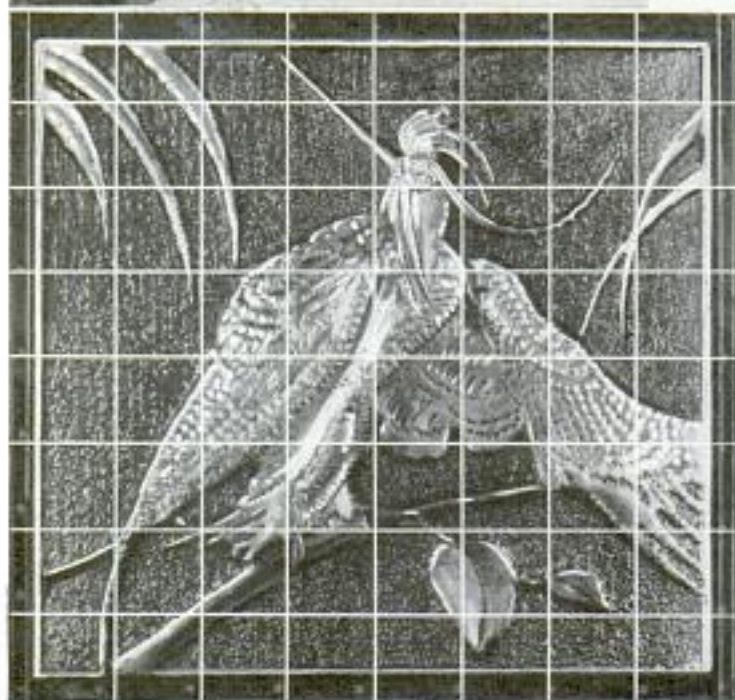
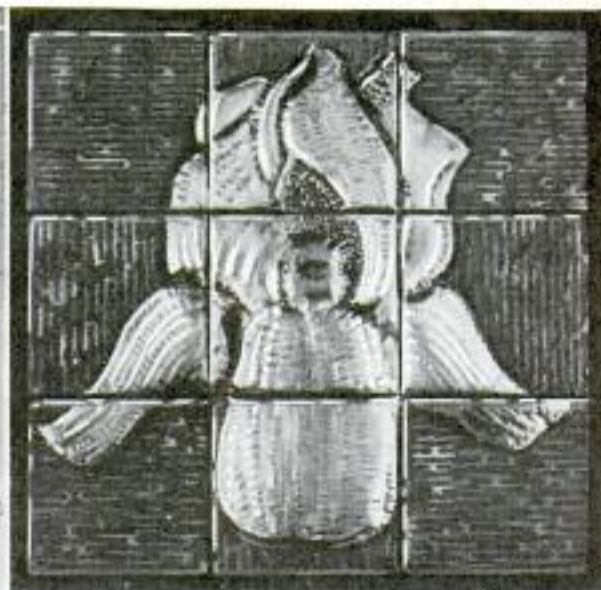
ATTRACTIVE plaques that make excellent wall decorations and at the same time furnish an unlimited choice of design, will have a strong appeal to the average home craftsman. Although the finished work looks quite intricate, it is really an easy matter to make them. Thin sheet brass, copper and aluminum are suitable for the purpose. Besides ornamental objects, more practical things, such as door panels, name plates, initials, house numbers, etc., can be made by this process, and for the pictorial effects almost

any kind of design that suits the maker can be used, including flowers, animals, birds and even photos of persons, the latter furnishing the basis for highly attractive silhouettes.

The only tools needed for doing this kind of



Hammering Sheet-Metal Plaques Is an Interesting Pastime, Much Easier than Generally Believed, and Productive of Some Highly Attractive Effects



After Painting, the High Spots Should Be Wiped Off to Expose the Bare Metal, and the Surface Is Then Varnished

work are a few nails, about $3\frac{1}{2}$ in. long, some brads, and a light hammer. The sheet metal should be about 35-gauge and is cut about $\frac{1}{4}$ in. larger than the design all around, to leave a border through which the finished plaque can be tacked to a wooden base. A temporary base of soft wood is used while hammering, the edges of the sheet metal being fastened to it with $\frac{1}{2}$ -in. brads. There should be no knots in this piece. The nails used for punching or marking are

ground down at the ends to various sizes as shown in the detail, and, for convenience in working, they may be set in short pieces of broomstick after the head has been cut off. However, plain nails without handles are just as good. Three of the tools were ground down to $\frac{1}{32}$, $\frac{1}{16}$ and $\frac{1}{8}$ in., respectively, while a fourth was ground down flat but not to a smaller diameter than the thickness of the nail. The sharp edges of the working ends should be carefully filed and made perfectly smooth with emery paper, as the slightest file marks and scratches on the ends of the tools will be transferred to the surface of the metal when hammering. In use, the $\frac{1}{32}$ -in. punch is handy for tracing and other fine tooling, the $\frac{1}{16}$ -in. punch for backgrounds

and grooving, the $\frac{1}{8}$ -in. punch for hammering or raising the metal, while the full-size punch is suitable for raising the metal and making coarse backgrounds. One must, of course, be careful when hammering, not to punch through the metal, which is more easily done with the smaller punches than with the larger ones.

The first thing to do in hammering out a plaque is to outline the design and border with the smallest punch so that it can just be seen on the reverse side. This is

done while the metal is held on the temporary soft-wood base with two brads. After tracing the entire design, remove the metal from the base and turn it upside down so that you can hammer from the other side, thus raising certain portions of the design on the front. A separate soft-wood block may be used as a base when this reverse hammering is done, or, in some cases, it will be found better to use a heavy piece of wall insulation or even ordinary wallboard. Also, instead of hammering out a border, it may be found better to press it out by means of a round punch, as this method will not leave any tool marks, which are usually not wanted in the border itself. After the various portions have been raised, at least to some extent, the metal is again tacked to the temporary base, and the details of the design and the background can be hammered in. When this has been finished, it may be a good idea in many instances to turn the plaque over once more to go over the raised portions carefully, for, while doing the other work on the face, the edges of the raised portions are sometimes accidentally flattened out against the background.

Coloring gives the finishing touches to the plaques, but before doing this, they must be mounted on a permanent wooden base, the edges of which may be beveled. First clean the surface thoroughly with a fine grade of steel wool or metal polish, the latter being preferable as it will not scratch the surface; then apply the colors, for which oilpaint will be found suitable. The high spots of the metal can be wiped clean for effect. As soon as the paint has dried, apply a coat of varnish to prevent the bare metal from tarnishing and to impart an even gloss to the entire surface. Another method of coloring copper and brass is with the use of chemicals. Black can be obtained by applying a solution of liver of sulphur in a very small amount of water, or by soaking a wadded rag and rubbing this over a piece of liver of sulphur and then rubbing the metal surface. A verdigris finish for brass and copper can be obtained by mixing some salt in a small quantity of ordinary vinegar and applying this to the metal, leaving the solution standing on the surface for some time.

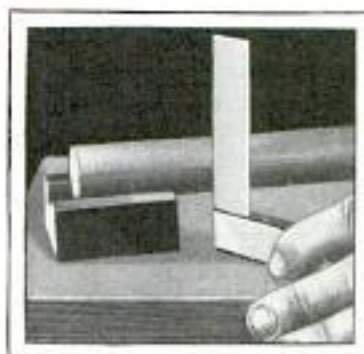


Stippled Backgrounds in Various Colors Add to the Beauty of These Plaques

Two plaques shown in the illustrations are divided into squares each representing 1 sq. in. If you like to make these, first lay off the 1-in. squares in actual size exactly as shown, and then it will be an easy matter to draw in the design.

Steel Square for Marking Shafts

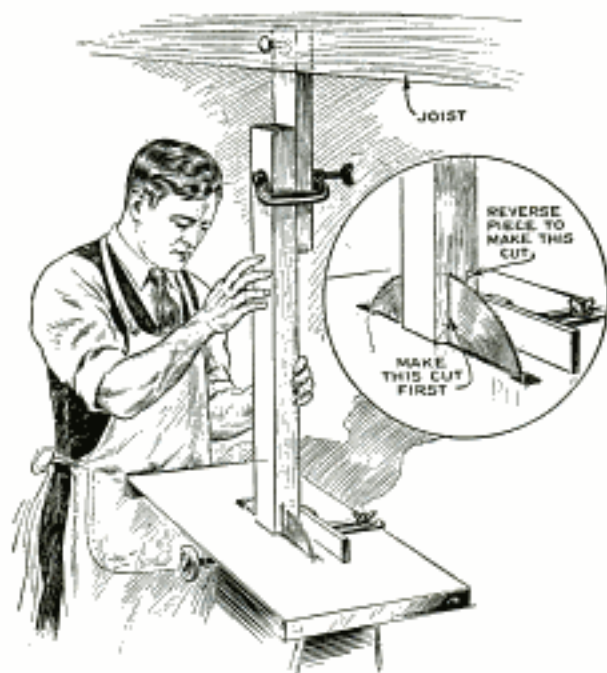
For scribing lines on opposite sides of a shaft, a square, used as shown in the illustration, will often be found more convenient than a surface gauge. Apply chalk or bluestone (copper sulphate) to the surface in the usual way, put the shaft in two V-blocks and set the square on the surface plate at a slight angle against the work to get a better mark. Then, by drawing the square along the shaft on



each side, two lines will be scribed exactly opposite each other, as the edge of square marks through the chalk or bluestone. This method saves much time at

no expense in accuracy.—Harry Moore, Hamilton, Can.

Sawing Joints on Home Woodworking Outfits



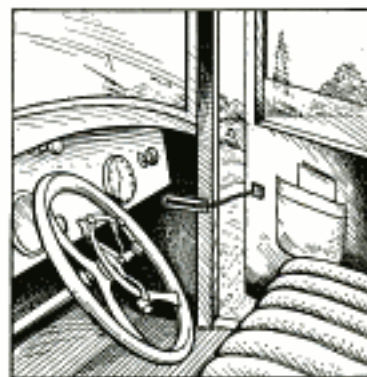
Pivoting Long Pieces to a Joist Above Enables Worker to Cut Slots and Tenons with Small Saw

Seemingly impossible operations are often within the scope of the average motor-driven woodworking outfit in use in many home shops. Slots and tenons in the ends of framing to make lock joints can be cut with it. The low fence of the average saw makes it practically impossible to hold a 5 or 6-ft. board in a perpendicular position while the cuts for a lap joint or tenon are being made through the lower end. However, to do this job quickly and accurately, the method illustrated has been found convenient. The fence is set at the correct distance to make the cut for one side of the slot or tenon. From one side of a joist directly above the saw, and running in the same direction as the rip fence, a plumb line is dropped so that the point of the bob rests on the edge of the face of the fence, at one end. The plumb line is then moved along the fence of the joist and the other end of the fence lined up. Thus the side of the joist is accurately in line with the face of the fence. A piece of 2 by 4-in. stock, having a straight edge, is pivoted to the side of the joist as indicated, the pivot being directly over the center of the saw blade. A large nail, driven in not too snugly, serves well as a pivot. The piece to be cut is clamped to the right-hand face

of the pivoted piece so that the lower end just slides on the saw table. Make the cut, holding the piece firmly against the fence. If the fence has been properly set, the piece can be reversed on the pivoted member and the other side of the slot or tenon cut in the same way. This method gives the top of the cut a slight curvature as the piece swings on the pivot above, but if the depth of the cut has been set just a shade under the exact depth required, this will be straightened out when the crosscut is made for the tenon, or the chisel cut in the case of a slot. The length of the pivoted member may be proportioned to the length of the piece to be cut, but on all jobs an overlap of at least 1 ft. should be allowed. If the swinging piece is long enough to come within an inch or two of the fence, pieces of almost any size can be cut. The swinging piece can be hooked up when not in use. In setting the fence for the slot or tenon cut, it is well to set it so that the cut will be made on the side of the slot or tenon farthest from the fence, reversing the work for the second cut.—A. V. Comings, Philadelphia, Pa.

Ventilating Closed Cars

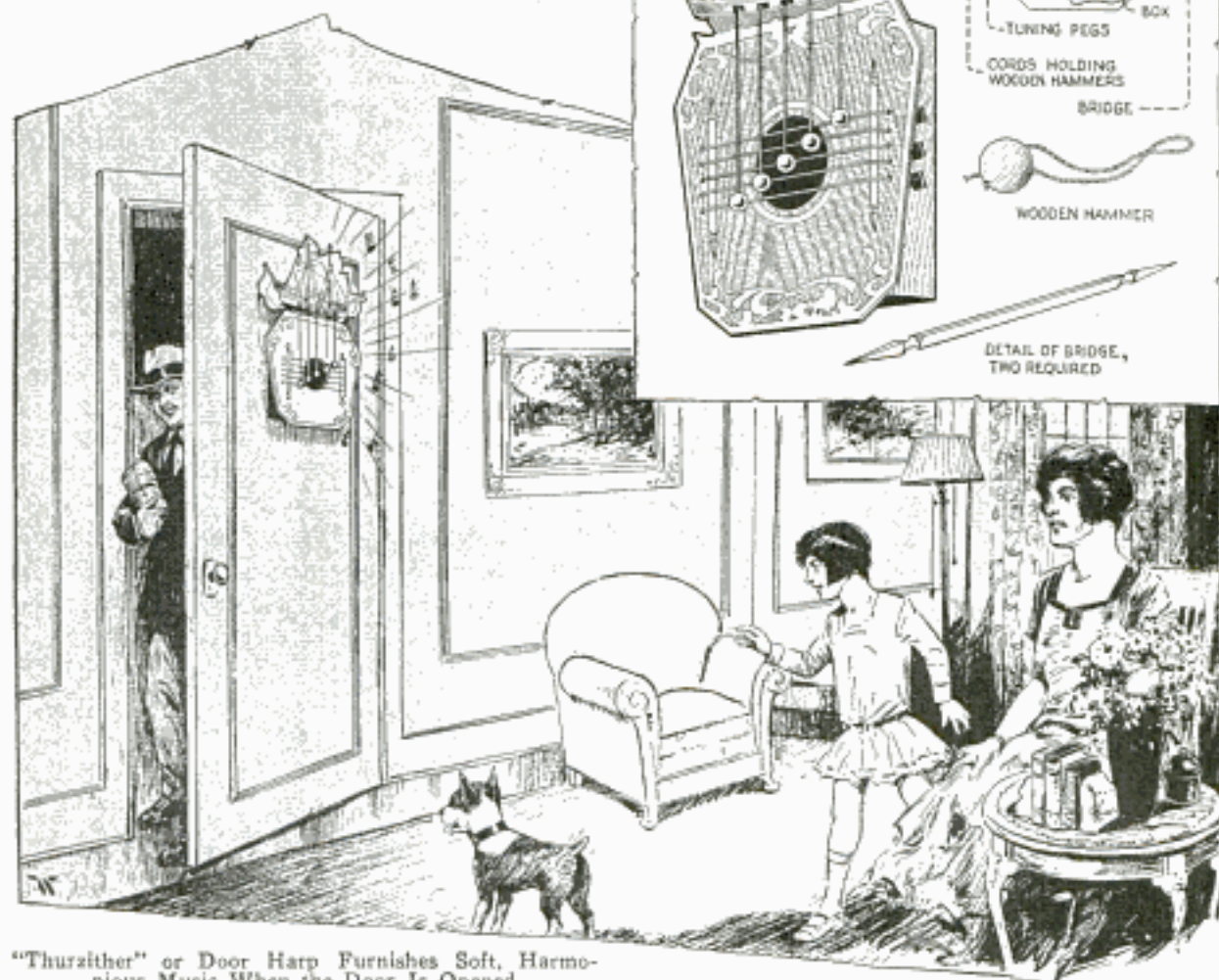
On automobiles where the door opens toward the front it is an easy matter to obtain ventilation while driving by installing an ordinary door chain of the kind indicated, which can be had at any hardware store. With the use of such a chain the door will be held open a few inches which permits it to catch plenty of air and at the same time prevents it from swinging open entirely.—J. A. Swank, Dayton, Ohio.



When erasing a sheet of typewritten copy, always slide the roller over toward one side to prevent particles from falling into the mechanism of the typewriter.

DOOR HARP IS PLEASANT NOVELTY FOR THE HOME

To many travelers in Germany and Switzerland, the door harps or "Thurzithers," which are hung on the doors of inns and taverns, are a pleasant surprise. These harps give forth music whenever the door is opened. Upon entering a



"Thurzither" or Door Harp Furnishes Soft, Harmonious Music When the Door Is Opened

tavern, soft music, resembling the mellow strum of a mandolin, greets the ears, the melody seeming to come from everywhere. Although some of these musical novelties may be very elaborate in construction, they can easily be made at home. It is possible to make one from a cigar box. Nail the cover down and cut a sound hole in the center of the cover. Glue down two strips of wood for bridges on the front, near the edges, one on each side of the sound hole. Next whittle five tuning pegs and drill holes for them in the sides, as shown in the detail, so that three pegs will be on one side of the instrument and two on the other, allowing a maximum space for manipulation of the pegs. String the harp with violin or mandolin strings.

Nail a $\frac{1}{2}$ -in. square strip of wood horizontally across the face of the box, near the top. Tack five pieces of string on this support, about $\frac{3}{4}$ in. apart. String a wooden bead to the bottom of each cord. The cords should be of varying lengths so that each bead strikes only one string. The varying lengths of the cords cause the beads to swing at different amplitudes so that one note succeeds another. More elaborate door harps may be made by removing the cigar-box cover and replacing it with a large panel of the same thickness. The panel should be large enough to conceal the sound box completely. In this case the strings are led to the pegs through holes drilled in the panel. The harp will stay in tune for a

long time if the peg points are sprinkled with a little powdered rosin, so that they will not slip. For a soft, sweet tone that is deep and resonant, make the harp from a large, deep cigar box and use violin D-strings. For a louder tone, use a shallower box and use mandolin D or A-strings.—Alexander Brown, Toledo, Ohio.

Automatic Lock Holds Windows Open



In houses where the windows are not balanced with sash weights, the problem of finding some object of suitable size to hold the window up is one of the minor but very frequent annoyances with which the busy housewife has to contend. To overcome

this, the lock shown in the drawing has been found highly useful. The window has merely to be lifted to the desired height and then released, which will cause the device to fall against the sash frame and hold it securely. The detail shows exactly how this lock is cut from a piece of sheet metal, drilled near one end and then bent. To release the window, raise it a little and with the free hand swing the holder clear of the sash frame and let the window down easily.

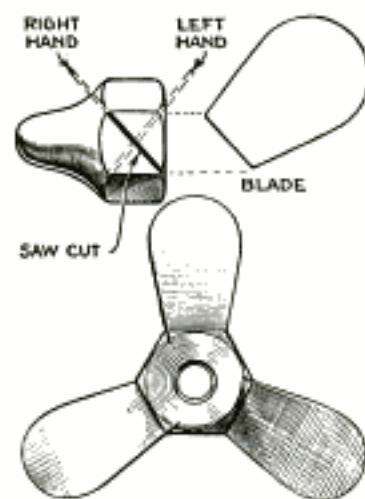
Tips for the Amateur Photographer

Many solutions are affected by light and it is not always easy to obtain amber-colored bottles in which to keep them, especially if large containers are needed. Black lacquer applied to ordinary glass vessels or jars has been found an even better protection than the amber color. Paper labels on bottles are easily washed off and quickly made illegible from drops

of solution getting on them. Adhesive tape is superior to paper and can be labeled with either pen or pencil. A strip of adhesive tape is also handy for graduating bottles. For example, if you wish to put 32 oz. of liquid in a bottle, measure this amount out carefully, place the bottle on a level surface and then stick the tape on the side, so that the top edge comes even with the surface of the liquid. When it is required to make up the same amount some other time, just fill the bottle up to the top edge of the tape. Corks in wide-necked bottles soon break and then the bottles cannot be properly closed so that they are air-tight. It will be found much better to use rubber plugs made for lavatory basins, which can be obtained in various sizes at a small cost. As they are equipped with a ring it is easy to insert or remove them. Washing prints is often done in the home bathtub. When transferring the prints from one dish to another, each print must be held up to drain the water. This is a tedious task and the following method will be found much more convenient: Just stick the prints to the side of the tub. They will adhere immediately and, by the time you have placed the last print on the tub the first one will be well drained.—F. A. Shrimpton, Toronto, Can.

Easy Method of Making Model Propellers

For model-boat propellers a very simple construction is shown in the illustration. Get a brass hexagon nut and saw a groove diagonally across three sides as shown. Blades are cut from



a piece of sheet metal of such thickness that it will fit snugly in the slots. It is then an easy matter to sweat the blades in the grooves. To obtain a still finer adjustment of pitch than is given by the

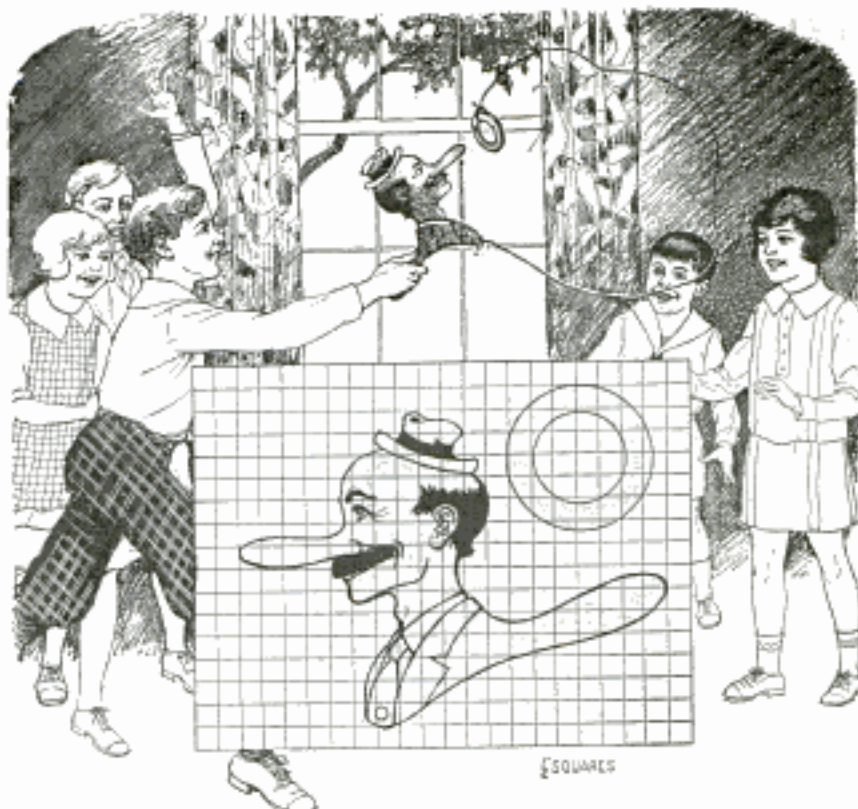
diagonal slots, merely bend the blades over a trifle. The nut must, of course, fit on the end of the driveshaft, which is threaded for the purpose.—P. H. Stanley, San Francisco, Calif.

Installing Extra Horns on Ford Cars

An additional horn, having one or two terminals to which the wires are connected, can be installed anywhere on your Ford. The wires from the present horn are merely extended by splicing additional lengths to their ends. A horn having only one terminal can be connected to a two-terminal horn if the extra horn is mounted on an insulating bracket. In this case, one of the two wires is connected to the single terminal, while the other goes to the horn case. As an insulating bracket is rather difficult to attach to the tie-rod between the front fenders, it will be found easier to install it under the hood on the left side of the frame ahead of the steering gear. A wood block will serve the purpose. When installing a horn, it is best to reverse the connections in order to discover in which way the horn will work best.—E. T. Gunderson, Jr., Humboldt, Iowa.

"Ring-My-Nose" Toy Provides Indoor Amusement

Although a ring target in the form of a face with a nose of extraordinary dimensions is not entirely new, the toy described here is different in that it combines the elements of the usual ring toss and cup and ball. The coat which forms part of the target is elongated at the rear, forming a handle. The exact shape can be laid out from the cross-section drawing, whose divisions represent $\frac{1}{2}$ -in. squares. The scarf pin is drilled out large enough to form a tie hole for the cord. The nose should have the sharp edges rounded off



Ring, Attached with Strong Cord to Target, Is Thrown Out and Caught on the Projecting Nose

with a rasp, and the whole head is carefully sandpapered before applying the paint. The head is painted flesh color, with the nose tipped in red. The features are outlined with black, while the eyes are painted blue. The collar is white, the tie green, and the coat black. A green hat with a black band makes a good contrast. The ring can be cut from $\frac{1}{4}$ -in. three-ply veneer or a wooden curtain ring will serve the purpose. The ring is fastened with a strong cord about 2 ft. long. If the cord is too long the game will be too difficult and if it is too short the ring can be caught too easily. The exact length should be determined by experiment in the hands of a child for whom it is intended. To use the toy, hold it by the handle and with a sweeping motion toss the ring into the air and try to catch it on the nose. With patient practice skill in the game soon is acquired. In competitive use, a score may be kept, striking the ring with the head, for instance, counting one; hanging it on the hat, three, and catching it on the nose, five.—Herbert C. McKay, Brooklyn, N. Y.

Wooden candles for mantel candlesticks are just as good-looking as tallow candles but are not affected by heat.

"ROAMER" A Cruiser

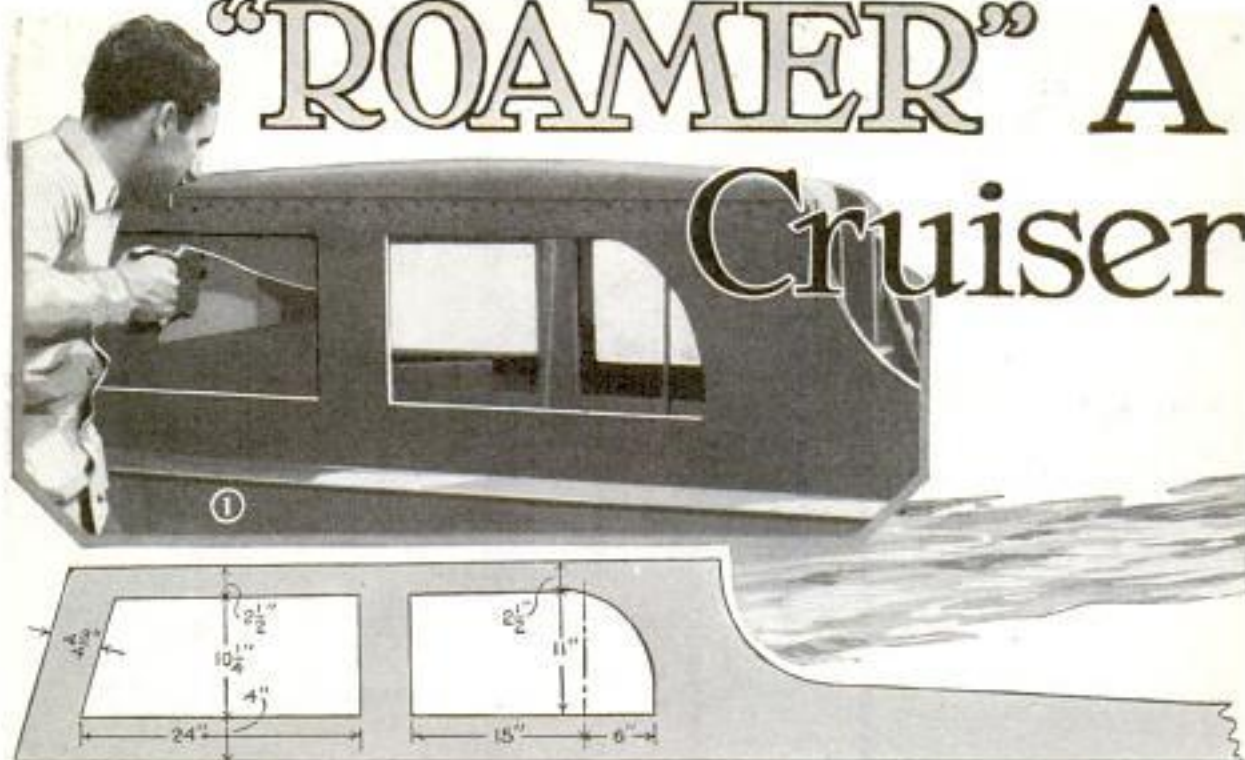


FIG. 2 OPENINGS FOR WINDOWS

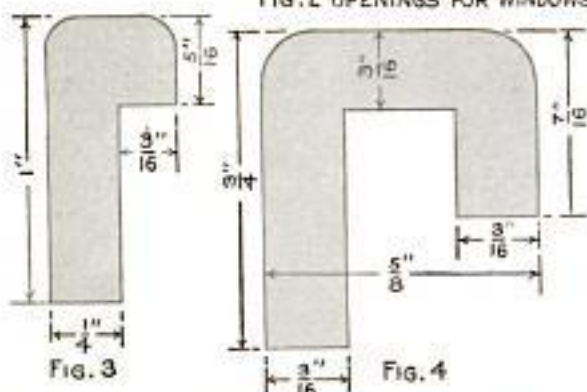


Fig. 3

Fig. 4



WELL, here we are on the "last long mile." The beginning of the end starts with the cutting of the cabin windows. These are to be cut in each side-wall of the cabin according to the diagram shown in Fig. 2, and in the manner shown in Fig. 1, using a wood bit to start the opening in each corner and then joining the holes with a saw.

Molded strips of mahogany are necessary for the window trim, and these strips will probably have to be cut out at the local lumber mill unless you own one of the small woodworking machines now so popular. At any rate, you will need about 23 ft. of the shape shown in Fig. 3, and 23 ft. shaped as in Fig. 4. Pieces of the Fig. 3 shape are neatly mitered to fit the edge of each window opening, being inserted from the outside and screw-fastened to the cabin sides, as shown in Fig. 5. The curved pieces for the after edge of the rear windows must be thoroughly steamed before they can be fitted into place.

The inside trim strips, Fig. 4, are likewise mitered to fit, but the top and bottom piece of each window must be shaped in a long curve on one edge in order to fit the glass. Here's the idea: You have a cabin side which is considerably curved fore and aft, especially at the forward end. You cannot expect the double-strength

Speedy Outboard

Part 5

by Sam Brown



glass to take this curve, so you put the curve on the wood and let the glass go its own straight way. Look at Fig. 6. It shows how the bottom piece of one window is shaped before fitting. The long lip A of the molding is what you must cut. Consider, now, the same piece fitted into the window, as in Fig. 7; it is pressed against the cabin side, and, consequently, takes the same curve. You will notice, in Fig. 8, that the curved lip straightens out, giving a straight edge on which to back the glass. The actual amount of "curve" on each piece can easily be found by fitting the strips into the window frames, and then marking a straight line across the face of the piece to represent the "glass line."

Putting the glass in the window frames is quite simple. Each of the panes should be set in seam composition and then fastened permanently into place with light strips of window molding on the outside. Fig. 9 shows one of the forward windows completed. Fig. 10 is a detail section of the same window and trim.

Unusual as it may seem, you start putting on the roof by taking part of the roof out entirely. That is, you will saw off each inside (door end) of the rear cabin pieces so that they will be $\frac{7}{8}$ in. in from the face of the door trim. The center portion of each of the three cabin beams immediately forward are then sawed out in line with the ends of the rear cabin pieces, to make the opening shown in Fig. 11. Two temporary lengths of $\frac{7}{8}$ -in. lumber are used to face the ends of the cut

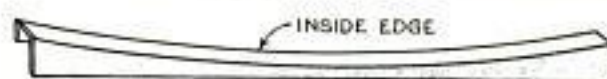


Fig. 8
DETAIL OF WINDOWS

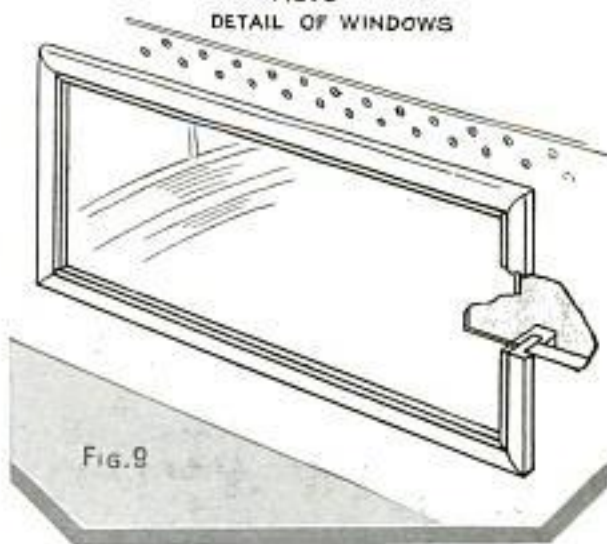
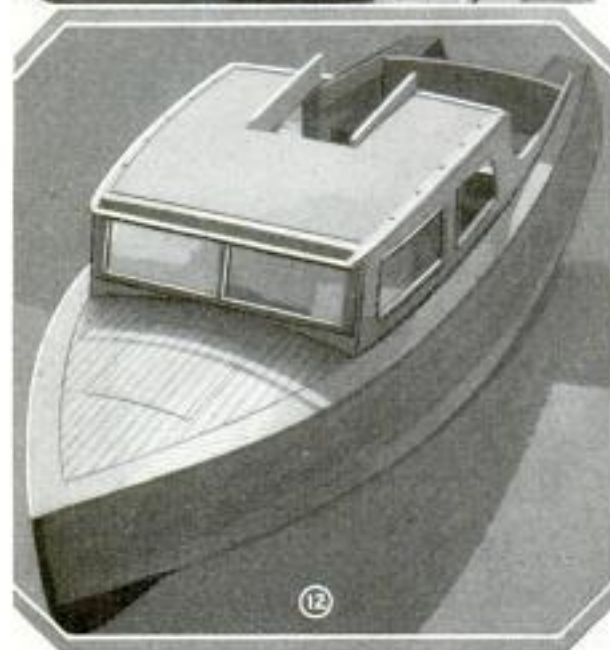
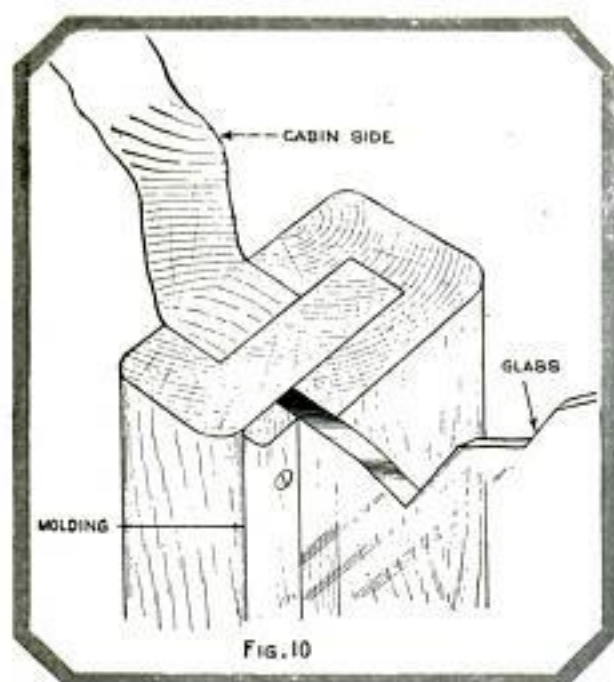


Fig. 9



beams, as shown in Fig. 12; and the cabin top is nailed into position. Composition wood fiberboard is used, the three pieces necessary being fitted into place according to the photograph.

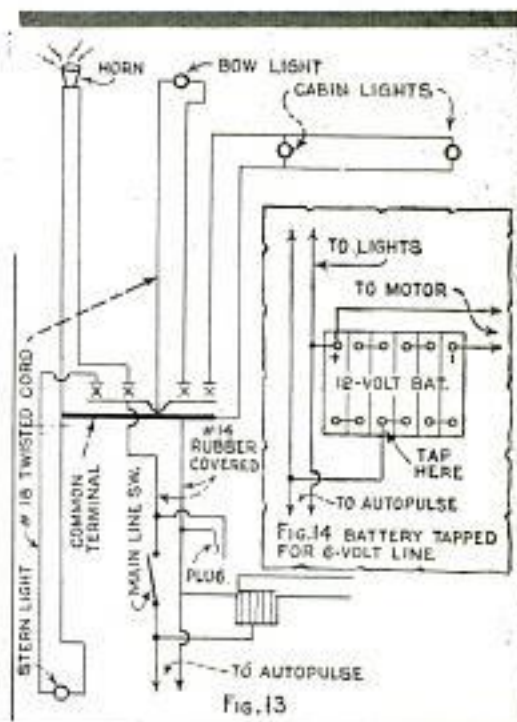
Leaving the cabin top for the time being, let's consider the wiring system of "Roamer." Fig. 13 gives the schematic diagram. The battery is to be located in the starboard (right) locker compartment. This should be a 12-volt battery, to handle one of the large electric starting motors. Holes are cut in the side of the motor well to allow the passage of two wire cables to connect the battery to the motor. All other battery-operated accessories on the boat need but 6 volts, so you will tap just half of the voltage of the battery to furnish current for these parts, as shown in Fig. 14. This 6-volt line is carried forward under the coaming to a common terminal on the inside of the cabin immediately below the steering-wheel shaft. The control switches are located immediately above the common terminal, but are mounted on the outside of the cabin, directly above the steering-wheel post. From the common terminal and from the switches are run the various wires which lead to the lights and to the horn. "Roamer" uses two cabin lights of the small wall type found in sedan automobiles. A hole is chiseled into each of the center cabin supports and the light let in. Necessarily, the wires will be run through grooves cut on the face of the center cabin support. These supports are to be faced later with light pieces of veneer, so don't get the impression that this is going to spoil the interior appearance of your boat.

The wires for the starboard cabin light are run across the roof over the main beam. A slight gap should, therefore, be left in the composition roofing to take these wires. The wires for the electric horn, which is to be mounted atop the cabin, are run up the face of the forward upright. Notice in the schematic diagram that a plug for a "trouble light" is installed inside the battery compartment; also notice the main-line switch which cuts off everything except the motor. Pay a dollar or two to have the wiring put in if you are not familiar with the job.

Before going back to the roofing business, let's consider five or six little jobs

which must be done. The first of these consists of putting in a curved strip of 3-in. wide mahogany to face the end of the deck which juts into the cabin, as shown in Fig. 15. This strip should be screw-fastened. In the same photograph, you can see the top of the quarter-round piece which finishes the lower inside edge of the windshield frame. This is likewise screwed in place. With this piece of quarter-round in place, you can calk the cabin sides. This consists of driving eight or ten strands of cotton wicking into the seam between the cabin side and the boat deck, as shown in Fig. 16. A blunt chisel makes a good calking tool. The calking process should continue entirely around the cabin. Lengths of $\frac{1}{2}$ -in. quarter-round are then fitted around the seam, to give a finished appearance. Regardless of the intended finish of your boat, these strips look best painted red; and to that end they should be but temporarily fastened in order to obtain a fit, and then removed for painting.

Metal strips must be fitted along the top edges of the coaming pieces, as shown in Fig. 17. A very good substitute for the expensive brass half oval which is commonly used for yachts, is the aluminum coping band which is used around the bodies of all closed-type automobiles. If you are striving to cut expenses, it is worth while to purchase a quantity of this from your local junk dealer or auto wrecker. The original nails in the coping should be punched out, and the holes countersunk to take 1-in. No. 6 screws. A length of the



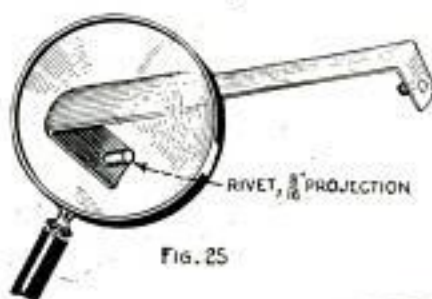
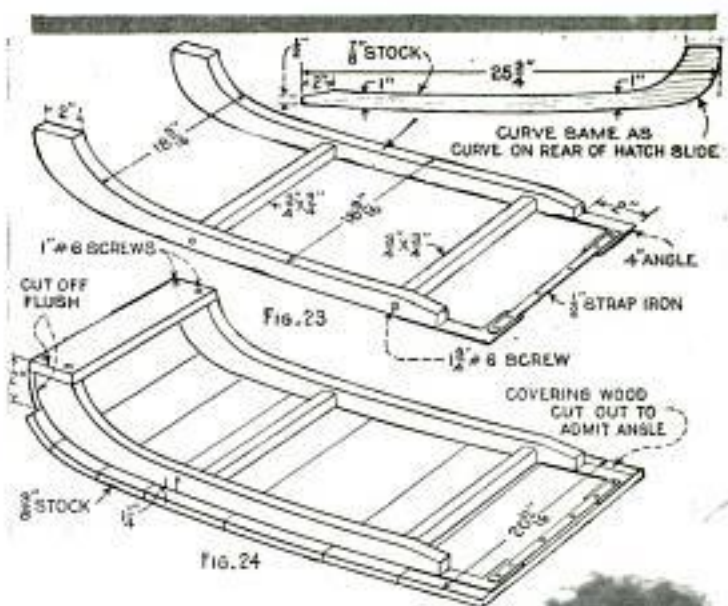
is fitted with two pieces of wood, fastened together as shown in Fig. 21, and then wedged between the hatch slides at the position shown by the section in Fig. 22, immediately behind the main cabin beam. The topping extends up to the riser strip on this piece.

That completes the hatch slide. Making the hatch cover is a matter of a wood and metal framework, as shown in Fig. 23, which is then covered with wood, as in Fig. 24. You will notice that all but 2 in. of this covering extends $1\frac{1}{4}$ in. beyond the hatch-lid framework. In other words, the hatch framework should fit snugly between the hatch slides, while the ends of the wood covering pieces should come flush with the outside edges of the metal strips which top the slides. Lengths of $\frac{1}{2}$ -in. wide strap iron, fitted with rivets at either end, as shown in Fig. 25, and shaped to fit, are screw-fastened into notches cut across the hatch lid at either end, as shown in Fig. 26. The rivets on these pieces are meant to catch under the lips of the hatch coping strips, as shown in Fig. 27.

The hatch lid is, of course, covered with topping like the remainder of the roof, and should be fitted with a handle at the rear end. All of the rubbing edges of the hatch lid and slide may be faced with thin lengths of brass, but this is not absolutely necessary.

A word about steering: Fig. 28 shows how the cables are installed from the steering-wheel drum to the motor. Double and single sheaves are used to carry the tiller cables as indicated. Detailed information about rigging the lines can be obtained from the company furnishing your motor or steering equipment.

You will, naturally, have the rear seat upholstered, and a cushion or cushions made to fit. These should be of leather, kapok-filled, and should be made with straps in order that they may qualify as life preservers. The double cushions for



the bunks are made on the same order. Looking into the cabin, Fig. 29, you get a good idea of how the bunks should appear. Notice, too, in this photograph, that the floor is covered with linoleum, and that the loose plank down the center is faced all around with brass edging strips.

A feed line must be carried from the large gasoline tank under the seat to the motor. This usually calls for an "autopulse" fuel pump which can be mounted in the battery compartment. The feed line should be provided at some point along its length with a quick-action joint to allow ready uncoupling in case the motor is to be removed. Air holes, fitted with fine brass screening, should be drilled in the

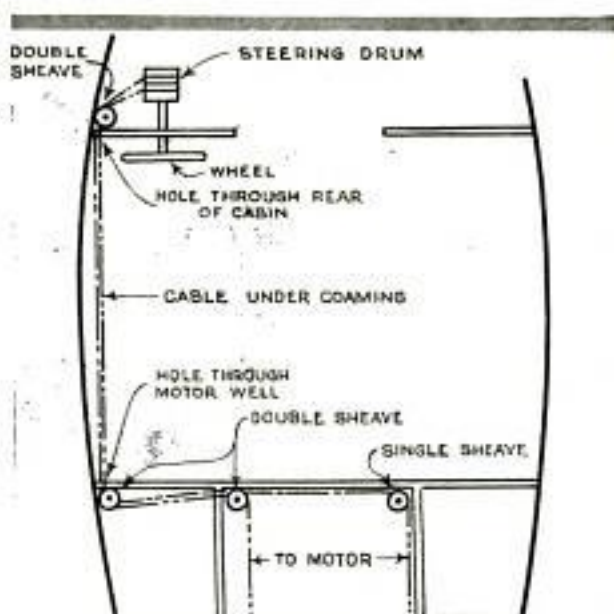
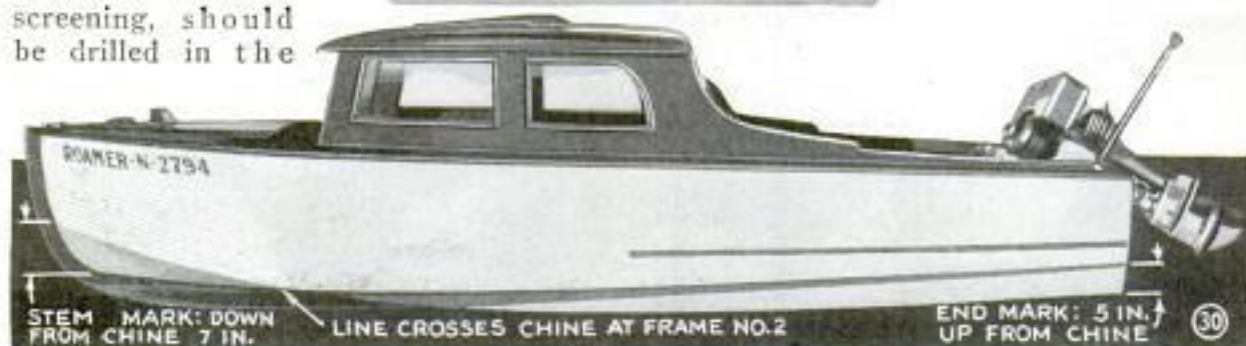


Fig. 28



29



STEM MARK: DOWN FROM CHINE 7 IN.

LINE CROSSES CHINE AT FRAME NO. 2

END MARK: 5 IN. UP FROM CHINE

30

transom board to carry away fumes rising from the surging gasoline in the tank.

"Roamer" looks best painted white. The original craft has four coats of green bottom paint up to the waterline. The sides were given two coats of white lead and oil, then two coats of white lead and turpentine. The latter mixture is somewhat chalky and washes away slowly,

son, fender streaks are necessary along the upper edge of the planking. These are 1½-in. half-round mahogany, and, since they are not subjected to as much wear as the rub streaks, need not be metal-faced. Because these fender streaks mark the division of white siding and varnished deck, they should not be put on until the painting is finished.

making the boat remain clean-looking.

Before grabbing a brush, however, the waterline must be carefully laid out according to the marks shown in Fig. 30. A chalked line, drawn tight, and snapped through the three points will give you an accurate waterline for painting purposes, the actual waterline being 2 in. below this. Rub streaks, of 1-in. square wood, 7 ft. long, must be fastened to each side of the boat at the rear, 6 in. above the painted waterline. These pieces must be metal-faced and can be seen in Fig. 30. Obviously, the purpose of the rub streaks is to protect the sides of the boat when the craft is riding at anchor alongside a pier. For a similar rea-

Going back to the paint, the deck and cabin should be finished natural with three coats of spar varnish. Oil stain may be used if you wish to darken the wood. The cabin interior looks best painted cream, with trim of natural-finish mahogany. As mentioned before, some of this trim is the $\frac{3}{8}$ -in. mahogany paneling which is used to face the cabin up-rights.

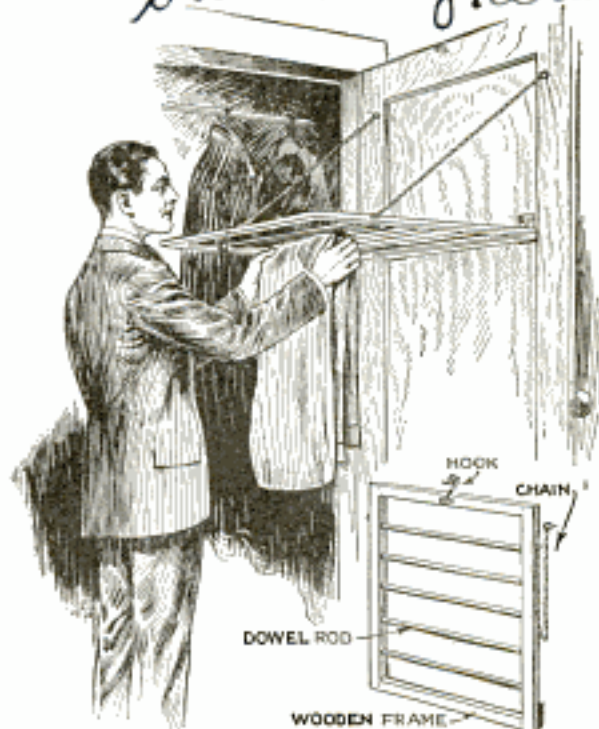
The nose, that is, the stem, can be finished in a number of ways. Some protection, of course, is necessary since the bare wood would rapidly split off from constant bumpings. Metal noses can be purchased in nickel, brass or copper from various concerns, but are quite expensive. The cheapest way to do the job, and one which is quite effective, consists in capping the stem with a strip of $\frac{1}{2}$ -in. brass half-oval. This is securely screwed to the forward edge of the stem and carried about 6 in. under the keel.

As to equipment, the law requires that a boat of this size should carry a combination red-and-green light forward, a white light aft, a means of extinguishing burning gasoline, life preservers for all passengers, a whistle or horn, two sets of pilot rules and a number. The pilot rules and the number can be obtained free of charge by writing the collector of customs at the port nearest your home town. Full equipment is not necessary when operating on small inland rivers and lakes. Play safe, however, by getting the pilot-rule book and reading up on the subject.

In addition to this compulsory equipment, you should carry a pair of oars, with the oarlocks mounted on the top edge of the coaming. Two chocks should be fastened at the forward end of the deck, with a large cleat immediately behind them. Two smaller cleats, one on either side at the rear, are also necessary. Various other gadgets may be added if expense is immaterial. And that's all.

Trouser Holder Utilizes Waste Space of Closet

In homes where the bedroom closet space is rather limited, the illustrated trouser holder, which folds against the closet door, will be found useful. It consists of a square frame having a number



This Hanger for Trousers Fits Snugly against the Closet Door

of dowel-rod crosspieces, which fit in holes drilled in the side members. The whole is hinged to the closet door as indicated so that it can be swung upward permitting the door to be opened and closed. Two lengths of light brass chain are attached to both the door and the holder to prevent it from dropping lower than a horizontal position, and, when folded, is securely held in the vertical position by means of a hook.—Wm. P. Mack, Chicago.

Tumbler for Honing Razor Blade



Double-edge razor blades can be honed on the inside surface of an ordinary tumbler, as shown in the illustration. The tumbler should be about 3 in. in

diameter and free from defects, which might spoil the blade. I have used the same blade for over a year and its edge is still in good condition.—Henry N. Grenier, N. Cambridge, Mass.



These Plywood Monkeys Can Be Hung in an Endless Variety of Positions

Plywood Monkeys Prove Amusing

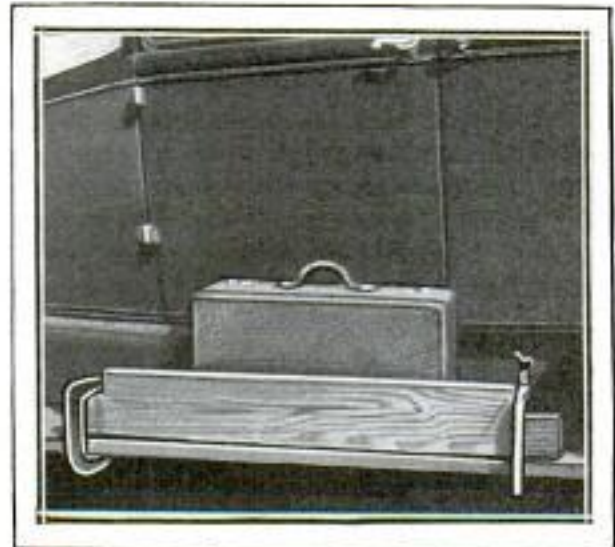
Capable of being arranged in a variety of positions, the plywood monkeys shown in the illustrations, afford considerable amusement. While the drawing gives a good form for the figures, other forms can readily be developed. A suggested variation is to place a cap on the head, the cap tapering into a hook corresponding to the tail hook. Plywood, $\frac{1}{4}$ in. in thickness, has been found suitable for cutting these figures, which is done by means of a jig or scrollsaw. The hands should form hooks at an angle of less than 90° with the forearm. The ankles should be less than 45° , while the tails form a full hook. The bodies are given a coat of brown, and, when this is dry, the trunks are painted in various bright colors, while the eyes are white and the mouths bright red. The support used for hanging the monkeys can be made of brass curtain rod, about $\frac{1}{8}$ in. in diameter and 16 or 18 in. high, having the upper end bent at right angles for about $\frac{1}{2}$ in.—H. C. McKay, Brooklyn, N. Y.

Photo of Watch with Objects Keeps Record of Exposure

When copying it is often desired to keep a record of the exposure. Instead of marking this on the negative you will find it much easier to place a watch next to the print being copied, which will show the exact length of time in seconds or minutes that the print was exposed. The arc covered by the second hand during the exposure will be blurred and thus plainly visible. This is also true of the minute hand in a longer exposure, although exposures of several minutes are seldom needed. Of course, the part of the negative showing the watch is not reprinted.—F. H. English, Springfield, Mo.

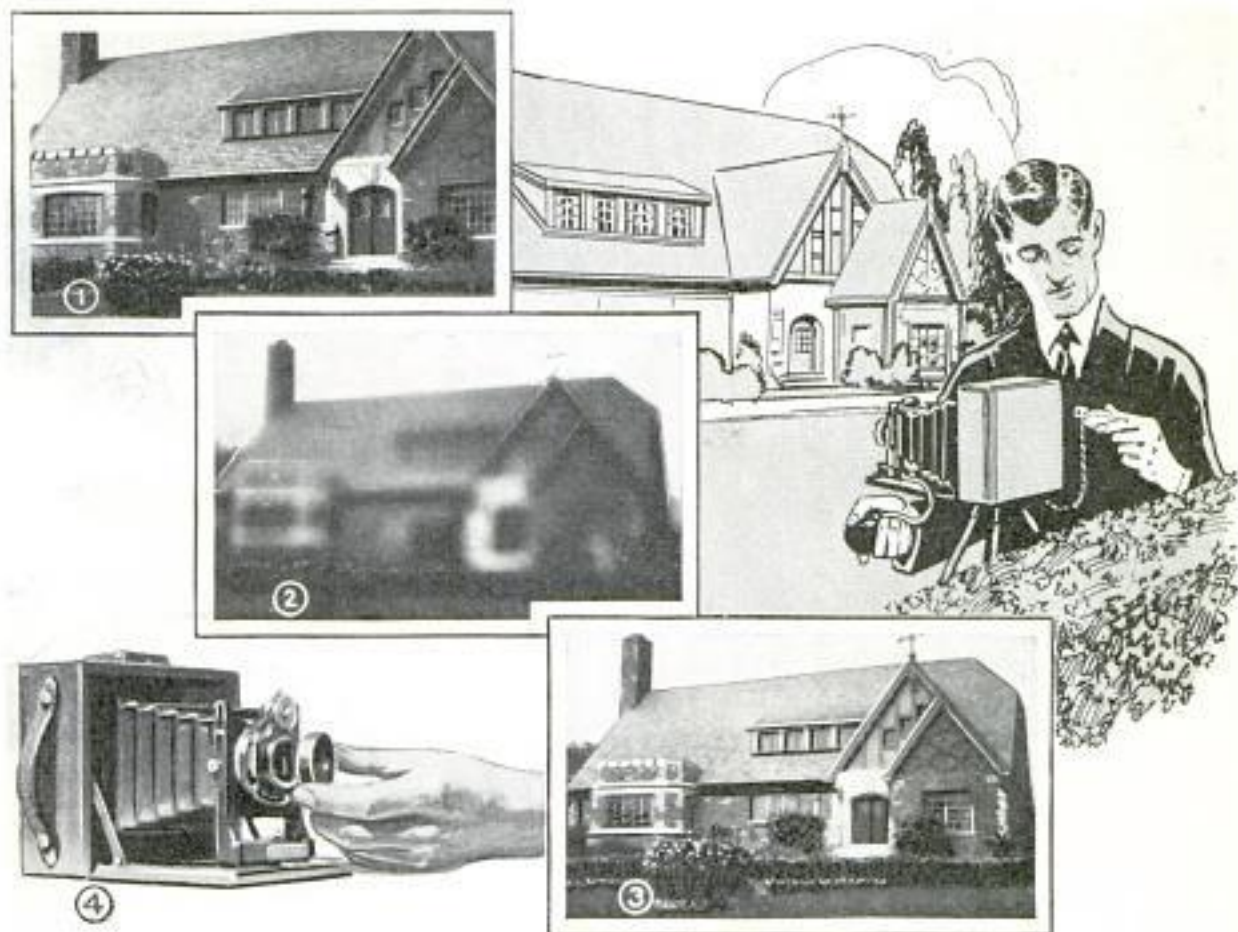
Emergency Luggage Carrier

When you need a running-board luggage carrier in a hurry and do not wish to go to the expense of purchasing one, get a 6-in. board, about 1 in. wide and as long as the running board. Cut out two corners on the same side of the board thereby reducing the width of the ends and permitting C-clamps to be used as shown in the photo. The clamps hold the board edgewise on the running board. The screw end of the clamps should, of course, project upward. It is surprising how securely a board can be clamped in this way, and if the clamps are kept tight, there will be no danger of the board coming off.—Myron L. Harmon, South Bend, Ind.



Two C-Clamps and a One-Inch Board Make a Handy Luggage Carrier for Your Car

CAMERA WITH PINHOLE CAP TAKES LARGE PHOTOS



The House in Photo 1 Could Not Be Taken in Full with the Lens at Hand; Photo 3 Shows the View Obtained with the Pinhole Cap

When it is impossible to place the camera far enough from an object to get it entirely on the film when in focus, as in Fig. 1, and the photographer has no wide-angle lens handy or does not wish to purchase one, the simple trick of using a pinhole cap over the lens will overcome the difficulty. Any snug-fitting paper cap is satisfactory. With a needle, about $1\frac{1}{2}$ times as thick as an ordinary pin, punch a hole in the exact center of the cap. The

object to be photographed is then focused on the ground glass until the whole of it can be seen, but very hazy as in Fig. 2. Then slip the pinhole cap over the lens, Fig. 4, and make the exposure, which will come out clear and distinct as shown in Fig. 3. When making a photo by this method, allow from 4 to 6 times the normal exposure for stop F.64 or from 8 to 12 times the normal exposure for stop F.32, etc.—K. F. Keith, Chicago.

Ashes on Clay Soil Grow Sweet Potatoes

For raising sweet potatoes, black soil and clay soil were found entirely unsuited by a small truck farmer, after he had tried for several seasons. It happened that some sweet potatoes were thrown away at the base of an ash pile and these, receiving no cultivation whatever, produced a surprising yield. The farmer analyzed the soil and found it to be rich in ashes,

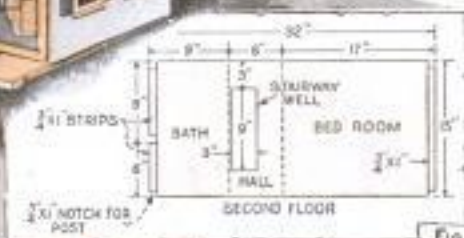
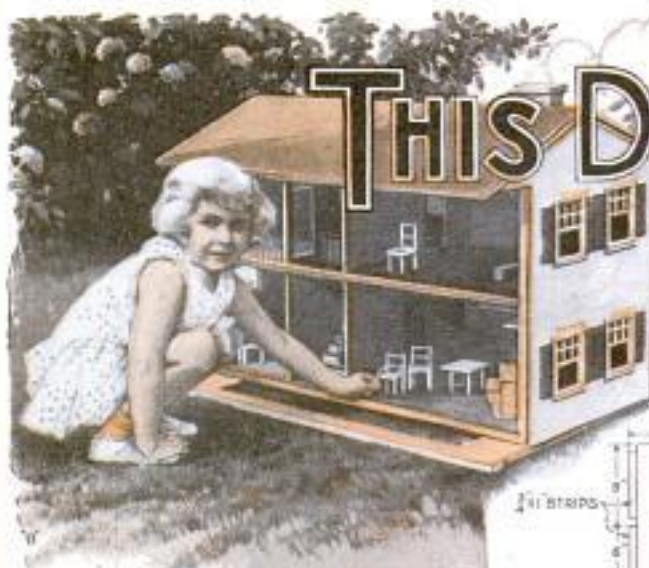
sand and loam. He duplicated this mixture as closely as possible and spread several wagon loads on a barren clay hill. Every year he now harvests large quantities of potatoes from this spot which he sells at a good profit.

☐ A small match box makes an ideal container for collar buttons and may be kept on the bureau; no one cleaning will throw away a match box that rattles.

X234B

THIS DOLL HOUSE

By Hi Sib



UNDERSIDE OF FOUNDATION

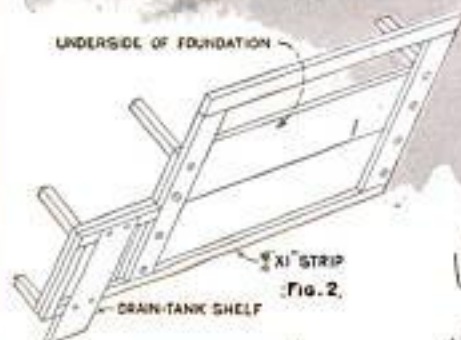


FIG. 2



FIG. 1

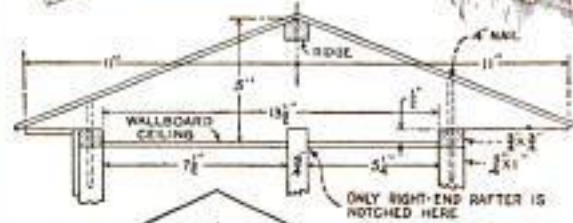


FIG. 3

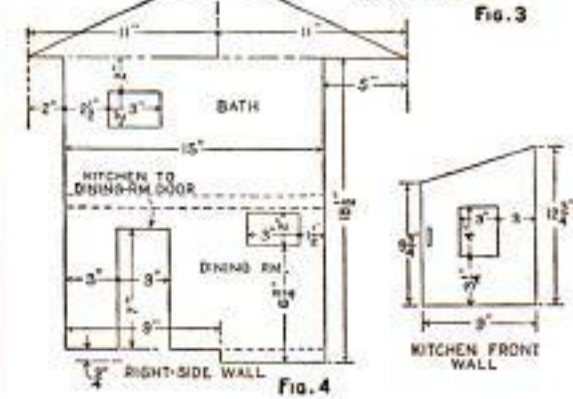


FIG. 4

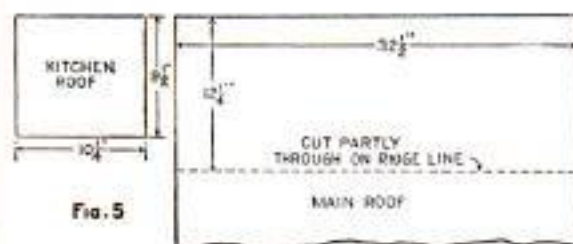


FIG. 5

ASSUMING that all self-respecting dolls appreciate a morning bath fully as much as their mothers—and probably a lot more—this very modern doll residence is equipped with running water and a built-in tub. Even the kitchen is provided with an honest-to-goodness sink and tap.

The architectural style follows the California Monterey type, a clean-cut and inviting design which is now very popular on the coast, and had its origin in the homes of the first prosperous American settlers. There are five rooms, not including upper and lower hall; a staircase, fireplace and upstairs balcony. The entire front wall, together with the verandah, is instantly removable, giving access to all the rooms.

Wallboard is used for the walls, partitions and roof, and a standard size sheet, 4 by 9 ft., will be ample for the job. Begin with the first floor, laying it out on the plan in Fig. 1. White pine, redwood or similar material is

square deal

HAS RUNNING WATER

suitable. The boards should be $\frac{3}{4}$ by $7\frac{1}{2}$ in. (net) wide. Tie them together at the ends by means of $\frac{3}{4}$ by 1-in. strips as shown. This prevents splitting and the tendency to warp. The second floor is made much in the same manner, having a staircase well cut in, as located in the drawing, before the two boards are fastened together with the end strips. Notches, $\frac{3}{4}$ by 1 in., should be cut where indicated for the corner posts.

In Fig. 2 is shown how the underside or foundation is built up, with cross cleats to support the extension in front for the wide step to the verandah, and the sheet-metal shelf for the drain tank. Strips, $\frac{3}{4}$ in. square, are nailed around the edges to level up the foundation. Next install the corner posts, which are of $\frac{3}{4}$ by 1-in. section

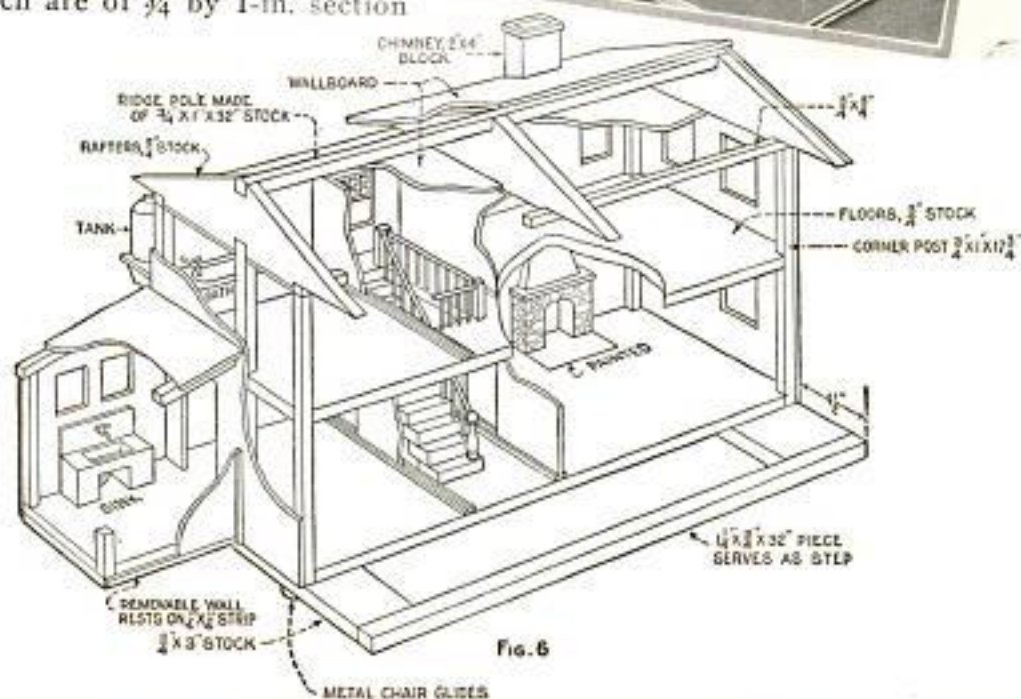
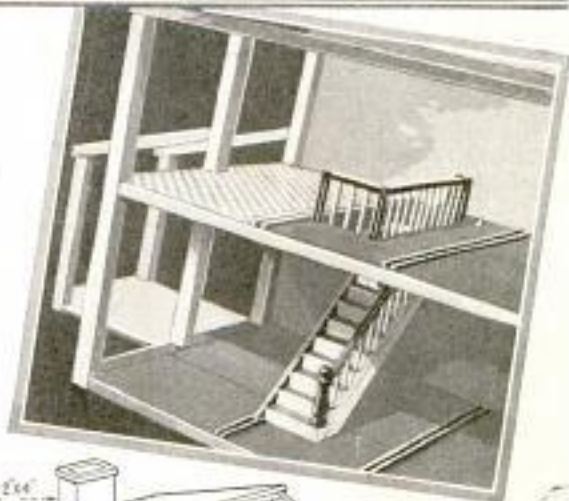


Fig. 6



(see Figs. 3 and 6). The second floor should be located so that the first-floor rooms will be just 9 in. high. Crosspieces, $\frac{3}{4}$ in. square, are laid across the tops of the front and rear pair of corner posts, and these in turn are bridged with the three gable-shaped rafters. In Fig. 3 is shown how to cut these rafters. They are secured to the corner posts with 4-in. nails driven down through them, but holes should first be drilled to prevent the wood from splitting.

White pine or redwood is first-rate material for the entire framework with the exception of the corner posts and the pieces across their tops, which should be of stronger wood. Construction of the kitchen framework is clearly shown in the cut-away perspective drawing, Fig. 6.

Now square up the framework and hold it thus with temporary diagonal braces, and

start on the walls. Figs. 4, 11 and 13 give dimensions of these, including windows and doors. If your framework is accurately made, you can lay out the walls, etc., from the drawings, but in case of any slight variation, it is well to hold the wallboard against the sides of the frame and mark around it.

Cut the rear wall first. Lay the wallboard flat on a level surface, with a clean board, or, better, a piece of scrap wallboard under the line you are about to cut. This prevents dulling the point of your knife and also insures a clean cut. Use, if possible, a knife with a thin, pointed blade and large enough handle to afford a good grip. The first cut should be fairly light, just enough to go through the surface without tearing it. Two or three more cuts should complete the incision. Above all things, keep the knife sharp. Make clean cuts particularly in the corners of window and door openings.

Having completed the rear wall, tack it to the framework temporarily, and make the end walls next, with allowance on the back edges to lap over

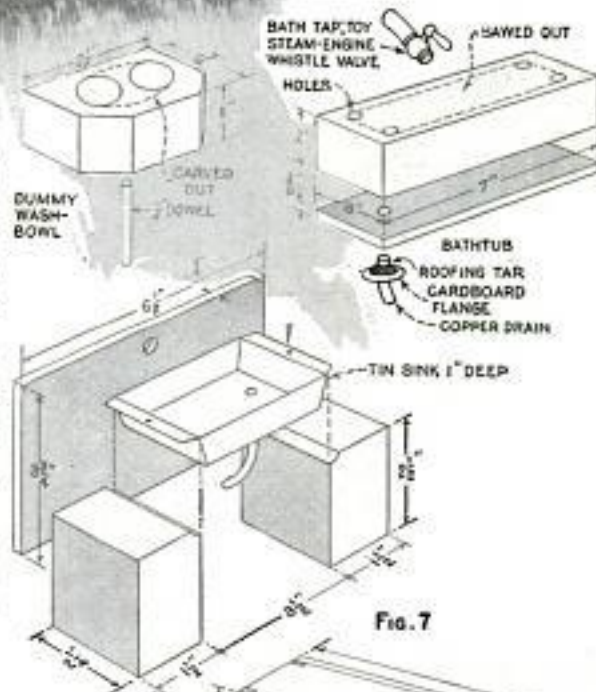


Fig. 7

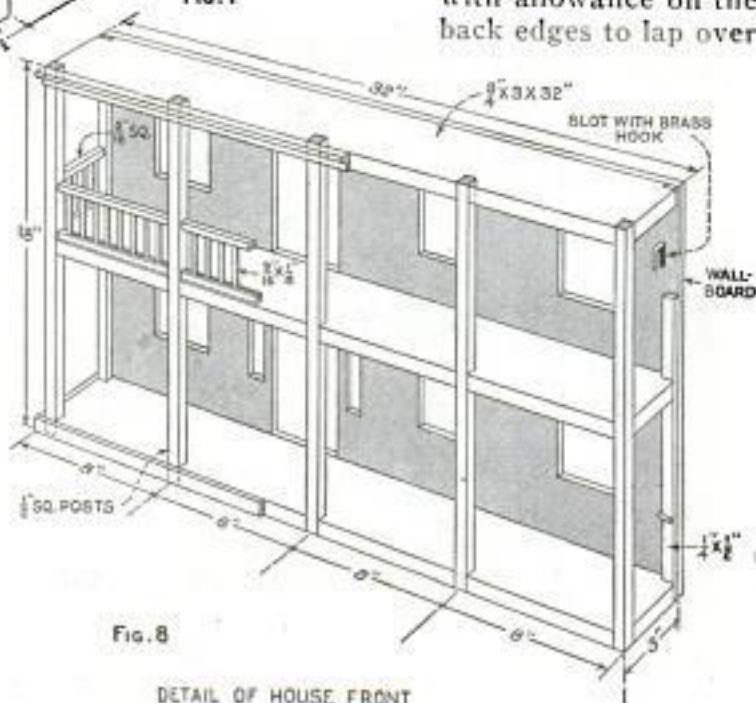


Fig. 8

DETAIL OF HOUSE FRONT

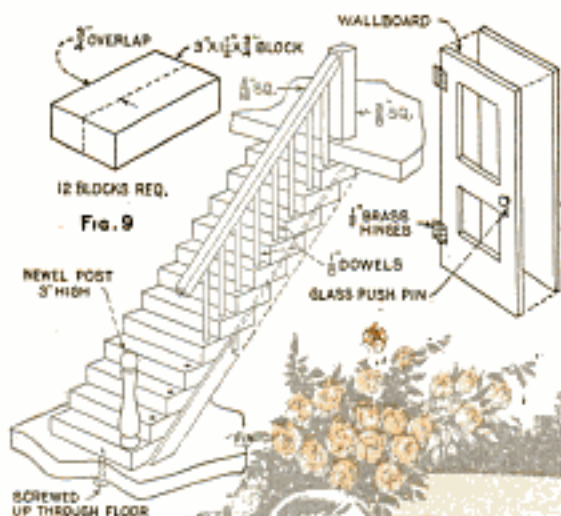


Fig. 9

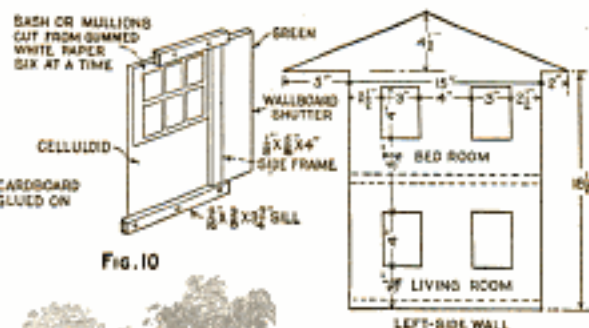


Fig. 10

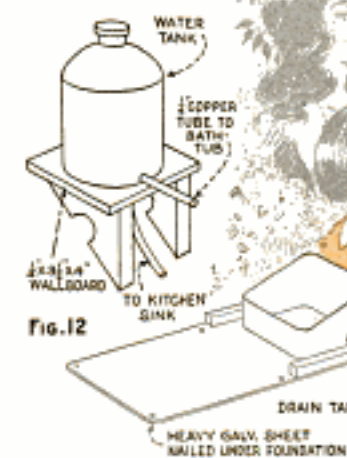


Fig. 12

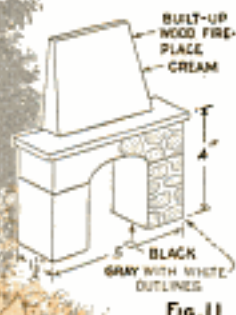
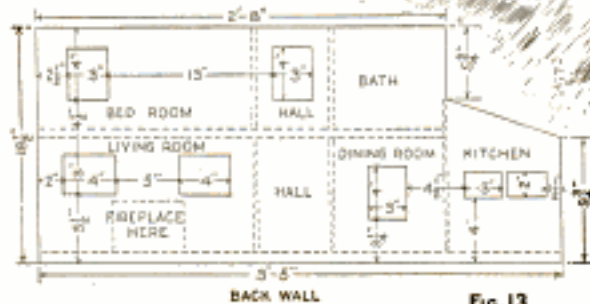
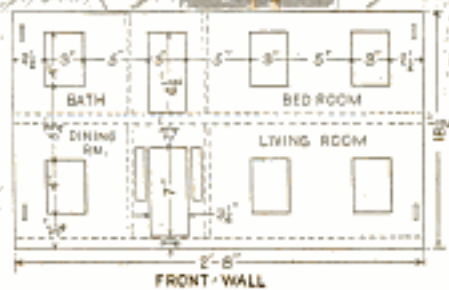


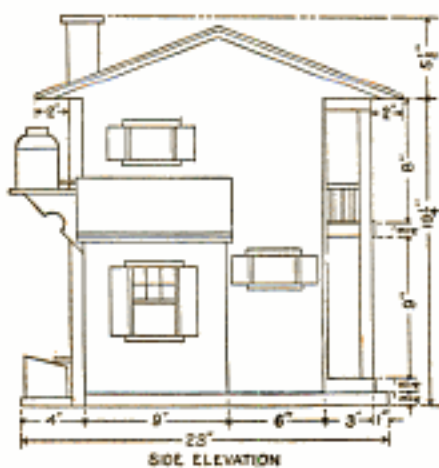
Fig. 11



BACK WALL



FRONT WALL



SIDE ELEVATION



Fig. 14

FRONT ELEVATION, COMPLETED HOUSE.

the edges of the rear wall, so that the joint will make a square corner without a gap. The front edges of the end walls should be flush with the front corner posts. Continue with the kitchen walls and front wall. The edges of the latter should come flush with the end walls.

Now give all walls two coats of paint, a white gloss exterior paint being suitable. Allow plenty of time for the first coat to dry before applying the second. When that, in turn, is dry, build up the window frames, Fig. 10. Celluloid is used instead of glass. Note that nearly all the windows are 3 by 4 in.; the celluloid should be cut $\frac{1}{4}$ in. larger all around, making it $3\frac{1}{2}$ by $4\frac{1}{2}$ in. For the upper sash, or mullions, use white gummed paper. Fasten about six sheets, gummed side down, on a smooth board, with sash outlines drawn on the top sheet and cut away the openings with a sharp knife. Then moisten the surface of the celluloid with a damp cloth and lay the gummed frames over it, pressing down through a sheet of dry paper.

Doors are easily made of wallboard, the panel effect achieved by cutting out openings and gluing a piece of pasteboard the size of the door on the back side (Fig. 6). Clamp them in a vise, or place under a flat weight while drying, so they will not warp. Although the balcony door opens to the inside, the main door swings out as the stairway does not permit its opening all the way in, and it is not feasible to set the stairway farther back.

Give the doors an application of walnut or mahogany oil stain, wipe away the surplus, and when dry, apply two coats of shellac or varnish. The first and second floors should also be given two coats, with the exception of kitchen and bathroom. For the former an appropriate pattern of oilcloth serves as linoleum, and in the bathroom a small check design to resemble a tile floor, as shown in the photo, may be laid.

The stairway is surprisingly easy to construct, as shown in Fig. 9. Note that the under edge, when assembled, is rabbeted to receive a finishing strip, which adds much to the appearance. The rail around the stair well on the second floor is made up in a similar manner.

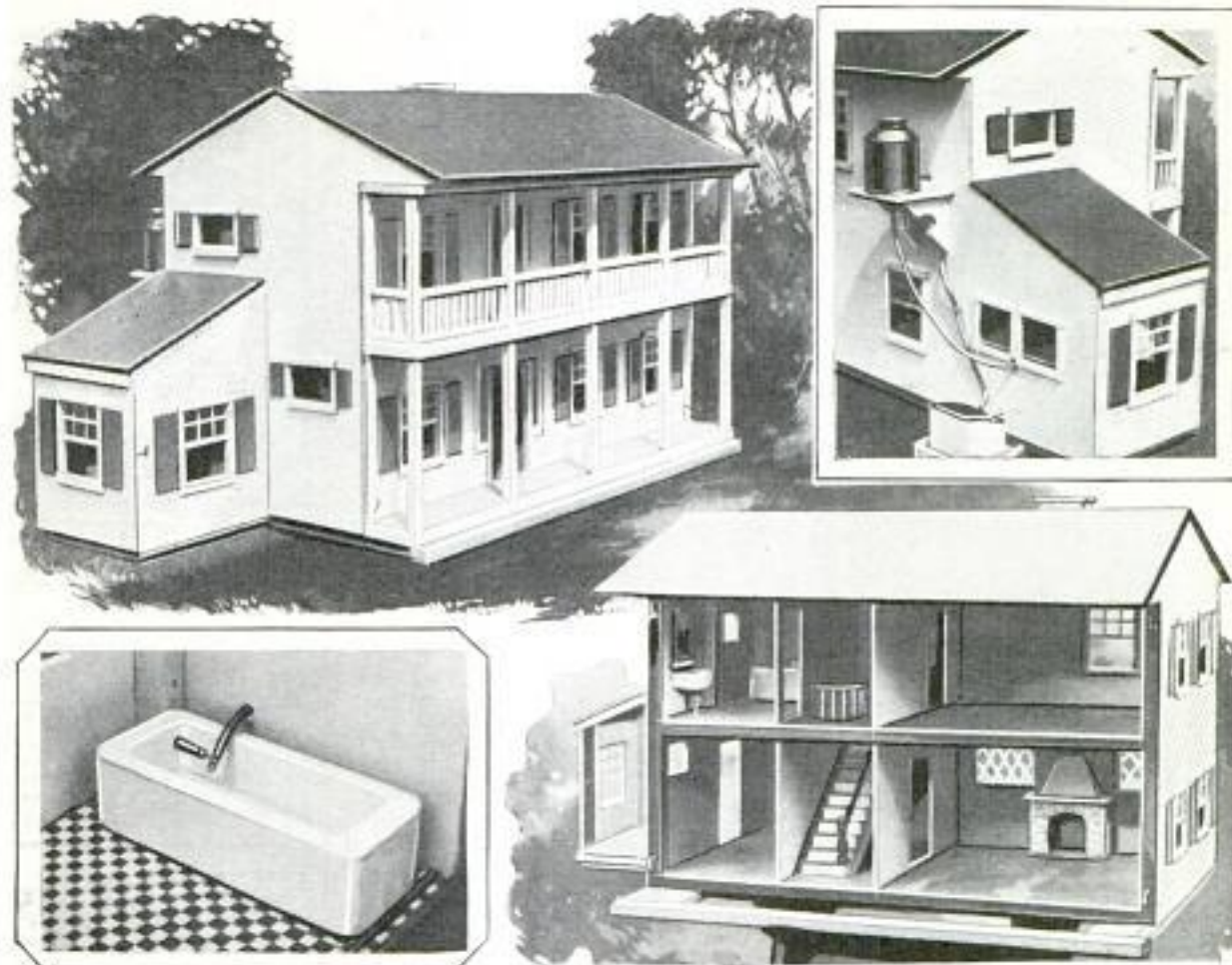
Before assembling, complete the paint job. The treads should be stained walnut or mahogany, with the risers in white, as are also the spindles and sides of the steps. Newel post and handrail should be finished like the stair treads.

The fireplace is made up of wood blocks, assembled as shown in Fig. 11 and finished to resemble stonework below the shelf. This is accomplished by giving it two or three coats of gray lacquer, and, when dry, outlining the joints in white. The inside is painted black, and a hearth is painted on the floor in either gray or brick-red.

The plumbing equipment is very easily made. For the built-in tub use a block of white pine, drilled and cut as shown in Fig. 7. Finishing is done with rasp and sandpaper, and the corners and edges are nicely rounded, as shown in the photo. A $\frac{3}{8}$ -in. piece is nailed to the bottom, and the joints on the inside are rounded by filling corners with a fillet of plastic wood. When dry, the tub is given several coats of white brushing lacquer, until it finally assumes the appearance of porcelain.

Quarter-inch copper tubing, such as is used for automobile gas lines, is satisfactory for both feed and drain pipes. A very little care assures a watertight joint in the drain. Locate the tub in position on the bathroom floor and mark where the drain pipe is to go through the wood. Bore this hole, as well as one in the dining room wall below where the pipe leads outside to the drain tank. Bend the pipe into shape for installation and, having carefully smoothed up the tub end, set it in place, so that about $\frac{1}{4}$ in. extends up through the bathroom floor. Make a pasteboard flange to fit snugly around the end of the pipe, push it down to the floor and spread on a small quantity of roofing tar, taking care not to get any inside the pipe. The tub is then forced down on to the drain pipe, the pasteboard flange squeezes the tar up into the joint, and there you are—a neat, absolutely watertight joint.

The washbowl is merely a dummy, whittled out of white pine and carefully sandpapered as shown. It is given several coats of white lacquer, and the dummy drain pipe is finished in aluminum paint. The bowl is set up in the bathroom with a



Top, Left, Kitchen End of House; Right, View of the Rear, Showing the Oilcan Supply Tank Mounted on Its Shelf, with Pipes to Bath and Kitchen, and Drain to Tank; Below, Left, Detail of Bath, Showing Faucet; Right, Interior View of House

narrow shelf above, topped with a mirror.

A sink is cut from a single piece of tin, with the edges bent up and soldered, as in Fig. 7. A piece of copper tubing is soldered in for the waste pipe, which leads through the wall to the drain tank outside. Note that the wood blocks are slightly grooved to receive the flanges of the tin sink, and the joint is smoothed over with plastic wood. White brushing lacquer is used to cover this job also.

For the supply tank, Fig. 12, a bright new copper oilcan, of the type shown, makes neat-appearing equipment. Such cans may be had at ten-cent stores in about half-pint size. They are not really all copper, so it will be necessary to paint the inside to prevent rust.

The faucets are toy steam-engine whistle valves. Solder them into the ends of the supply pipes, and make the shelf to support the tank on the outside of the bathroom. A drain tank can be made of a tin can cut off at an angle, the higher side on the back to serve as a splash

guard when the tub is running through a heavy assignment on Saturday night.

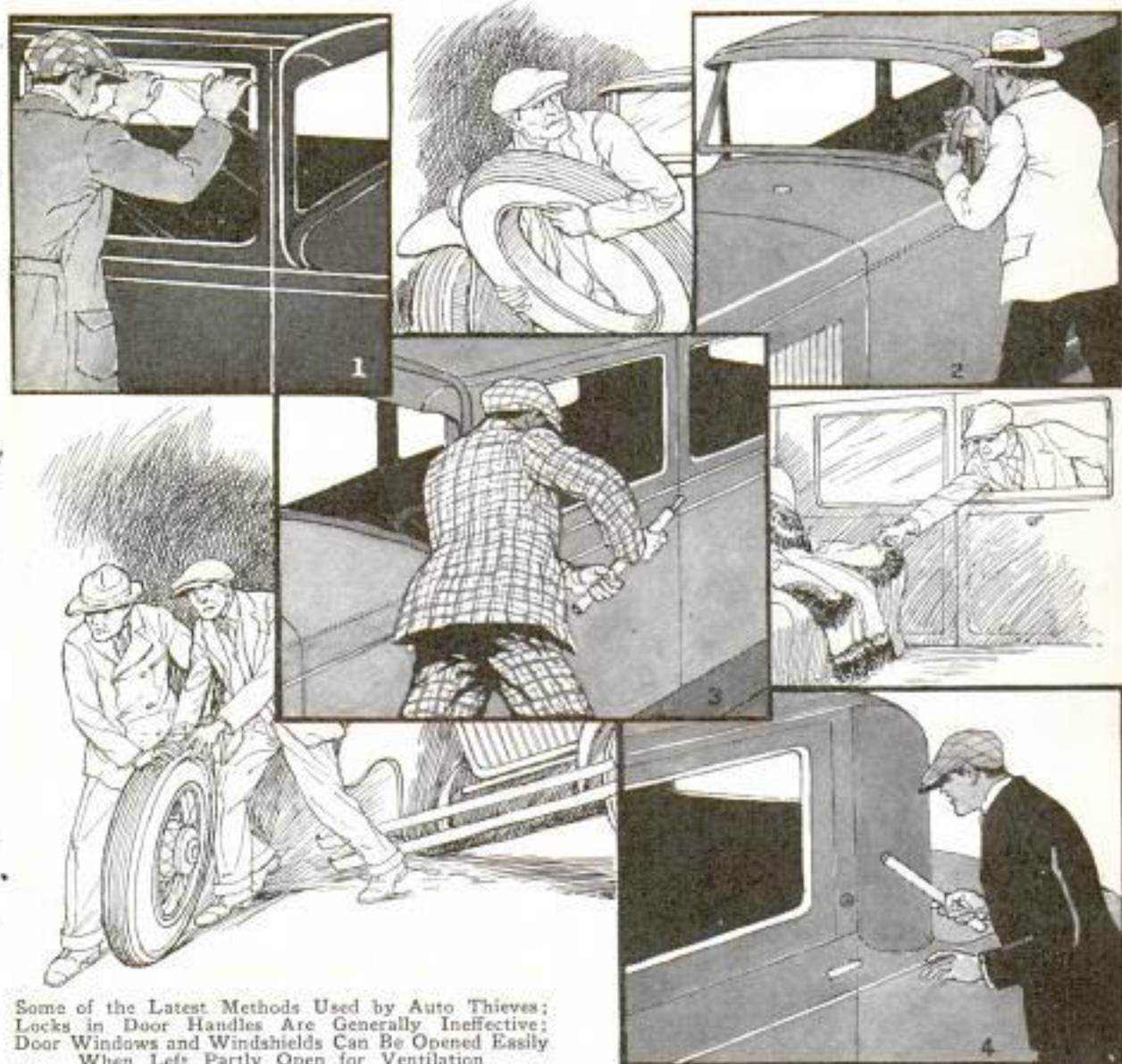
With everything installed, complete the front of the house, which is built in separate unit to be removable (Fig. 8). Porch, balcony floor and ceiling of the latter are all cut to the same pattern, 9 by 3 by 32 in., with notches for the five square columns on the front side and the two pilasters at the corners of the wall.

In assembling the verandah, it is assumed, of course, that all the window and door frames are already installed on the front wall of the house, since it is not an easy matter to put them on after the verandah work is completed. Note, in Fig. 8, how the front side of the house is held in place with brass L-hooks passing through slots in the wallboard. A quarter turn holds the wall securely.

Before nailing down the wallboard roof, fasten on the chimney with nails or screws on the underside. The latter has a molding around the top, the inside area being painted black.

*Roofing for Lead. Kontrol Asbestos Fibre Paste Roof Cement
Martin Senner & Co. Chicago*

LATEST TRICKS OF THE AUTOMOBILE THIEF



Some of the Latest Methods Used by Auto Thieves; Locks in Door Handles Are Generally Ineffective; Door Windows and Windshields Can Be Opened Easily When Left Partly Open for Ventilation

Few people realize the ease with which an adept thief can gain entry into an apparently securely locked car. Millions of dollars in plunder is the yearly toll of the auto sneakthief, who makes a practice of walking along a dimly lighted street in the early evening and during the dinner hour. Carrying a flashlight, he throws a beam into the parked cars he passes. If the flash reveals anything of value left on the seat or floor, he generally finds a way to gain access to the loot, unless a few simple precautions are taken.

It is a habit with many car owners, when parking their cars, to leave a window down about $\frac{1}{2}$ in. or more for ventilation purposes. Such a car is easy prey for the robber. Mr. Thief has lately found

that by inserting his fingers into the opening, as shown in Fig. 1, and gently shaking the window, the glass will slide down slowly, which it will not do under a direct and steady pull. Then again, on some of the popular-priced cars having windshields that open outward, owners frequently leave the windshield slightly open, feeling sure that it is held securely by the thumbnuts. A clever car thief grasps the glass as shown in Fig. 2 and, by shaking each end alternately, can soon loosen the thumb screws, no matter how snugly they have been tightened. It is then a simple act to reach inside and open the door. To foil such methods of entry through the windows, be sure to see that they are all tightly closed. However, even with these

precautions, there are many tools that will quickly open the ordinary car-door lock. One of the simplest of these is a piece of gas pipe, which, when applied as shown in Fig. 3, will noiselessly break almost any car lock that is incorporated in the door handle. The best protection against such an occurrence, however, is to install a good cylinder lock of the better grade in the door itself, as shown in Fig. 4. With such a lock, few thieves will tackle the car as they would have to break the glass and thus attract undesired attention.

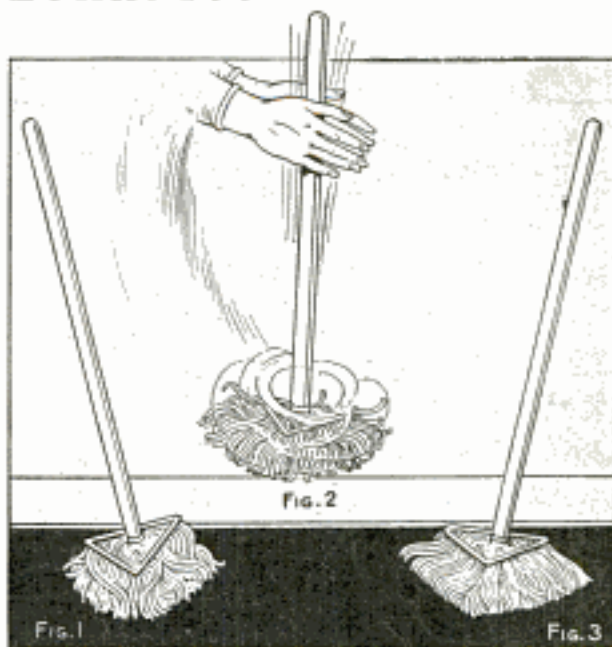
Another device used by the professional car thief, and one recently developed to perfection, according to a large Chicago lock-testing laboratory, is a "hootenanny," so-called by the criminals using it. This is said to render ineffectual even the armored-cable, grounded-distributor type of lock, formerly considered impregnable. Although this device has proved quite a boon to the thief, the manufacturers have developed a lock for distributor caps which renders cars theft-proof against even the hootenanny operator.

A favorite racket for the small thief is the acquisition of wheels and tires, which he collects along dimly lighted streets. It takes only a few moments for a couple of quick wheel thieves to remove the lugs and slip off the wheel, letting the axle fall on the ground, much to the embarrassment of the owner or driver when he returns. This kind of loss can be prevented by equipping each wheel with a special rim lug fitted with a key-operated lock similar to a spare-tire lock, which prevents the lug from being loosened.

To prevent the loss of valuables from your car, the best advice is to remove articles that you do not wish to lose. Then, as a further step, insure with a reputable company.

Old Magazine Holds Rubbers While Cleaning Them

Rubbers are hard to hold when scraping mud and dirt from them. The task is made much easier by rolling up an old magazine and putting it inside of the rubber from toe to heel to serve as a handle. This will prevent the rubber from yielding under pressure.



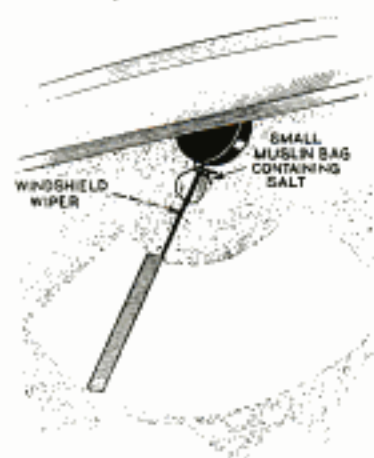
Tangled Strands of Mops and Dusters Can Be Spread Out by Twisting the Handle between the Hands

Spinning Mop Disentangles Strands

Strands of floor mops, polishers and dusters frequently stick together and form a tangled mass. To untangle it, lift the mop a few inches off the floor and spin the handle between the palms of your hands. This creates a centrifugal force that throws the strands into a flat fanlike arrangement. While the mop is still spinning drop it to the floor. It will then spread out covering a maximum area, and will stay flat until lifted again.

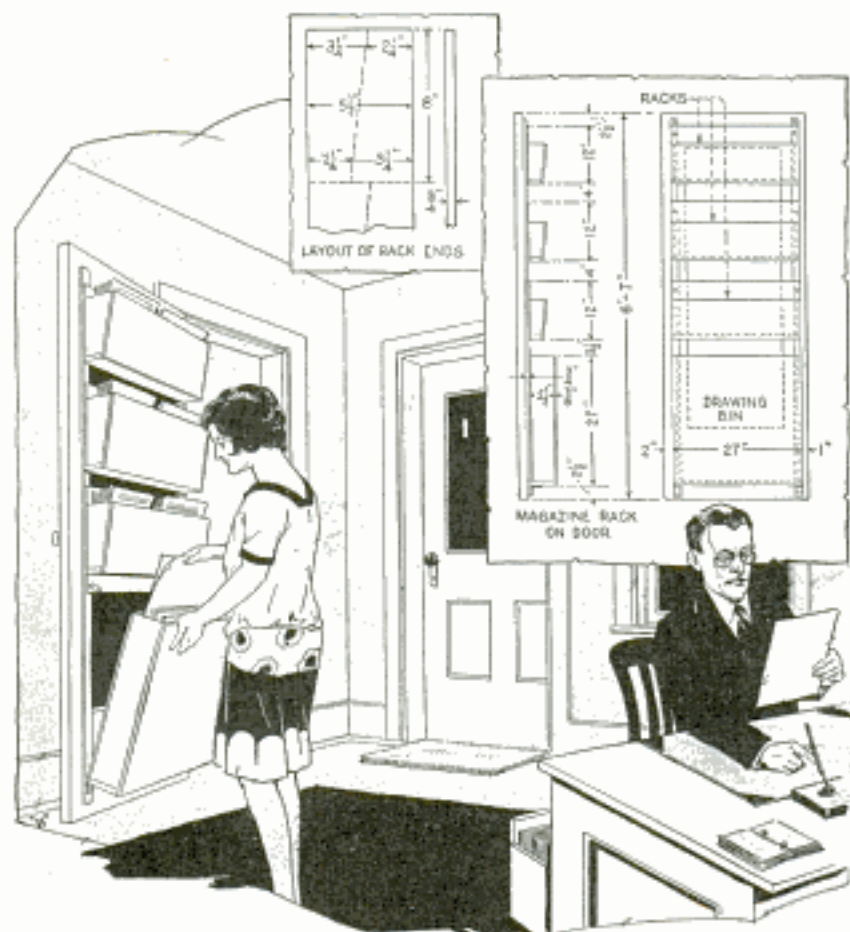
Salt Keeps Windshield Clear of Sleet

In Wisconsin a number of bus drivers are employing a simple but effective method of preventing accumulation



of ice on the windshield during sleet storms. A small muslin bag containing salt is attached to the upper part of the windshield wiper. The moisture

dissolves the salt gradually, the water runs down, is caught by the wiper and spreads evenly over the glass.



Tier of Racks, Attached to the Inside of a Closet Door, Makes a Convenient Place for Keeping Magazines

Magazine Rack Is Attached to Closet Door

Attached to the inside of a closet door, the tier of racks shown in the illustration provides a convenient storage place for magazines at home or in the office. The bin at the bottom is intended for office use, but two more racks may be built instead. Three-ply veneer, $\frac{3}{8}$ in. thick, is used for the back, front and bottom. The ends are cut from 1-in. white pine, 6 in. wide, making the top and bottom square with the back and running the width from $2\frac{1}{4}$ in. at the bottom to $3\frac{1}{2}$ in. at the top. All other dimensions are given in the details. If carefully sawed, only the upper edges of the ends need sanding. Each rack is screwed to a piece of plywood, which in turn is screwed to the door. If a bin is made, it should be hinged at the bottom as indicated, and a turnbutton provided at the top to hold it in place. It is a good idea to drive the nails at various angles, in order to obtain a dovetailing effect. Four-penny finishing nails are

used for fastening the sides and bottom to the endpieces.—Edwin M. Love, Alhambra, Calif.

Focusing Cloth White on One Side Is Cool

People do not wear black clothing in the tropics. Any photographer who has worked outdoors during hot weather with his head under a black focusing cloth knows the reason. Black cloth absorbs the heat, and he soon feels the intense temperature. On the other hand, white cloth reflects heat as well as light, and for this reason one side of a focusing cloth was covered with heavy white muslin, both cloths being sewed together along the edges. In use, the white covering was kept on the outside and it was then

found that the absorption of heat was greatly reduced. When the focusing cloth becomes soiled it can be sent to the laundry. In making some tests with a thermometer, it was found that the difference in temperature under a white and a black cloth, when used in the sun, was from 15 to 20° F., depending, of course, on the outside temperature.

"Holster" for Pipes Prevents Breaking Them

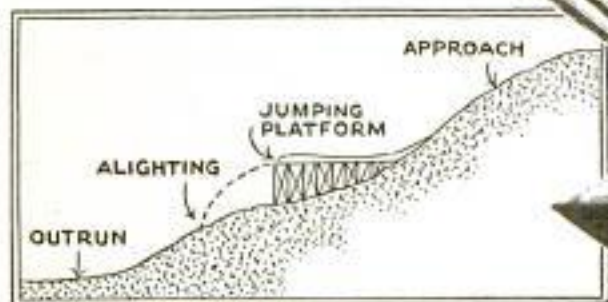
A piece of auto-top covering, slit so that it can be hung from a belt and to receive the stem of a pipe, makes a convenient holster that prevents your pipe from being broken. The best position for the holster is at the side, as shown in the drawing.—Wm. P. Coleman, Grand Rapids, Mich.



HOW TO BUILD A SUCCESSFUL AND SAFE SKI JUMP



off may be made of posts or boughs covered with snow, entirely of snow, or of planks covered with snow. For 50-ft. jumps, the take-off should be from 3 to 4 ft. high, and the alighting ground should be about 100 ft. long. The snow should be packed moderately on the alighting ground to provide the right slope, as the



One of the Most Thrilling of Winter Sports Is Ski Jumping: Where Hills with Proper Slopes Are Not Available, Artificial Approaches Can Be Built



To fly through the air on a pair of wooden wings is one of the most thrilling of winter pastimes, and it is comparatively easy to make a ski jump, provided the contour of the land is suitable. The ideal ski-jumping course consists of an approach, a take-off or jumping platform, the alighting ground and the out-run. If possible, select a north or northeast slope. A southern slope is not desirable. The detail shows the proper contour of the land to make an ideal ski run. A slope of about 30° is best. Where insufficient slope prohibits the proper angle, an approach of timber may be built as shown in the photos. The take-off should be level or sloping gently downhill, and the angle should be a gradual one. The alighting ground should have the same angle as the approach. Measure this accurately, as it is very important in making successful jumps and safe ones. The take-

jumper should never land on level ground. It is essential that he land on the steep slope for safety, so that he may keep on going until the momentum gained is gradually lost as the slope flattens out in the out-run. The ideal alighting ground at the foot of the hill should gradually grow less steep until it merges into a safe level out-run where the jumper is able to swing or stop. No logs, stumps or other debris should remain here, as they might cause disaster.—Earle W. Gage, Ashville, N. Y.

Doorknob Rids Poultry House of Snake

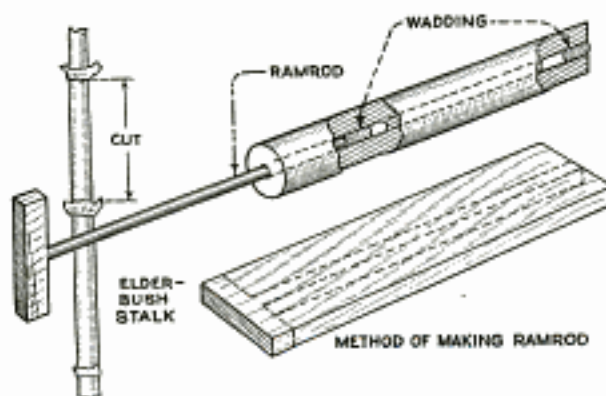
An old white doorknob was found effective by a Texas poultry farmer to rid a house of a snake that had been robbing the nests. All the eggs were removed from one nest and the doorknob substituted. In due time the snake came and swallowed the knob—good night, snake!



In the Construction of This Bobsled, Pipe and Pipe Fittings Were Found Highly Suitable

Pipe Makes Rigid Frame for Bobsled

Here is a sled that is easy to make, as pipe and pipe fittings are used in its construction. The pipe offers greater strength and rigidity than a wooden frame and this feature is surely needed to withstand the hard usage the boys give it. The following parts are needed: Three $\frac{3}{4}$ -in. nipples, $4\frac{3}{4}$ in. long; five $\frac{3}{4}$ -in. nipples, 2 in. long; three $\frac{3}{4}$ -in. tees; seven $\frac{3}{4}$ -in. pipe flanges; 26 round-head bolts, $\frac{1}{4}$ by $1\frac{1}{2}$ -in.; one hardwood board, $10\frac{3}{4}$ by $\frac{3}{4}$ by 5 or 6 ft.; two pieces 1 by 2 by 19-in. hardwood for footrests; four pieces hardwood, 1 by 3 by 19 in., for runners; 8 ft. of runner iron, and a sufficient number of 1-in. wood screws to fasten the runner iron to the runners. The flanges are screwed to the underside of the board and also to the sides of the runners. One at the front serves as a pivot on which the front runners turn for steering. Cleats screwed to the board provide suitable footrests.



Straight Branch of Elder Bush Makes Good Barrel for Popgun

Sponge in Wide-Neck Bottle to Hold Water Color

Those who use water colors for art work will find the following idea a useful one. Get a number of wide-neck bottles, 2 or 3 in. high, and cut a piece of sponge to fit in each. Soak each sponge with water and work in enough color so that, when a brush is drawn over the sponge, it will absorb some of the color. The amount will be sufficient for working without the risk of dripping. Each bottle is labeled according to the color it holds. Stoppers are used when the bottles are not in use, to

prevent the sponges from drying out. In this way color is always available and it will not be spilled when the bottle is accidentally upset.

Popgun Barrel Made from Elder Stalk

Barrels for homemade popguns can be made from branches of elder bush. A straight section is cut off between two joints as indicated in the detail. The bark is peeled off and a stiff wire is forced through the pithy center, the wire being worked sideways until the core is removed. A ramrod, fitted with a handle, is whittled down to fit the chamber, but should be about $\frac{1}{2}$ in. shorter. The gun is then ready to be loaded. Pieces of wet

newspaper are pressed into the larger end of the chamber and pushed to the other end with the ramrod. The wad will be forced out of the gun with a loud "pop," if the ramrod fits snugly and is moved quickly. W. J. Nelson, Los Angeles, Calif.

SHOP NOTES



How to Sharpen Bandsaw Blades

By W. CLYDE LAMMEY

RECONDITIONING a bandsaw blade is a much more tricky job than is the case with a circular-saw blade, but with the aid of a few simple devices, it is possible to do a first-class job in the small workshop.

Jointing and setting are important operations, and, unless the teeth of a blade are badly damaged, the former should be done first. Remove the blade from the wheels, taking pains to prevent it from kinking. Turn it so that the teeth run backward, remove the upper and lower guides and slide the upper guide support up out of the way. Clamp a strip of hardwood, $\frac{3}{4}$ in. thick, to the table top so that the edge of the strip bears against the back of the blade. Draw the blade a little tighter than usual on the wheels, and start

the motor. If the blade shows a tendency to run off the wheels, adjust the upper one until the blade runs on the center of the tread. With the saw running at its regular speed, hold the coarse side of an ordinary carborundum stone lightly against the points of the teeth as shown in the photo. Hold the stone firmly on the table after it has come in contact with the teeth and do not allow it to shift after it touches the teeth lightly. When you find that every tooth has been touched by the stone, the jointing is completed; otherwise

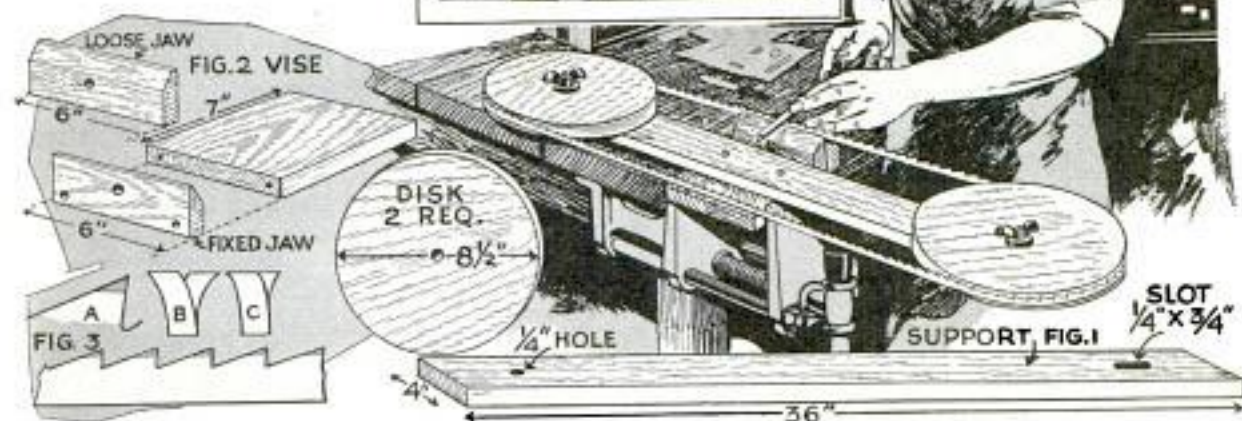
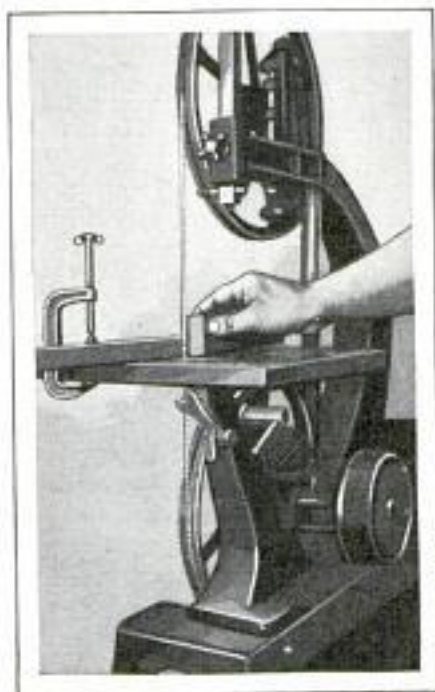


Photo Shows How a Carborundum Stone Is Used to Joint the Teeth of a Bandsaw; the Blade-Holding Jig Below Is Handy for Setting and Filing

the operation should be continued. Take care, however, not to take off more than is absolutely necessary, for on blades $\frac{1}{4}$ in. and less in width, the gullets must then be filed down to such an extent that the blade will be materially weakened and is apt to break under the strain of sawing.

A good hand sawset, which can be adjusted to set the teeth accurately, is obtained. Fig. 1 shows an arrangement made for holding the blade. From $\frac{3}{4}$ -in. stock, turn two disks about 8 or 9 in. in diameter. Crown the faces slightly as on a pulley, and drill a $\frac{1}{4}$ -in. hole in the center of each. Get a piece of $1\frac{1}{4}$ -in. stock, 4 in. wide and of such length

that, when the disks are mounted at its ends, they will hold the saw blade taut. The disks are held in place by means of bolts and wingnuts, the support being slotted at one end to permit movement of the disk for tightening the blade. This saw-blade holder is then attached to an improvised vise, which in turn can be held in the workbench vise as shown in the illustration. The saw-blade vise, shown in Fig. 2, holds a portion of the blade rigid while it is being set or filed. It consists of three parts, which are made of maple, namely: a fixed and a loose jaw, and a wooden base which holds these jaws. The fixed jaw is screwed to the base, and then the disk-support arm is also screwed onto it, so that the saw blade will come up against the fixed jaw. Set the loose jaw in place against the fixed jaw and drill a $\frac{5}{16}$ -in. hole through both at the center. Tighten the jaws together with a $\frac{1}{4}$ -in. bolt, washer and wingnut. With this vise, it is an easy matter to set and file any saw blade. Adjust the saw set so that it bends less than half of the tooth, as indicated at detail A, Fig. 3.

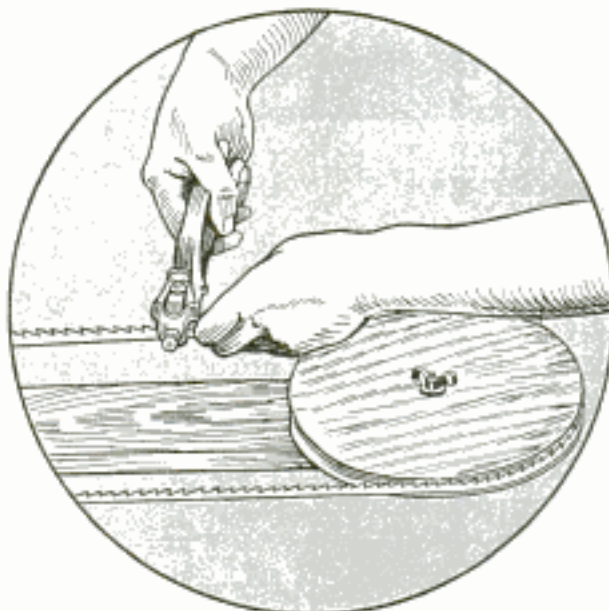
A coarse set on the teeth will make the blade cut very fast, and it will then turn

curves of very short radius, but the edges of the cut will be rough. If you do fine sawing with a narrow blade, and the nature of the work requires that the blade turn short-radius curves, give the blade a coarse set. Usually a coarse set will be

found best for average conditions. Uniformity in setting the teeth is important. When a hand set is used, the adjustment must be checked several times to insure accuracy of width. A "valley" between the alternate teeth, as shown at detail B, Fig. 3, must be carefully avoided, as this will cause the blade to draw sideways in the cut and will lessen the cutting speed. The correct average set

is shown at detail C, Fig. 3. Leave the saw vise loose enough so that the blade will move when the disks are turned. Begin setting the teeth at any point, and after two or three alternate teeth have been set, tie a short piece of thread at the starting point. The set must be accurately located on the tooth before using it, or it may slip and pinch off the point of the tooth. Also, remember to move to the second tooth each time in order to avoid bending two adjacent teeth in the same direction. Continue the setting operation until the alternate teeth have all been bent one way. Then set all the untouched teeth in the opposite direction, using the same pressure.

After the setting has been done, get a stiff bristle brush and clean the teeth of accumulated sawdust and dirt, which will clog the file. Get a three-cornered file and be sure that it is clean. Though these precautions may seem unnecessary and are often neglected, they nevertheless contribute to a first-class job. Tighten the vise on the blade with the gullets of the teeth just above the top of the jaws. Make the file stroke straight across the blade at right angles, starting on a tooth

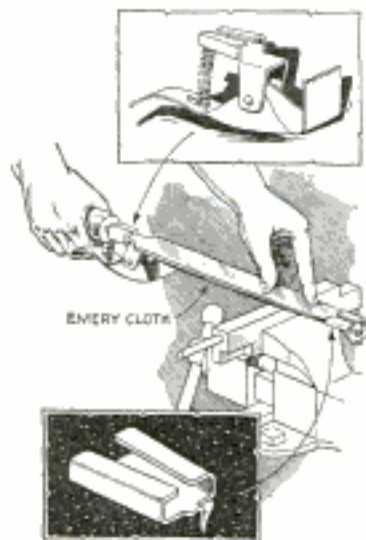


Setting the Teeth of a Bandsaw. Especially a Narrow One, Must Be Done with Extreme Care and Accuracy

that is set away from you and file every second tooth. The object of filing after jointing is to bring the teeth to a sharp point, but it is of equal importance to keep the proper shape of the teeth. Teeth of a bandsaw should be filed to give them a slight uniform "rake," which causes the blade to pull into the wood when cutting. This prevents a light blade from bending back when the wood is pushed against it. The rake will be automatically formed by a three-cornered file if the file is held at the correct angle with relation to the teeth, as shown in the lower detail of Fig. 3. After the teeth bending one way have been filed, reverse the position of the blade in the vise and file the other teeth in the same way. Alternate teeth will then be filed in opposite directions. Take pains to hold the file so that the bevel of the tooth is cut uniformly to the bottom of the gullet. Never "touch up" the points of the teeth of a bandsaw, even when the width is $\frac{1}{2}$ in. or more, as the shape of the teeth is certain to be altered by doing so.

Emery Cloth Held on File with Clamps

As emery cloth is often used after filing, the illustrated method of holding it on one side of the file by means of a couple of specially made clamps, will be found highly convenient. The details show the exact construction of the holders, the one near the handle comprising a spring clip,



hold the emery cloth
Chmelar, St. Louis, Mo.

while the one at the end of the file is fitted with a sharp point that is driven through the strip of emery cloth. Both pieces are made so that they can be put on or taken off in a moment. While in place, they do not slip and securely.—Joe



Pivoted between Shelf Brackets. This Board Holds Reference Charts and Tables on Both Sides

Swinging Reference Table

In stores, shops, offices, etc., where reference tables and charts are often used, the illustrated method of mounting the charts will be found useful. Two shelf brackets are screwed to the wall, one directly above the other, as shown, leaving enough space between them to accommodate the board on which the charts are to be mounted. The board is pivoted between the brackets with screws, so that it can be turned around. Reference matter is tacked to both sides of the board and the latter turned to a position where it can be seen most readily.—Henry S. Laraby, East Haven, Conn.

Large Blotter Prevents Drafting Paper from Buckling

Changes of humidity have considerable effect on drafting paper as it absorbs the moisture, which causes it to stretch and buckle, especially when tacked to a drawing board. This trouble can easily be overcome by using large desk blotters, which are laid on the paper when the draftsman leaves for the night, suitable weights being used to hold the blotter tightly against the paper. The blotter, of course, prevents moisture from reaching the paper by absorbing it. In the case of very large drawings and tracings, two or more blotters can be stapled together.

Block Prevents Splitting When End Planing

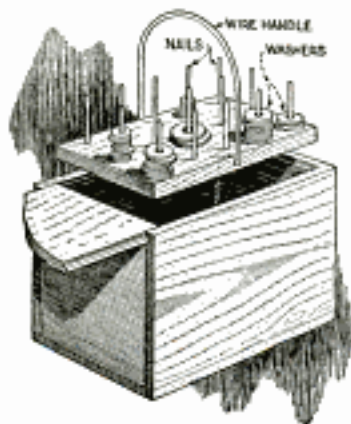


Small Block of Wood, Clamped to Piece to Be Butt-Planed, Prevents Splitting

Clamped to the edge of a piece of wood as shown in the illustration, a small wooden block will effectively prevent end wood from splitting when one uses a butt plane. This is a simple kink, but one worth remembering, as any amateur and even professional woodworker will have use for it often. Of course, it is necessary to have the top of the block cut square, and it must be set flush with the surface to be planed.—Horace Lemaster, Maryville, Missouri.

Handy Method for Storing Washers and Nuts

Washers and nuts of varying sizes may be stored in the same box and yet be kept separated by following the method indicated in the drawing. A 1-in. piece of wood, just large enough to go inside the box, is fitted with a wire handle, and a number of long



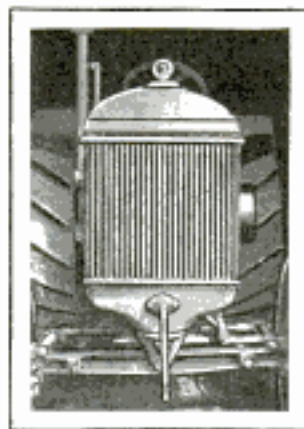
finishing nails are driven through it from the underside, and spaced at equal distances for neatness. The washers and nuts are slipped over the nails and the holder is then dropped into the box. When one looks for a particular size it is then an easy matter to find it without waste of time.—Lester P. Young, Culver, Ind.

Redeveloping Dark Sepia Prints

Most photographers have had the experience of ruining prints when making sepias by having the color flash up too fast to a dark brown. The prints are then too heavy, and the highlights are all choked out. A simple method of saving the print, and also the time required to make another, is as follows: Use ordinary reducing solution on the print until it is too light. Wash it and then place it in the sepia toning solution so that it is redeveloped until the desired color is obtained. This treatment also brings out the highlights to just the right degree.—Kenneth Keith, Chicago.

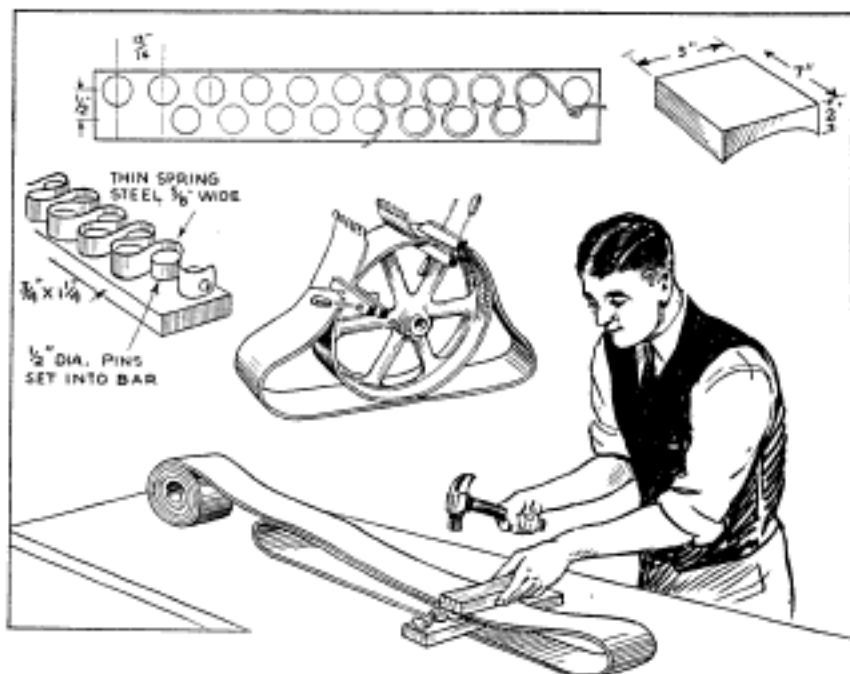
Protector for the Tractor Radiator

When field work necessitates the use of a radiator protector, a good one can be made as follows: Get two lengths of $\frac{1}{2}$ -in. pipe as long as the width of the radiator and drill $\frac{3}{8}$ -in. holes through one side of each pipe. The holes are spaced about $\frac{3}{4}$ in. apart and only the end holes are drilled through both sides of the pipe. Iron rods, as long as the part of the radiator to be protected, are slipped into the holes and similar rods a trifle longer than the rest are threaded at both ends and slipped through the end holes. Two nuts on the end rods, one on each side of the pipe, hold the assembly together. The method of supporting the protector in front of the radiator will vary with the make of tractor to which it is applied.



Cutter for Interlocking Sanding-Belt Ends

Interlocking ends, as shown in the illustration, increase the strength and consequently the life of the joint on a sanding belt. The device used to cut the ends in this way consists of a piece of spring steel, with one edge sharpened, which is threaded between two rows of staggered pins and fastened to the end pins as indicated. The pins are mounted in holes drilled in a wooden base. In use, the cutter is laid on the bench and one end of the belt is laid, sand side up, over the sharp edge of the cutter. With a hammer and a piece of soft wood, the belt is cut off. After careful measurements to determine the exact length of the belt, the other end is cut in the same way, looping the belt to make sure that the ends will be cut to match. Pry the ends of the belting from the cutter, and the belt is ready for joining. For this purpose it is handy to use a cast-iron pulley of suitable width and about 14 to 20 in. in diameter, clamping the ends of the belt to it with woodworkers' clamps as indicated in one of the details. Perfect alinement of the belt is necessary to make it run straight. The joint is backed by a piece of muslin glued to the underside. Place a piece of heavy brown wrapping paper over the pulley, and on this lay the muslin, well soaked in thin, hot glue. Quickly drop the ends of the belt in position and cover them with a block of wood, cut to conform to the curvature of the pulley. Clamp the block on over the joint of the belt and allow it to dry

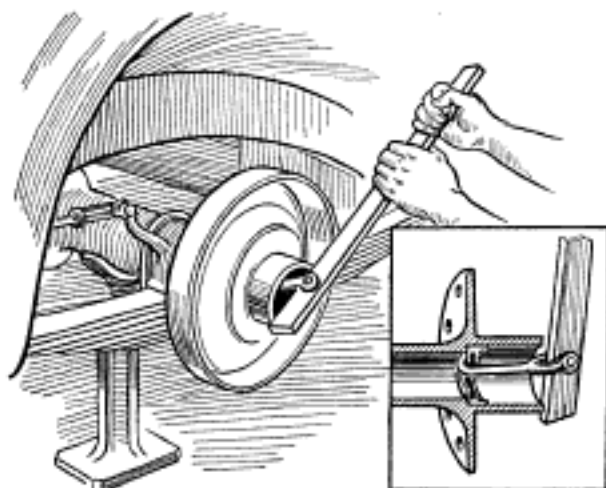


Interlocking Ends Form Good Joint on Sanding Belts; after Being Cut, the Joint Is Glued on Muslin

overnight. The belts used on the machine for which this jointer was used were 6 in. wide, but the device can be used on belts of any other width by altering dimensions to suit.—Harry R. Clausen, Chicago.

Tool for Pulling Grease Retainers from Axles

Many garagemen will find the illustrated tool for pulling inner grease retainers out of rear-axle housings, especially on Chevrolet and Pontiac cars, a time and labor saver. It consists of a hook pivoted at the end of a 1 by 1 1/4-in. flat-iron bar, 13 1/2 in. long. The hook can be made from the end of a model-T Ford brake rod.



This Pulling Bar Makes It an Easy Matter to Remove Grease Retainers

The fitting straddles the bar nicely, and the section or rod can be bent to the shape indicated in the drawing. The center of the hook pivot should be 1 1/2 in. from the end of the bar, while the hook itself should extend 2 in. beyond the edge of the bar.—John A. Blaker, West Auburn, Massachusetts.

Log Cabin Built in Attic



In the Center Is the Wagon-Wheel Lighting Fixture, and Just Above May Be Seen the Bunk That Covers the Vent Pipe in the Floor

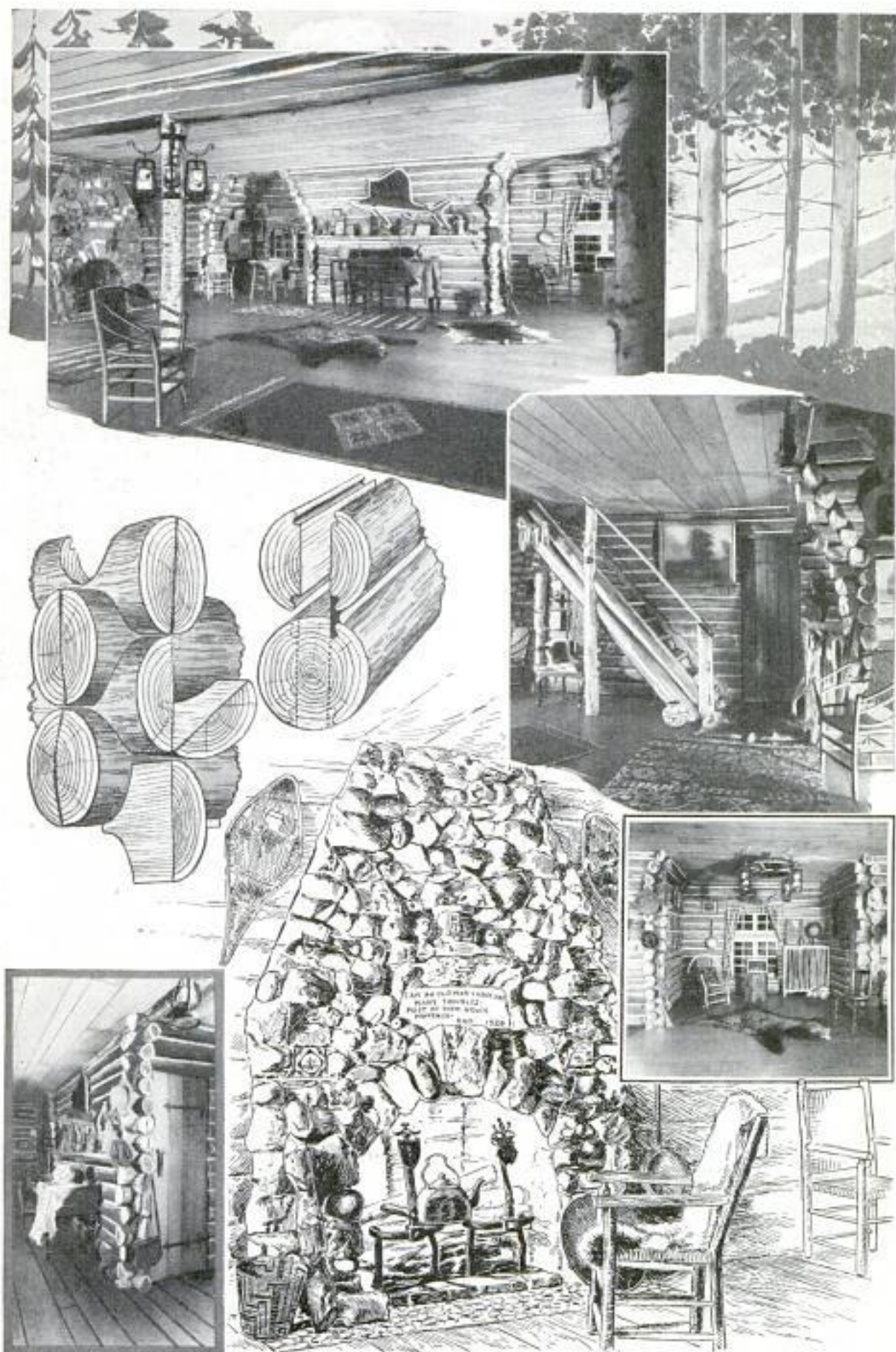
WHEN Mr. Kenneth Curtis, of Winnetka, Ill., decided to build an additional room in his attic, he wanted not only something unusual, but something livable also. How well he accomplished his design is shown by the photographs accompanying this article. As soon as the attic door is closed, one is immediately transported to the north woods; even the smells are "woody."

The ideas embodied in this novel room can be adapted in many ways: for the attic room, like the original; for the unused room that is to be made into a "den," or for the basement that is to be transformed into a recreation room. For the sidewall "logs" Mr. Curtis used ordinary 5-in. cedar fence posts, which ran from 6 to 8 ft. long. Out of the center of each post, a 1½-in. plank was cut, as indicated in the right-hand detail on the opposite page. The planks thus obtained were used for making the doors of the "cabin," and for similar purposes, where a rough-plank effect was desired. The sections of the logs left after cutting out the plank were used as the side walls, be-

ing nailed directly to the studding, flat side to the studs. Before nailing, the edges of the logs were rabbeted as indicated, so as to form a key for the plaster chinking used to fill the spaces between logs. The half logs were joined at the corners as indicated in the left-hand detail. Thus the lowest log on a wall was notched halfway through for the next log above to fit into it; this log, in turn, was notched on its upper edge for the next log, and so on. Where the corners projected into the room, the effect of whole logs was obtained by nailing short sections to the projecting half logs, as is also shown in the detail.

As mentioned above, the chinking consisted of plaster, but this has a tendency to crack and fall out, so it is suggested that oakum or some semiplastic material, such as is used for calking around residence windows and doors, be employed instead.

The ceiling was made of wormy cherry planks. Knotty pine, stained a deep brown, or weatherbeaten planks from an old shed also form a good ceiling. The



floor in the original room was linoleum, in random-plank pattern, but many other materials can be used. The main thing is to simulate the appearance of the floor in a real log cabin. All pillars were made of birch poles, as were the radiator covers, the table legs and the framing for the bunk seen in the heading. This bunk, incidentally, covers a vent pipe that comes through the floor in what threatened to be an awkward position.

The stairway, with its log stringers and pillars, forms an interesting note in the room, and it is suggested that it be included in any similar room, even if it does not lead anywhere. This also applies to the fireplace, built of field stone. In many places, a real fireplace may be built, but it ought to be incorporated, even if it is only an imitation.

For communication with the rest of the house, an old magneto-type telephone was installed, as more in keeping than a modern type. The main lighting fixture is shown in the head, and consists of a wagon wheel, with four old-fashioned hand lanterns wired for electric lamps, the chimneys being smoked up with a candle before installing. Many interesting lighting devices are a feature of the room, but naturally the selection of the fixtures and the method of illuminating the room are a matter of choice and availability.

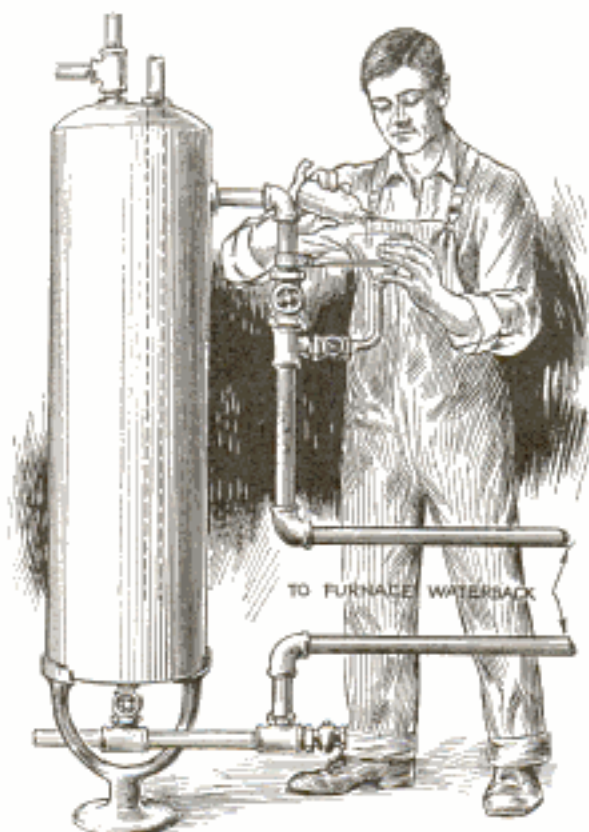
Furnace Coils Can Be Cleaned without Removing Them

In many parts of the country the water for household use is very hard. If none of the commercial water softeners are

used, the furnace coil and hot-water heater coil will "lime up" in a short time, causing inefficient operation and other trouble. When the furnace coil is thus clogged, it is often necessary

to remove it for cleaning with muriatic acid, and sometimes to renew the coil. The drawing shows a simple method of eliminating the trouble. The water in the storage tank need not be drained out or disturbed except that the hot water is used for cleaning. A valve is cut in the furnace-coil circulating pipe close to the point where it enters the hot-water tank. A reducing tee is placed below this valve and a $\frac{1}{4}$ -in. globe valve is screwed into the reduced end of the tee with a $\frac{1}{4}$ -in. nipple.

Two other nipples, connected with an elbow, are attached to the small valve, forming an intake into which the muriatic acid is to be poured. A glass funnel is slipped into the end and is supported by a suitable bracket. At the bottom entrance to the tank, a valve is installed and another one is placed at the lowest part of the system to permit draining the contents of the coil and tank. It is advisable to use gate valves for this purpose, as they do not obstruct the flow of water and will not lime up. To clean out the coil, close the valve directly under the tank and open the one used for drainage. Water from the tank will then flow out through the furnace coil and it will carry out all loose scale and sludge. The hard scale which clings to the inside of the coil must be removed with muriatic acid. The top valve in the hot-water line is closed, and the small adjacent one opened. About 2 pt. of muriatic acid is slowly poured into the funnel. Only a



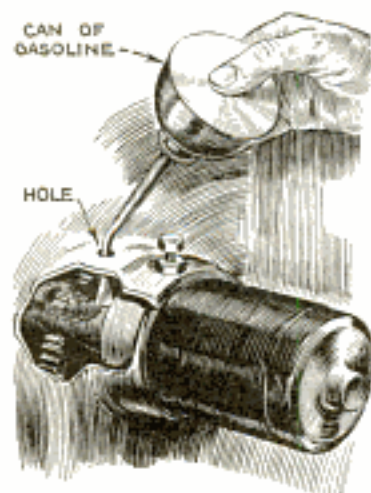
This Installation Permits Cleaning Out Clogged Furnace Coil with Muriatic Acid in a Short Time

small amount of acid must be poured in at a time and as soon as the acid in the funnel starts to sputter due to escaping gas, the small valve must be closed at once to prevent the acid from being thrown out. After a short time, it may be opened again and, if no more gas escapes, the rest of the acid is poured in. The small valve is then closed. As the gas cannot escape, the resulting pressure forces the acid through the furnace coil. Allow the acid to remain there for about 10 minutes, after which it must be thoroughly flushed out with water by opening the large upper valve. Leave the water run through for about 5 minutes. The coil is then ready for use again. Close the drain valve and open the one under the tank, while the top valve in the hot-water line must also be left open.

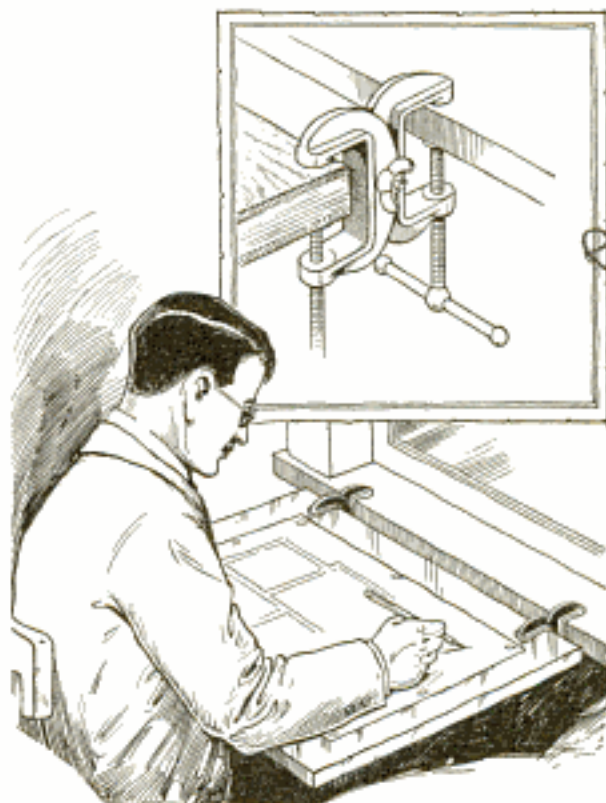
Hole in Housing Permits Cleaning the Starter-Drive Gear

On the starting motor of a car, the engaging mechanism consists mainly of a shock-absorbing spring and an unbalanced pinion. The pinion rotates on a thread, which causes it to engage the flywheel gear. Oil is not required on the parts of the starter mechanism, and the presence of oil will cause a collection of dirt, which will render the gear inoperative. It is essential to have the spring fastened at both ends. A broken or weak spring should be replaced. When the

starter goes in with a slam, it is probable that the torque spring is broken and must be renewed. Usually the mechanism is under a cover or guard. If oil is thrown off the flywheel onto the gear,



the latter should be washed with gasoline. A hole drilled through the housing, if the gear is inclosed as shown in the drawing, will permit washing it out as shown.



C-Clamps Enable Draftsman to Attach Small Drawing Board to Window Sill or to Edge of Table

C-Clamps Provide Convenient Holders for Drawing Board

With the aid of C-clamps securely held together in pairs as shown in the detail of the drawing, a draftsman, whose work takes him from place to place, will find it possible to attach his drawing board to a window sill or any similar ledge. The backs of each pair of clamps are drilled for a screw and wingnut, with which they are held together. This method of attachment allows a certain degree of adjustment to suit the user. When attached to furniture, insert small pieces of cardboard between it and the clamps.

New Remedy for Poultry Lice

A new and effective remedy for poultry lice is to paint the perch poles with nicotine sulphate just before the birds go to roost. The fume from this penetrates the feathers and kills the lice, but is entirely harmless to the birds. This method has been tried by experimental workers as well as practical poultrymen, and has always proved successful. Nicotine sulphate is an extract prepared from tobacco leaves and may be purchased at any drug or seed store.

William S. Spencer, Hartford Conn. N.Y. Patavia Clamp Co., 203 Center, Patavia, N.Y.

Swedish wrought iron. Swedish American Steel Corp. 429 Kent Ave Brooklyn, N.Y.

OF ALL crafts practiced by the home worker, there are very few offering the wide variety of practical projects that are possible with bent iron. Here is a medium which can be all curves or all angles; something that lends itself equally well to the making of a massive garden gate or a simple end table; an art which carries all the materials necessary for its practice in the average hardware store. Many of the simpler pieces especially, such as the humidor and lamp shown in Fig. 1, the small table pictured in Fig. 2, and the step railing shown in Fig. 3, should appeal to the home worker who appreciates projects with a "sparkle."

Taking the humidor first, this piece is constructed from $\frac{3}{16}$ by $\frac{3}{4}$ -in. strap-iron stock throughout, and is of a style which might be labeled as more or less "French modernistic."

Starting out, you will make the two ends to the size and shape indicated in Fig. 4. The outer parts of the "leg" at each end, including the curl at the bottom, are made in one piece, as may be seen in Fig. 5, while the inside triangle is fashioned from another piece. Both units are half-notched at the two points where they cross each other, the notch being cut with a hacksaw, as shown in Fig. 5, to allow the interlocking fit which is apparent from Fig. 6. The curls at the leg ends should not be fastened until the $8\frac{3}{4}$ -in. crosspieces, shown in Fig. 7, are fitted into position, when it will be possible to fasten all three pieces with a single rivet. The legs of the triangular section in each end are given a half twist below the curls, at the point indicated, and then fastened at the apex with a single rivet or bolt, after which the curls are pressed inward and



Bent Iron for

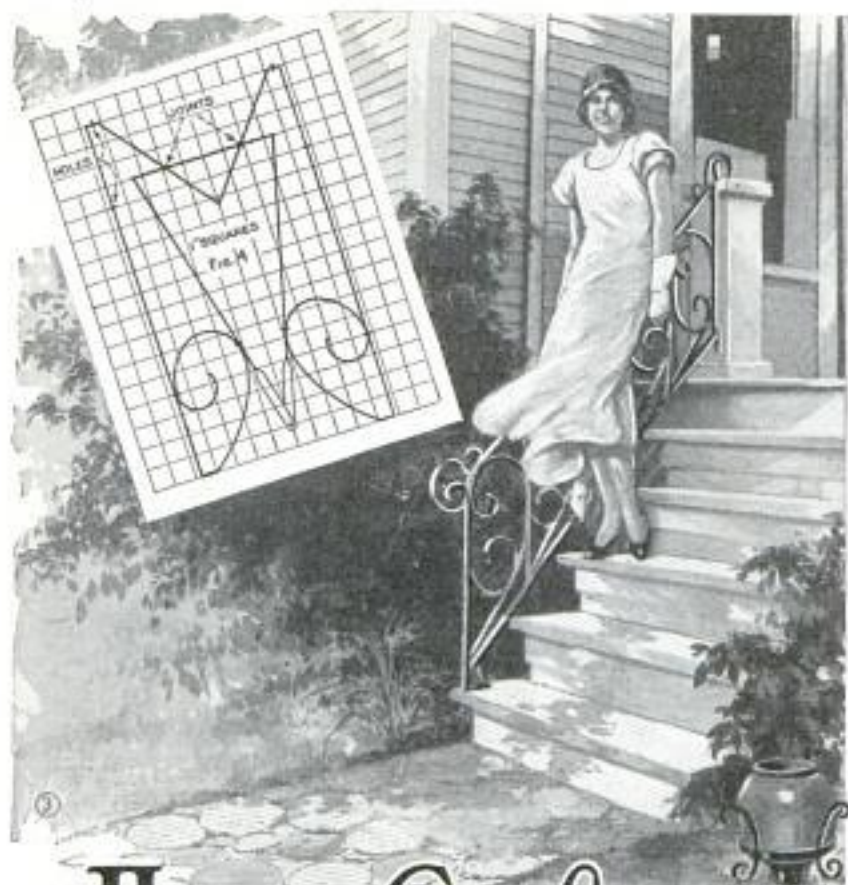
by Robert Gregg

PART II

riveted to the triangles at the point of contact.

Fig. 7 shows the completed humidor done in Japan black. The box on top, built to the dimensions given in Fig. 8, is fastened to the ironwork by means of four small screws, inserted through holes drilled in the top of each endpiece.

The stand lamp, which completes the unit shown in Fig. 1, is a piece equally easy to construct. The stem, in this project, is a 38-in. length of 1-in. square brass tubing. The actual ironwork which converts this tube into an attractive lamp begins with the shaping of the legs according to the diagram shown in Fig. 9. One length of $\frac{3}{4}$ by $\frac{1}{8}$ -in. strap iron is used in making each pair of legs, the iron being half-notched at the point of crossing to form the loops and allow of a half-lapped joint, as shown in Fig. 10. The

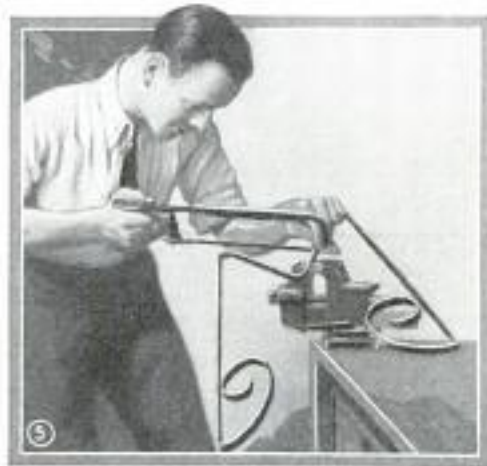


The Home Craftsman

two legs are held together with a short piece of threaded brass tubing which is fitted through a hole drilled in the center of each pair and held in place with a square nut on either side. The nut used on the top side should be of such a size as to fit the long brass stem snugly. With this arrangement, the legs are held together, the brass stem is centrally anchored to the legs, and a passage for the wires is provided, all in one operation. The legs are fastened to the brass stem with small screws threaded into holes previously drilled and tapped in the sides. Long cane-shaped pieces of strap iron are fastened at one end with the same bolts, and fastened again in a similar manner at the top of the stem, as pictured in Fig. 11. The extreme top of the brass tube is cut to allow one side to be

use many light blows instead of a few powerful ones. Working in this manner, you will not only get a cleaner job on each rivet, but you will greatly decrease the possibility of the piece being hammered out of shape.

The table shown in Fig. 2 is a neat little design which is somewhat different. The framework for this consists of a length of $\frac{5}{8}$ -in. strap iron, shaped to form a 12 by $17\frac{1}{2}$ -in. rectangle, with the corners bent at 45° to permit fastening of the four 1 by 17-in. legs, as shown in Fig. 12. Each of these is held in place with a single rivet, with the exception of the leg that conceals the joint in the top framework, where the fastenings should be two, as in Fig. 13.



Figs. 14 and 15 show the proper spacing for the diagonal braces and S-pieces

turned over, thus sealing the end. A hole is then drilled through the turned-over piece, into which is screwed a standard twin-socket light fixture, the wires extending down through the tube and out at the bottom, a trifle above the floor level.

The greatest care must be used in assembling these bent-iron pieces. Only through constant checking can pieces be constructed which will stand level and be perfectly symmetrical. To this end, it is advisable to do all preliminary assembling with small bolts, rather than insert the rivets as soon as each hole is drilled. Not until the piece is faired-up satisfactorily should the final fastenings be put in. Even at that late stage, be careful. In riveting,

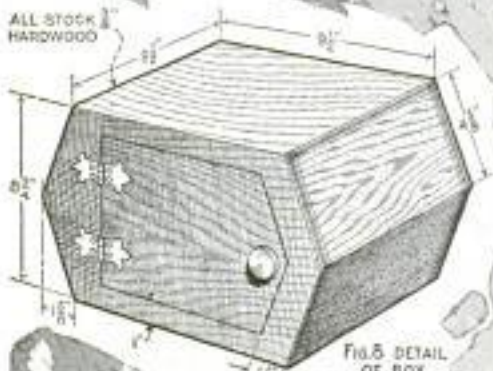
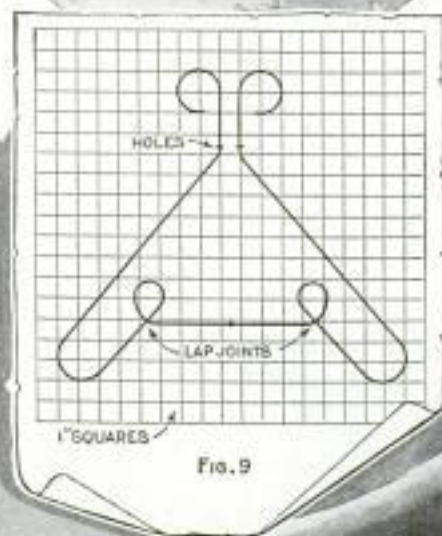
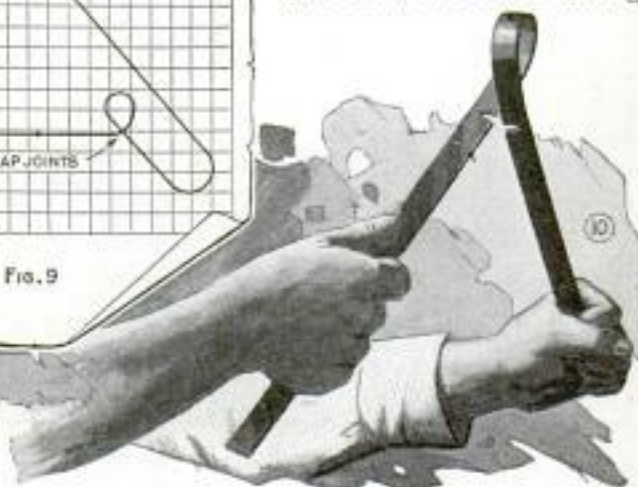
ALL STOCK
HARDWOODFIG. 8
DETAIL
OF BOX

FIG. 9

which go to make each face of the piece. Each brace is given a half twist at each end in order to make a flat-side-to-flat-side connection with the legs. Solder may be substituted for rivets in fastening the S-pieces into place between the diagonals, as shown in Fig. 16. A suitable top for the table can be constructed from a shallow galvanized pan in which are set colorful tile blocks in red and yellow squares, as shown in Fig. 17. The pan may be fastened to the frame with small angles and screws, using flat-head screws in the pan, countersunk flush.

Getting into something a trifle heavier, the railing shown in Fig. 3 makes an excellent project. It is impossible, of course, to give the dimensions of this unit, since the angle and length of each particular set of steps will determine the angle and length of the railing. However, the general principles of construction can be applied equally well in any case. The top and bottom of the rail are made from $\frac{3}{8}$ by $\frac{3}{4}$ -in. iron stock, which is left perfectly straight with the exception of a sort of shepherd's crook, which is turned around a length of pipe at one end of each piece. Strips of $\frac{1}{4}$ by $\frac{3}{4}$ -in. iron are spaced at 10-in. intervals along

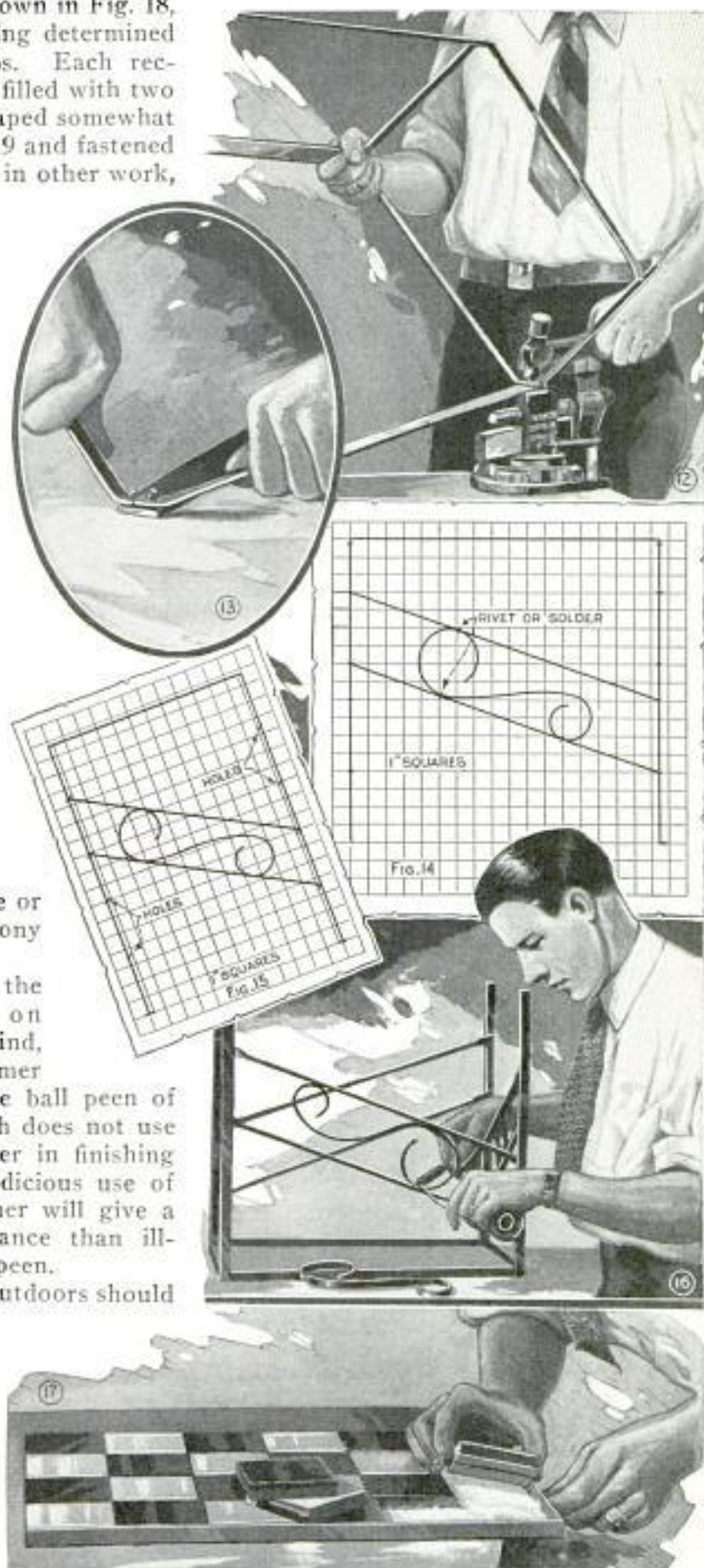


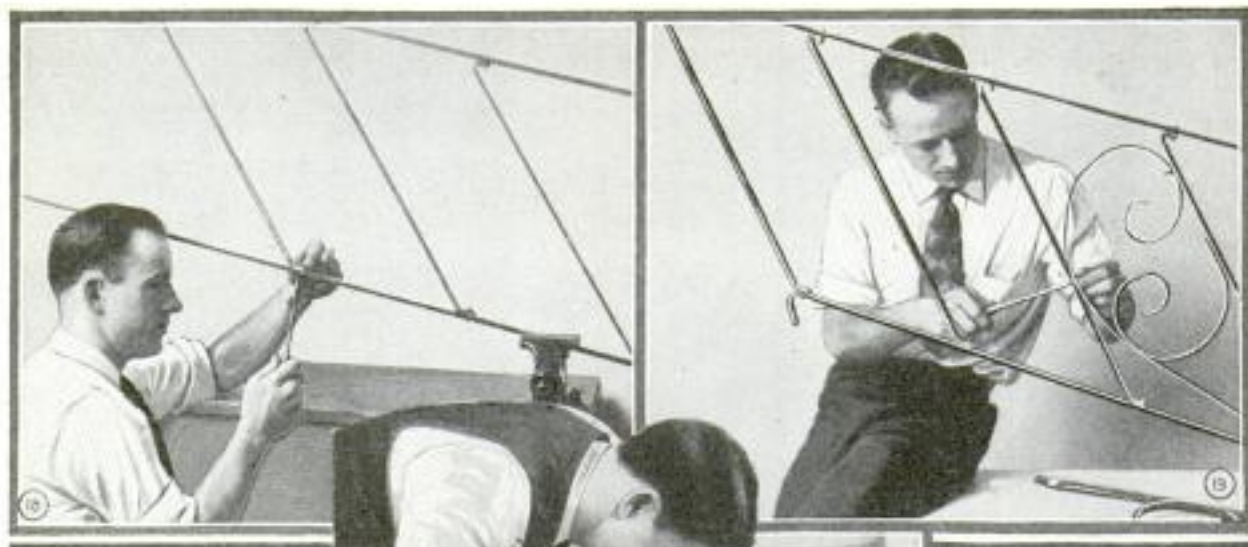
the length of the rail, as shown in Fig. 18, the turned-over angles being determined by the sweep of the steps. Each rectangle thus formed is then filled with two curls of $\frac{3}{4}$ -in. flat stock, shaped somewhat to the form shown in Fig. 19 and fastened at the points indicated. As in other work, the preliminary fastenings should be bolts. Proper stays to hold the piece in position will be determined by the style of steps on which the railing is to be used. If on the flat-top post type, which seems to predominate, an S-curve should be used to bind the rail and post together, as in Fig. 20. This does not add any to the strength of the unit as a whole, but it does add greatly to the appearance of the piece, which otherwise would make the impression of being "sawed-off."

While this particular arrangement has been described as a step railing, it is obvious that the same design could be used successfully as a fence or as a straight porch or balcony railing.

Do not overemphasize the "hand-hammered" effect on bent-iron pieces of any kind, and especially do not hammer all over the piece with the ball peen of the hammer. A blacksmith does not use the ball end of his hammer in finishing real wrought work. A judicious use of the flat face of the hammer will give a far more realistic appearance than ill-considered use of the ball peen.

Work that is to be used outdoors should be coated with boiled linseed oil, which is rubbed on in a thin coat and allowed to dry just like paint. Several coats may be given at intervals, and these will effectively prevent the pieces from rusting. Of course, the work may be painted, just like





any other outdoor structure, but ironwork does not look its best when it has been painted.

Pieces to be used indoors, like the lamp, may be coated with any good furniture wax, after the high lights have been brought out by polishing with emery cloth. A good grade of lubricating oil (cylinder oil) may be used for the same purpose, rubbing the pieces first with an oily rag and then with a dry one. A rub or two of oil once a year will thereafter keep them in good condition.

Color should be used only sparingly, if at all, on large pieces, and then only on small portions of the design. The color

is usually brushed on all over, then, while still wet, wiped off the high spots, leaving it in the hammer marks and other hollows in the design. Brushing lacquers can be used for this, after the iron

has been hammered and cleaned. Various effects can be tried out on scrap pieces of the stock, and a finish selected that will suit the piece. Dropblack, ground in turpentine, can also be used as a wipe coat, rubbing it off with a rag slightly moistened with turpentine, and leaving just a trace of black in the hammer marks. A visit to the nearest antique store will suggest many finishes that can be imitated.

How to Straighten a Buckled Handsaw

Although handsaws should be handled so that they do not bend or kink, it is well to know how to restore a saw having such a defect. A saw remains kinked after being bent over forcefully because the metal on one side of the blade has been stretched, making this side slightly longer than the other. Holding the blade over a smooth surface and striking the raised portion therefore offers no remedy; in fact, usually makes the defect worse. The proper procedure is to cushion the blade on a film of water which is poured on the smooth, level surface of the piece

used for an anvil. The saw blade is placed on the film of water with the buckled side up and a sharp blow with a hammer is then usually sufficient to straighten the blade.—Lemuel Harris, Nogales, Ariz.

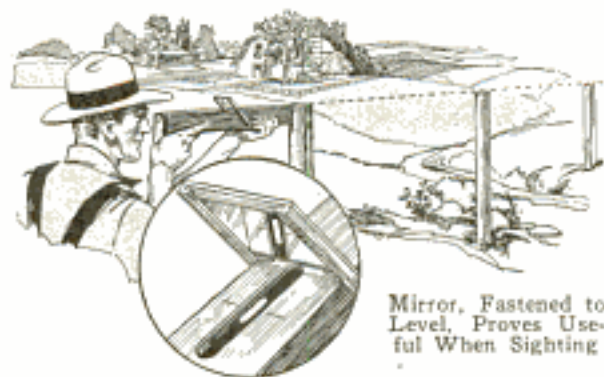
Tin-Can Lid Used as Reflector to Mark Width of Truck

Fastened to the lower left-hand corner of a truck bed, at the front, a large tin-can cover reflects an effective warning to approaching motorists as it shows them exactly how wide the truck is and thus helps to gauge the clearance necessary

when passing. Although a cover similarly attached at the back end of the truck will be helpful, the one at the front is really more important, as the brilliancy of the truck's headlights often prevents an approaching driver from seeing the truck body.—Horace Lemaster, Maryville, Mo.

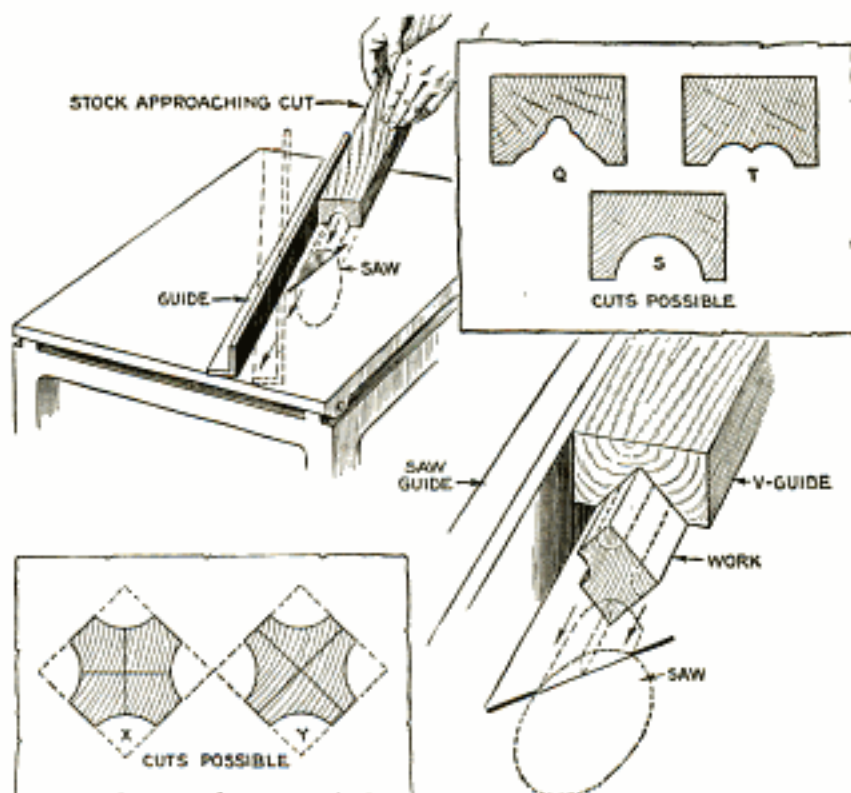
Mirror on Level for Correct Sighting

When sighting over the face of a level for any purpose, as, for instance, when setting fence posts, the user cannot tell whether he is holding the face perfectly level. In such cases, a small mirror will be found helpful as it enables the worker to see the level glass while he is sighting over the face. Construct a frame of light wood, letting two sides project a few inches at one end. The distance between the extending sides should be the same as the width of the level so that, when the projecting ends are pushed over the level as indicated, the mirror will be held in position firmly. Make a pencil mark on the side of the level to show the correct position of the mirror, which will eliminate the need of adjusting the mirror every time it is used. A small brad, driven into one or both of the extending pieces, on the inside, prevents the mirror from slipping



Mirror, Fastened to Level, Proves Useful When Sighting

down against the edge of the level and cutting off the line of sight.—Luther Strosnider, Onaga, Kans.

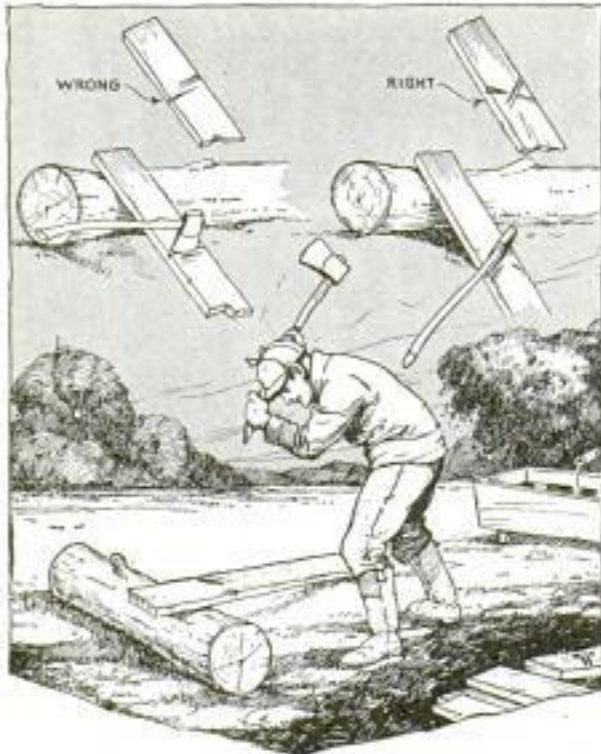


Angle-Iron Saw Fence, Attached to Table Obliquely, Enables the Operator to Cut Fancy Molding

Oblique Saw Cuts for Making Molding

Among the many odd cuts possible on the hand-feed rip saw, none perhaps are so little known as those which can be made by using an oblique fence. In this kind of work the direction of feed is at an angle with the saw instead of parallel to it, and the particular angle at which the fence is set, and the height of the saw table, determine the width of the slot to be cut. Although some of the cuts shown in the illustration have been drawn with true circular arcs, in practice the cut is slightly elliptical. This irregularity, however, is usually so slight that it makes no difference. The guide or fence is screwed to the saw table at the angle which will give the desired width of cut, and the table is then raised so that a very light cut is taken. It is necessary to run the work through a number of times and each time the table must be lowered a trifle. To cut a groove at a corner of a piece of square stock, a V-guide, such as shown in the right-hand detail, must be used. For a fence, a length of angle iron will be found useful.—John E. Hyler, Peoria, Ill.

Use the smallest milling cutter possible—the cost is lower and less power needed.



Making Crossing Diagonal Cuts When Chopping Prevents Chips from Striking the Workman

Diagonal Cuts Prevent Flying Chips

When chopping up a board, every blow of the ax is apt to send a piece of wood flying against the worker. This danger is largely overcome by making the cuts in a crisscross fashion as shown in the drawing. Both the usual and the suggested methods of chopping are indicated in the upper details.—J. W. Bailey, Baltimore, Maryland.

Linoleum Scraps for Advertising Signs

Painting white signs on the sidewalk directly in front of their stores is the usual method employed by many storekeepers to advertise. Powdered chalk mixed with water makes a good sign for the purpose but soon wears off and must then be renewed. Permanent signs made with regular paint, are seldom desired. One Chicago merchant uses a better method for temporary signs. He got a number of cheap linoleum scraps, 2 to 3 ft. wide and 5 to 6 ft. long. On the reverse side the signs were painted and the scraps were laid out in front on the sidewalk. These signs last a surprisingly long time without repainting as the rough nap prevents the chalk from being scraped off. At night they can be taken in if desired.

When the lettering is to be changed, the chalk is removed with water and a scrubbing brush. A set of these signs for periodic sales can be kept on hand ready for use, and thus save the storekeeper considerable time.—K. F. Keith, Chicago.

Making Power-Hacksaw Blades Last Longer

The teeth on a power-hacksaw blade wear out first at one end where all the cutting is done. By inserting a block between the work and the fixed jaw of the vise, an entirely new set of teeth are brought into action. When these teeth are worn out, the whole length of the blade is worn, and may then be scrapped.—L. Daniels, Seattle, Wash.

Pencil on Surface Gauge Marks Wood

The scriber of a surface gauge does not make a very distinct line on wood, and when I had a number of wooden blocks to mark off, I decided to use a pencil to make a line, thus saving the trouble of chalking the work. To use a surface gauge in this manner it is not necessary to make any new parts. Simply take out the spindle and insert the scriber in the clamp on the block; then use the pencil in the spindle hole of the scriber clamp as the photo shows.—Harry Moore, Hamilton, Can.



Using a Pencil in the Spindle Hole of a Scriber for Marking Wood

Attachment for Graflex Camera Enables Focusing without Opening It

For use in places where a graflex camera cannot be opened, and the image brought into sharp relief in the usual way, the illustrated focusing attachment will be found helpful. It was devised by a western newspaper photographer who often had to resort to guessing the focus, especially when he was "kidnaping" shots of prominent persons in courtrooms and other public places, where the opening of the camera would attract too much attention and give the person or persons to be photographed a chance to "cover up." A steel ball and a small coil spring are placed inside a short piece of tubing, one end of which has been closed just enough to prevent the ball from coming out. The other



Attachment on Graflex Camera Permits User to Put It in Focus without the Trouble of Opening It

end of the tube is soldered to a small brass plate, as shown in the detail, and two holes for screws are drilled through the plate. An ordinary bullet catch, to which a base plate is soldered, will serve equally well. A hole, which will just admit the tube, is drilled through the box of the camera at the point indicated. With the lens set at the correct focus for different desired distances, the drilling is continued, just enough to make small indentations at points on the rack arm. The attach-

ment is then screwed to the side of the camera and is ready for use. When moving the lens forward or backward, the operator can feel the ball drop into the indentations, and knowing at which focus these are drilled, he can correctly ascertain just how far to move the lens to get the object in clear focus without opening the camera. No actual measurements can be given as these would vary according to the camera on which the attachment is used.—L. M. Curtis, Venice, Calif.

Rubbing Vellum Paper with Magnesia Makes Erasures Possible

When drawings are penciled on vellum, which is common practice especially in the field of tool designing, it is practically impossible to make erasures, as lines drawn sufficiently dark for blueprinting cannot be removed and therefore mistakes print equally well with the corrections. This trouble can readily be over-

come with a cake of magnesia, obtainable at any drug store. Peel off the glue-paper wrapper from one end of the cake just far enough to expose the end of the cake. Rub the exposed end over the vellum paper on which a penciled drawing is to be made. No matter how hard the pencil is pressed in making the lines, it will be possible to erase them with ease so that they will not show up in the blueprint.—Frank L. Wade, Tampa, Fla.

A New England Colonial Home



© The Architects' Small House Service Bureau, Inc.

Plan No. 6-F-8

PLANS for small homes come and go—most of them go. But a first-rate Colonial house design is as stable in market value as anyone can build. Thus we understand why architects and builders recommend it. Take any street of small homes—the house that catches your eye and gives you most lasting pleasure is the finely finished Colonial house. That is the reason resale values stand up.

There are plenty of jazz houses. Most of us are tired of them. It is certain also that most of them cost more than they should. The “dancing architecture” is not cheap. Now this house, you can see, is straightforward; no furbelows, no added ornament to take money out of your pocket or to increase the mortgage. It will be inexpensive to own and to run, a friendly house. And it has real beauty.

The plan has the arrangement most people want, and it has been designed with expert care to bring in all the little things that loom so large in carefree housekeeping. You do not walk through the whole house to get from kitchen to front door. The dining room opens on your garden. The location of the fireplace conserves materials and heat, also reduces the cost of installing your house heater.



FIRST FLOOR



SECOND FLOOR

The Architects' Small House Service Bureau of the United States, Inc., was formed to furnish a complete and dependable small house plan service at moderate cost. For information regarding the blueprints and specifications address the bureau at 1200 Second Avenue, South, in Minneapolis, Minn. The bureau is under the control of the American Institute of Architects.

Get a tested blade in your screw-driver



"... a long row of experts, who test 'Yankee' screw-driver blades—each and every one of the hundreds of thousands."

EVER stop to think that you make a screw-driver do duty for about everything from cold-chisel to crow-bar?

No use trying to escape that fact—when a screw-driver is made. Or to dodge it when you buy your screw-driver.

Every "Yankee" blade is individually tested—and twice tested—by "Yankee" toolmakers.

The name "Yankee" on the tool means a blade that won't twist, crack, break, or bend on the edge; and that is "Yankee"-fastened in

the handle so that it can't be loosened by use or abuse any time, anywhere.

"Yankee" Screw-drivers are right in design, materials, temper. Well balanced, and with comfort-grip handles, they make work easier. It pays to get a genuine "Yankee."

No. 90. Standard Style: Fifteen sizes, 1½" to 30" blades. Price, for 5" blade, 50c; 6", 55c; 7", 65c; 8", 75c; 10", 95c; 12", \$1.10.

No. 95. Cabinet Style: Eleven sizes, 2½" to 15½" blades. 4½" blade, 40c; 5½", 45c; 6½", 50c; 7½", 60c; 8½", 65c.

Ask dealer for "Yankee." To get Tool Book to help you make things, use coupon below.

"YANKEE" TOOLS

TO HELP YOU MAKE THINGS



NORTH BROS. MFG. CO., Philadelphia, U. S. A.

Send me "Yankee" Tool Book, illustrating quick-action tools: Two-speed (11-inch) Hand Drills, Quick-Return Spiral Screw-drivers, Adjustable-Tension Push Drills, Ratchet Breast, Hand and Chain Drills, Automatic Bench Drills, Ratchet Tap Wrenches, Removable-base Vises, Etc.

Name

Address



"Yankee" Vise
No. 1993

Removable from base for holding work on drill-press or other machines. True all sides. Jaws open, 3¼ in.; price \$9.90. Other sizes, \$3.75 up.



New How-to-do-it Book Makes Home- Crafting EASY!

IT'S REAL FUN to build things, make models, fix furniture, or do ANY wood-working job, when you know the EASY ways to cut and fit 24 types of joints, shown in this new book. The diagrams, photos and clear instructions will soon teach you to do carpentry like an expert.

It is amazing how much practical information is packed into 32 pages! Tells how to plan and equip a home work-shop, gives lists of saws and tools for a small, medium or larger shop . . . suggests suitable bench machines . . . and shows how to build a folding work-table or big modern bench, saw-horses, tool box and wall cabinet.

Also, tells you where to obtain job plans to build 200 things for home, lawn, garden, sports, farm, etc. Book costs only a dime; worth dollars to every tool user—young or old, amateur or expert. Just

send 10c and coupon below.



CUT THIS OUT

E. C. ATKINS and Company,
(Est. 1857), 426 S. Ill. St., Indianapolis, Ind.
I enclose a dime for new ATKINS Saw Book. (PRINT below)

Name.....

Street.....

City.....State.....

Owning a home-workshop means father and son will have good times together.



1
Selecting GOOD tools saves you time and money, and assures you better results.



2
Making accurate wood joints is easier with the expert aid this book gives you.



3
Building a work-bench, tool box, or wall cabinet is real fun. The book shows how!



4
Getting plans to build 200 other articles is made easy by a handy reference list.



The New CRESCENT Screwdriver



Drop forged bits, properly hardened; shank hardened full length; ferrule turned from solid bar of steel; tough, hard maple handles with a water and grease proof finish, assembled in a way which makes loosening of the parts an impossibility are the main features of this new line of screwdrivers.

The combination of these features results in a tool that will stay on the job every minute and do its work well.

CRESCENT TOOL COMPANY
Jamestown, N. Y. Cable Address "Crescent"

CRESCENT and Smith & Hemenway TOOLS



MASTER INTERLOX SLIDE RULE
Only rule that gives inside measurements by direct reading. No guesswork. Both sides for ordinary outside measure, too. Fastest and simplest to use. Fine construction. Lasts longest. Slide cut like telescope. Locks right in use. Dealers and Agents Wanted.
MASTER RULE MFG. CO., Inc., 321 E. 135th Street, NEW YORK CITY

TWO RULES IN ONE
4 ft. \$.90
5 ft. 1.00
6 ft. 1.20
8 ft. 1.60



GERSTNER Tool Chests
for
Toolmakers and Machinists
Better, finer, more desirable than ever. Catalog free.

Gerstner & Sons
488 Columbia St. Dayton, Ohio



STANDARD GARDEN TRACTOR
A Powerful Tractor for Small Farms
Plows, Seeds, Cultivates, Mows Hay and Lawns
Gardeners, Florists, Nurseries, Fruit Growers and Poultrymen
EASY TERMS
Walking & Riding Equipment
Free Catalog. Does Belt Work
STANDARD ENGINE COMPANY
3221 Como Ave. Minneapolis, Minn.



New 19" Jig Saw
Here is the most for the money you have ever been offered. A heavy, well-built tool that will handle an astonishing variety of work. Cuts 2 1/4" oak, pine 3/4" boards, all with 1/4 horse motor. Mechanically right. Why fool with miniatures when this real job costs no more? Send for circulars DA2.
SYPPER-ARCON CO.
1524 Fernwood Ave., Toledo, Ohio

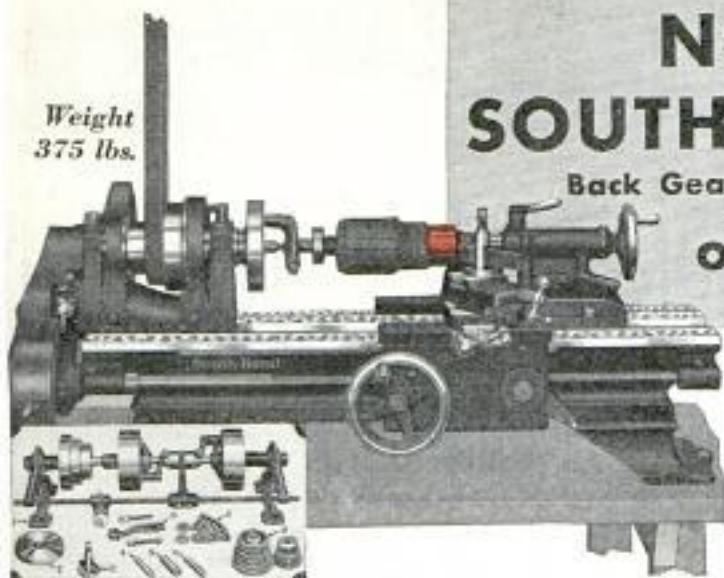
SYPPER-ARCON
\$19.95

New Model SOUTH BEND LATHES

Back Geared Screw Cutting Precision Lathes

on Easy Payments

Weight
375 lbs.



9" x 3' New Model Junior South Bend Bench Lathe **\$169**

Prices of Other Popular Size 9" Junior Lathes

Size of Lathe	Shipping Weight	Countershaft Drive	Down Payment	12 Monthly Payments Each
9" x 2½'	350 lbs.	\$163.00	\$32.60	\$11.41
9" x 3¼'	400 lbs.	\$175.00	\$35.00	\$12.25
9" x 4'	425 lbs.	\$182.00	\$36.40	\$12.74
9" x 4½'	450 lbs.	\$190.00	\$38.00	\$13.30

Send Now for these Books

"How to Run a Lathe"
25c Postpaid

Latest Edition of this famous work, contains 160 pages, with more than 300 illustrations. Simplest, most complete and practical book on lathe operation. Shows how to handle 400 different types of lathe jobs as practiced in the modern machine shop. Sent postpaid for only 25 cents; coin or stamps of any country accepted.

Auto Mechanics' Service Book, Free

This 48 page book shows a model auto service shop; gives up-to-date methods for servicing armatures, valves, bushings and pistons; describes complete equipment for these jobs, costing only \$265.00 Complete. Sent free, postpaid.

Catalog No. 91-A, Free

This 104 page book illustrates and describes the 96 different sizes and types of New Model South Bend Lathes. Send the coupon now for your copy, free.

Only \$33.80 Down

\$11.83 per month for 12 months for this 9" x 3' New Model Junior South Bend Back Geared, Screw Cutting Bench Lathe with countershaft and equipment. Wt. 375 lbs.

You can install any of the 96 sizes and types of South Bend Precision Lathes on easy terms of 20% down, balance in 12 months. The new models have improvements which make them more than ever the outstanding lathe values in the world.



9-in. Junior New Model South Bend Lathe, with Simplex Wall Counter-shaft and Lathe Equipment **\$169**

Extra Parts for Drive

¼ H. P. Motor, 1800 R. P. M. Non-Reversing (1-Phase 60 Cycle A. C.)	\$34.00
Switch, Knife Type	2.50
Conduit and Wiring	4.00
Beltting (Motor to Countershaft) 2" wide x 8¾' long	2.75
Beltting (Lathe to Countershaft) 1" wide x 6¼' long	1.25
Total for Complete Motor Driven Lathe as shown	\$213.50

May be bought on down payment of \$42.70 and \$14.95 for 12 months.

SOUTH BEND LATHE WORKS

649 E. Madison St., South Bend, Ind., U.S.A.

Lathe Builders for 24 Years — Over 50,000 South Bend Lathes in Use

SOUTH BEND LATHE WORKS
649 E. Madison St., South Bend, Indiana, U.S.A.

Gentlemen: Please send me books checked

- "How to Run a Lathe" (25c)
 Auto Mechanics' Service Book (Free)
 Catalog No. 91-A (Free)
 Easy Payment Plan

Name _____

Address _____

City _____ State _____

Amazing NEW TOOL VALUE

An Automatic Push Drill Carrying in the Handle Eight Sizes of Drill Points

Pick out the size drill you want from the separate numbered compartment. Insert it in the steel jaws.

Place drill point where you want hole.

Push—push—and presto, you have a smooth clean hole.

The handiest tool ever invented for household use.

Made by one of America's leading makers of fine tools, **SHOW THIS AD TO YOUR DEALER AND SECURE DRILL FOR \$1.25** or if he hasn't a stock yet, mail coupon to us and tool will be sent postpaid, C.O.D. \$1.40.

USE THE COUPON TODAY!



Goodell-Pratt Company, Dept. M-2, Greenfield, Mass.

Please send me a No. 158 Automatic Drill. I will pay postpaid \$1.40.

Name.....

Street.....

City..... State.....

My hardware dealer is.....

Nothing under \$2.00 ever bought such a good tool!

BURN YOUR NAME ON TOOLS

WITH THE ARKOGRAF

PROTECT YOUR TOOLS FROM THEFT

Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil.

Complete Outfit \$3.50—Freight Anywhere

Interesting Illustrated circular free. Write today. Agents wanted.

ARKOGRAF PEN CO., 1171 E. Stark St., Portland, Oregon



The PRODUCTO

Electric Work Shop
Combination



\$89.90

A sturdier home work shop—completely equipped. Send for circular.

THE PARKS WOODWORKING MACHINE COMPANY

Dept. PM-2, 1530 Knowlton St., Cincinnati, Ohio
Canadian Factory: 338 Notre Dame East, Montreal

PARKS
WOODWORKING MACHINES

SOLDER LIKE A PROFESSIONAL

with the

ESICO "Junior"

(Reg. U. S. Pat. Off.)

You can handle any soldering job—in a clean-cut professional way—with this easy-to-use electric soldering iron. Heats quickly and stays hot! Thousands in daily use by mechanics everywhere. Dark mahogany anti-heat handle; replaceable forged copper tip; highest grade nickel chrome heating element. Same durable construction as Esico "Industrial" used by U. S. Navy and leading electrical and radio factories. Plugs in, any current; 6 ft. flexible cord. Length 12 3/4 in., wt. 1 1/2 lbs., price complete \$2.75.

If your dealer can't supply you, send no money order or registered letter. It's your worst foe.

The Highest Quality Iron Ever Offered at the Price

Electric Soldering Iron Co., Inc., 137 West 17th St., New York, N. Y.

Boys—have fun with chemistry—25¢



Surprise your friends with magic chemical tricks; make ink; dye cloth; test water and soil; write secret letters with invisible ink; pour blue, brown and black liquids from a pitcher of water. All these and more chemical stunts can be done with Chemcraft Junior. It's the best box of fun you ever had; shows you useful things to do. Get yours now.



FREE MAGAZINE

to every boy who writes now. Contains chemical information and new tricks and stunts with chemicals. Write for yours now.

The Porter Chemical Company
93 East Washington St., Hagerstown, Md.



HAVE ELECTRICITY ANYWHERE INSTALL AN ONAN LITE PLANT

COMPLETE, 110 volt, ELECTRIC PLANT for Farms, Camps, Ranches and Summer Homes. Operates on gasoline and generates electricity. RUNS HOUSEHOLD APPLIANCES and LIGHTS. A Simple, Sturdy Plant..... \$139 Also other models, Direct Current or Alternating Current to 2,000 watts. Write for circular.

D. W. ONAN & SONS
63 Royalston Ave. Minneapolis, Minn.

CLASS PINS 35¢

FREE CATALOG

Either pin, silver plate... 35¢ ea.
Sterling silver or gold plate... 50¢ ea.
For 2 colors enamel, any 3 or 4 letters & dates

lower prices on Open Sets
951 BASTIAN BLDG.

BASTIAN BROS. CO. ROCHESTER, N. Y.

KINKADE GARDEN TRACTOR

and Power Lawnmower
A Practical, Proven Power cultivator for Gardens, Suburbanities, Truckers, Florists, Nurserymen, Fruit Growers.

New Low Prices—Easy Terms
AMERICAN FARM MACHINE COMPANY
1058, 33rd Ave. SE. Minneapolis, Minn.



OTTAWA LOG SAW



only \$39

GREATEST OFFER EVER MADE

Make Money! Wood is valuable. Saw 15 to 20 cords a day. Does more than 10 men. Ottawa easily operated by man or boy. Falls trees—saves limbs. Use 4-hp. engine for closer work. 30 DAYS TRIAL. Write today for FREE book. Shipped from factory or nearest of 6 branch houses.

OTTAWA MFG. CO., 1741 -W Wood Street, Ottawa, Kansas



Combination Square

No. 33—hardened steel blade—graduated in 8ths, 16ths, 32nds, and 64ths—drop-forged head—eight handy tools in one.



Micrometer

No. 230—cut-away frame—lock nut and ratchet stop—0 to 1" in thousandths—finest accuracy and feel.



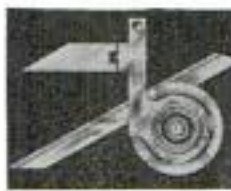
Indicator

No. 196—dial graduated in 1000ths—extremely sensitive—for testing, centering, and truing-up all types of work.



Depth Gage

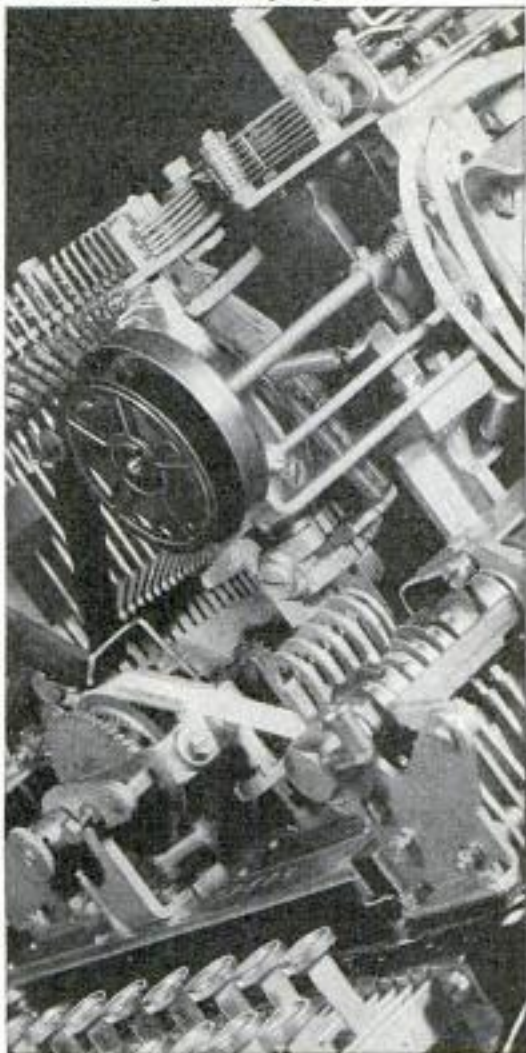
No. 449—flat, blade-like rods—base is hardened, ground and lapped—range 0 to 3"—micrometer accuracy.



Protractor

No. 359—dial lock, blade lock and fine adjustment are all on upper side—vernier reads to 1/12th degree—arcut angle attachment.

Close-up of the Simplex Printer, the machine used by Western Union for sending and receiving telegrams.



TYPEWRITING BY WIRE

Imagine yourself in New York, tapping out a message on a compact little machine with a typewriter keyboard. As you type, the telegram appears before you on a paper ribbon. And the same message appears simultaneously, letter by letter, on an identical machine in a distant office.

Here is a miracle of ingenuity—and accuracy. Asked to build complicated and precise machines like these, skilled machinists use the finest tools they can find—tools like Starretts, that make it easy to be accurate.

In your work, how often have

you wished you had better tools? How often have you felt that your skill didn't have a chance to show, simply because your tools were clumsy or inaccurate—or missing? Determine now to own the Starrett Tools you need—the tools that will give you greater pride and pleasure in your work.

Send the coupon for your free copy of the Starrett Catalog No. 25 "AP". This book describes and illustrates over 2500 fine Starrett Tools and shows how you can use them to do better work and do it faster.



Use Starrett Tools

SEND FOR THIS CATALOG

THE L. S. STARRETT COMPANY
ATHOL, MASSACHUSETTS
Please send me Starrett Catalog No. 25 "AP".

Name

Address

City State



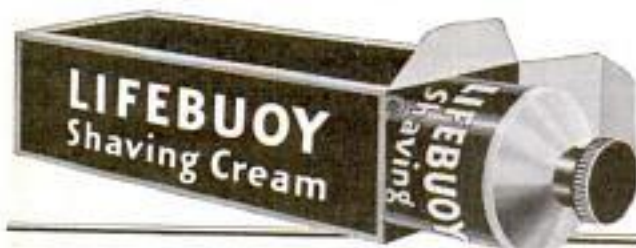
Good news for men with tender spots

PAINFUL tender spots vanish in a jiffy when you shave with the double-dense lather of Lifebuoy Shaving Cream.

This test proves it

Lather up with Lifebuoy. Shave as you always do. But feel how lightly the razor skims over tender spots—how easily the wiriest whiskers come off—without painful yanking, scraping or after-irritation. That's because Lifebuoy lather soothes, lubricates, protects.

Get the big red tube of Lifebuoy at your drug-gist's. Or send for a free trial tube. Address Lever Brothers Co., Dept. C-2, Cambridge, Mass.



Boys Fly the IDEAL EAGLET



20 in. Size
Construction
Outfit

50c

Postpaid

A Perfect Model of a Commercial Plane. All balsawood (not cardboard) with many features of expensive models. Easy, quick construction; everything ready to put together; weighs 1 oz. complete. Flies like a big one! Get one now and have some real fun!

Send 5c for Big 48-pg. catalog and Circular.

Ideal Aeroplane & Supply Company, Inc., 26 West 19th Street, New York City

LOWEST PRICES in years for KALAMAZOO Quality

Save 1/3 to 1/2

New FREE book quotes **Lowest Prices in Years** for Kalamazoo quality. **Only \$5 Down** on any stove, range or furnace, 200 styles and sizes. Coal and Wood Ranges, Furnaces \$55⁴⁵ up



Gas and Combination Ranges, Heaters and Furnaces, 24-hour shipments. Ranges \$38⁵⁵ up. 30-day FREE Trial, Satisfaction or money back. 30 years in business. 750,000 customers. Write today for FREE book.



Kalamazoo Stove Co., Mfrs.
391 Rochester Avenue
Kalamazoo, Mich.

"A Kalamazoo Direct to You"
Trade Mark Registered



Good and Good for You.

Build a CLOCK for Pleasure or PROFIT!

FREE BOOK

of Clock Making.

Money Making

ideas. Gives details,

prices of move-

ments, parts.

Write NOW for

copy!

Shows How YOU Can Make Fine

Clocks Right at Home

—for yourself, or to sell at Big Profits. We

furnish instructions, parts. Works \$1.85

for Model, Brass, Grandfather's Clocks.

Write for Special Blue Print Offer, FREE

Catalog.

AMERICAN CHIME CLOCK COMPANY

1670-G Ruffner St. Philadelphia, Pa.

Keds

At \$1.00, \$1.25, \$1.50,
\$1.75 and up to \$4.00.

United States Rubber Company

MOVIES In Your Home



Our marvelous, practical Movie Machines sell as low as \$3.75 postpaid, and use same size film as big theatres. We also have wonderful films at lowest prices—with a new film exchange service.

Don't Miss This! Write NOW for Free Catalogue.

PARAMOUNT MANUFACTURING CO.
Dept. G-36, BOSTON, MASS.



The "IDEAL"

Lawnmower Sharpener

is a wonderfully simple machine that sharpens all makes of mowers perfectly, scientifically, without taking the mowers apart. Just pick up the mower, set it in the "Ideal," make a few simple adjustments and proceed to sharpen. In 15 minutes the mower is ready for the lawn, and you have made \$1.50 to \$2.00—depending upon the charge you fix. No training required, and machine set up in a few minutes. Plug into light socket and start to sharpen. Hundreds of dull mowers in your locality are waiting to be sharpened. Sharpens skates—all kinds—perfectly.

You can make \$4.00 to \$6.00 an hour with THE "IDEAL" LAWNMOWER SHARPENER

This Man Is Doing It—SO CAN YOU

You've got the chance—the same chance as W. T. Moore, Twin Falls, Idaho, who made \$1,200 net profits in 90 days—the same chance as Walter Wever, Middletown, N. Y., who made \$1,000 in 4 months—the same chance as hundreds of others who have reaped rich rewards with this amazingly efficient lawnmower sharpener.

USE YOUR SPARE TIME. If you work at a trade, put an Ideal in your basement and earn \$4 to \$6 an hour evenings and Saturday afternoons. E. W. McCormick, Saginaw, Mich., writes: "Five years ago I bought an Ideal Sharpener on which I have ground over 5,000 lawnmowers. In the last few weeks I worked at my trade, machinist, full time 9 hours a day. I also ground 97 mowers which netted me \$114.10 clear gain."

PAYS FOR ITSELF AND MAKES BIG PROFITS. C. S. Coburn, North Little Rock, Ark., writes that his "Ideal" Sharpener earned enough in 18 months to pay for itself and \$1,857.00 worth of additional machinery.

OUR FREE BOOK TELLS YOU HOW—these men and many others have made themselves independent—built substantial, permanent, BIG PAYING business with this Ideal Sharpener. Send for this book today—It's Free.



MAKE EVERY
SPARE HOUR PAY
YOU \$4.00 to \$6.00



Send for FREE BOOK Today!

THE FATE-ROOT-HEATH COMPANY,
918-944 Bell St., Plymouth, Ohio.

Send me the book that tells me how I can make my spare time worth \$4 to \$6.00 per hour.

Name.....

Address.....



New H-F-L Mastertone

—new in magnificence of tone—
—new in power with world-wide
—reach—new in quick tuning—
—new in sensitivity and selectivity
with a station at every point
on dial. A new price—America's
finest radio at amazingly low
cost. FREE Book explains all.
Send for it and Special Offer now.

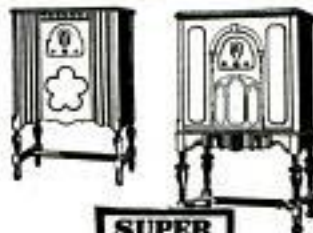
HIGH FREQUENCY
LABORATORIES
52-3900 N. Claremont, Chicago

MOTORCYCLES



Price \$10 and up purchased
through our Co-Operative
Plan for as low as \$1.00
down and \$1.00 per week
Indians Harley-Davidsons Ace
Henderson and Cleveland
Send ten cents for Bulletin A.
Motorcycles shipped to all parts of the world.

WALKER-INDIAN CO., 1309 Baylston St., BOSTON, MASS.



SUPER
Screen
Grid
\$49.88
Complete
less tubes

FREE! Send for BIG SPECIAL
OFFER—No obligation.
Midwest Radio Corporation
1218 Successful Year
807-DF Miraco Dept., Cincinnati, Ohio

TRY IT
30 DAYS FREE
BEFORE YOU BUY

Factory to you. Save to 50% on latest
Screen Grid Electric or Battery
Radio. Get 'Send No Money' Offer.

MIRACO Radio

Amazing bargains direct from
big, old reliable factory. Don't
buy unless 30 days' use proves
entire outfit unbeatable at up to
twice our price for tone, selectivity,
distance, power. 1 yr. guar.

Mobiloil



DAYLIGHT
for READING
from ANY lamp



Instantly, banish tendency toward
eye-strain, sleepiness and blur when
reading, studying or working by artificial
light. Amazing invention that
fits around bulb transforms the nerve-tiring
yellow incandescent light into bright, restful
DAY-light. Your eyes will feel the difference
instantly! Fits home, office or shop
lamps and fixtures. Sold only on a guarantee
of money back if not more than enthusiastic
over results.

FACTS FREE! Write TODAY for fully illustrated literature and 10-DAY TRIAL OFFER!
LANG'S DAYLIGHT, Inc. 1833 E. 55th St., Dept. 7
CLEVELAND - OHIO

EASY-TO-BUILD COACHES



In a few hours with a small hammer
you can put together TALLY-HO.
Parts cut to fit, with clear instructions.
Also George Washington Coach. Either
\$4.95 C. O. D. plus postage. Money
order outside U. S. A. Horses \$5 pair.

ROY HANCOCK

Send .15 (coin) for '31 Catalog 323 Douglas Avenue, Portsmouth, N.H.



MOTORCYCLES

Pay As Low As \$2.00 per Week
Hendersons, Harley-Davidsons, Indians
Slightly used and rebuilt. Hundreds to
select from. Send 10c for list today.

MYEROW BROS. CO., 15 Berkeley St., Boston, Mass., U. S. A.

THE REGAL GEARED HEAD LATHE

for only **\$27⁸⁶** per month

THE latest in engineering design—convenient and easy to operate—smooth, accurate and powerful. Every Regal Lathe is guaranteed. Before the LeBlond Guarantee Tag is attached this lathe must pass every test given LeBlond products which range in price up to \$40,000. (It must be right.) A wonderful tool for accurate light work or repairs.

Regal Lathes are made in various sizes. The one shown is 10 inches by 3 feet. It sells for the low price of \$398.00. Lathe is shipped to you immediately upon receipt of \$79.60. Balance in monthly payments of \$27.86.

Write for complete descriptive literature.

Jobbers interested in a high-class lathe for the repair, maintenance and light manufacturing fields, please write.

IMPORTANT FEATURES

3-speed selective geared headstock, with heat-treated hardened gears.

Equipped with feed rod—taking the wear off the lead screw—retaining its accuracy for screw cutting.

Carrriage with exceptionally large bearing surface.

Extra heavy bed with numerous cross girths, all of close grained nickel steel iron.

The Regal Lathe comes to you equipped (including motor) ready to operate.



\$398.00

Size:
10"
x
3'

The R. K. LeBlond Machine Tool Co.
"Regal" Division, Cincinnati, Ohio.

Send me full details of the Regal Line of LeBlond Lathes.
(No obligation.)

Name.....

Address.....

City.....State.....

100

The
R.K. LEBLOND
MACHINE TOOL CO.
CINCINNATI, OHIO, U.S.A.

Thompson
BEATS
the World
on BOATS

THOMPSON
BOATS

CATALOG
FREE!



OUTBOARD MOTOR BOATS—For Every Purpose and Every Purse—The very fastest and most seaworthy Boats for family use, and a strictly up-to-date line of Step Plane Racing Models. Holders World's Outboard Endurance Record.

Rowboats
\$48.00
and up—

Most complete line ever offered, at real money-saving prices.

Canoes
\$50.00
and up—

Some all wood, others canvas covered. Light, swift, safe, strong and durable. Many color combinations.



Motor Boat
\$745

Mahogany Runabout. 16 and 18 ft. Speed 25 to 35 mi. per hr. Complete with 4-cycle motor installed, including electric starter and reverse gear.

CATALOG FREE—SAVE MONEY—ORDER BY MAIL
Please state the kind of boat you are interested in (45)

TWO LARGE FACTORIES
THOMPSON BROS. BOAT MFG. CO.
213 Ann St. (Write to) 113 Elm St.
PESHIGO, WIS. (Either Place) CORTLAND, N.Y.



GEARS

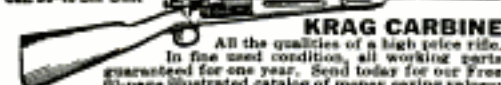
In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, rollers, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 10

CHICAGO GEAR WORKS
769-773 W. Jackson Blvd., CHICAGO, ILL.

Cal. 30-40 Six Shot



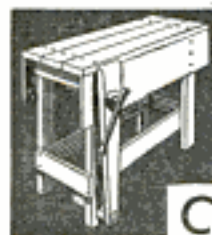
KRAG CARBINE

Price

\$9.75

All the qualities of a high price rifle. In fine used condition, all working parts guaranteed for one year. Send today for our Free 60-page illustrated catalog of money saving values; Guns, Ammunition, Cutlery, Sports and Gov't goods.

Deposit required on all orders. Money refunded if not satisfactory.
W. Stokes Kirk, Dept. P. M-2, 1627 N. 10th St., Phila., Pa.



For **10c.**
Only
You Get

Complete Plans
FOR A WORKBENCH

It's easy to build this strong bench for your workshop. Stanley Plan No. S72b tells you how, step by step.

And this is only one of the 25 Stanley Plans which show how to make 25 useful articles. Send 10¢ for Plan No. S72b and list of other Plans.

THE STANLEY RULE & LEVEL PLANT, New Britain, Conn.

STANLEY TOOLS



FREE

BIG

48-Page

BOOK of USES

*for new kind of wood
you mould with your hands*

NEWS! Amazing new kind of wood that handles like putty, hardens into wood, looks like wood... Plastic Wood you can plane, turn, carve... Plastic Wood that expertly mends a thousand things and makes anything you can make with natural wood or modeling clay... That's its name... **PLASTIC WOOD**. Sold in cans and tubes, in 9 colors, by all paint and hardware stores. Just mail coupon for big 48-page, profusely illustrated book that shows the many uses for this new kind of wood you just mould with your hands. **SENT FREE!**

MAIL THIS COUPON

The A. S. BOYLE COMPANY, Dept. 2-PM-4
Cincinnati, Ohio

Send me—free—Big Book of Uses for Plastic Wood.

Name.....

Street.....

City..... State.....

PATENT

Protect Your Ideas

Take the First Step Today

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon on the opposite page.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trade mark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

NO CHARGE for Information On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will also send you my "Record of Invention" form on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

My Offices
Just Across
Street From
U.S. Pat. Office



Above is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared in my offices.

NILOS

Inventors
Write for these **Free**
Books

Strict Secrecy Preserved

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. It is probable that I can help you. Highest references. But **FIRST**—clip the coupon and get my free book. Do **THAT** right now.

Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims.

Practice confined exclusively to Patents, Trademarks and Copyrights



Clip this Coupon and Mail it Now!

CLARENCE A. O'BRIEN, *Registered Patent Attorney*
70-D Security Savings and Commercial Bank Bldg.
Washington, D. C.

(Or, Suite 1106, Dept. A-8, Woolworth Bldg., New York City)

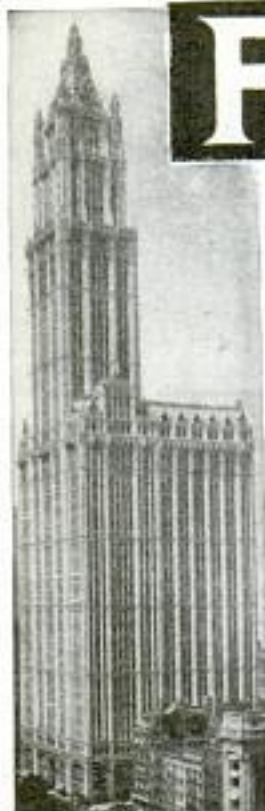
Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name.....

Address.....

(Important—Write or print name plainly and address office nearest you)

PATENTS TRADE MARKS COPYRIGHTS



Our New York Office
Suite 1007 Woolworth Bldg.



Our Philadelphia Office
828 Fidelity Phila. Trust Bldg.



VICTOR BUILDING
Our New Building Nearly Opposite U. S. Patent
Office Specially Erected by Us for Our Own Use



Have You An Idea?

Our Offer: FOR THE PROTECTION OF YOUR INVENTION

YOUR FIRST STEP—The Inventor should write for our blank form "RECORD OF INVENTION." A sketch and description should be made on this Blank, signed, witnessed, then returned to us. We also give our opinion as to whether the invention comes within the Patent Office definition of a patentable invention. This "Record of Invention" will serve as "proof of conception." *There is no charge or obligation for this service.*

Our Five Books Mailed Free to Inventors

Our Illustrated Guide BOOK

How to Obtain a Patent

Contains full instructions regarding U. S. Patents, Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

Our Trade Mark Book

Shows value and necessity of Trade Mark Protection. Information regarding *Trade Marks and unfair competition in trade.*

Our Foreign Book

We have Direct Agencies in Foreign Countries, and secure Foreign Patents in shortest time and lowest cost.

Progress of Invention

Description of World's Most Pressing Problems by Leading Scientists and Inventors.

Payment of Fees in Installments

It is not necessary that the total cost for the preparation and prosecution of a patent be paid in one payment. Our custom is to permit our clients to pay for their applications in three installments as the preparation of the application progresses in our office. This plan makes the payments easy for the inventor.

We Regard a Satisfied Client as our best advertisement, and furnish anyone, upon request, lists of clients in any state for whom we have secured patents.

*Highest References—Prompt Service
—Reasonable Terms*

VICTOR J. EVANS & CO.

Patent Attorneys, Established in 1898

Main Offices: 789 9th St., N. W., Washington, D. C.

Nearly Opposite U. S. Patent Office

DELAYS ARE DANGEROUS IN PATENT MATTERS

IMPORTANT! To Avoid Delay!

YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE to save correspondence, secure protection and early filing date in the Patent Office. To secure **special preparation** of your case send \$25.00 on account with model or sketch and description of invention. If the invention is not patentable we will return fee less cost of search.

We Assist our Clients to Sell their Inventions.



Our Chicago Office
Suite 1640-42 Conway Bldg.



Our Pittsburgh Office
Suite 514 Empire Building



Our San Francisco Office
Suite 1010 Hobart Building



MAIN OFFICE, VICTOR J. EVANS & CO.—VICTOR BUILDING, WASHINGTON, D. C.

Our Large, Comprehensive Organization has been established for 30 years and offers Prompt, Efficient and **Personal Service** by experienced Patent Lawyers and Draftsmen. Every case is in charge of a Specialist who has been selected for his knowledge and experience in certain lines of invention. Our Lawyers practice in all U. S. Courts and defend clients in suits involving Patents, Trademarks and Copyrights. All Communications, Sketches, Drawings, etc., preserved in fireproof Files, strictly **Secret and Confidential**. We shall be glad to have you consult us or to answer any questions in regard to Patents, Trademarks or Copyrights without charge or obligation.

**FREE
COUPON**

VICTOR J. EVANS & CO.
PATENT ATTORNEYS *Established
in 1898*

NEW YORK OFFICES
1007 Woolworth Bldg.

CHICAGO OFFICES
Suite 1640-42 Conway Bldg.

PHILADELPHIA OFFICES
828 Fidelity Phila. Trust Bldg.

PITTSBURGH OFFICES
514 Empire Bldg.

SAN FRANCISCO OFFICES
1010 Hobart Bldg.

MAIN OFFICES: 789-9th Street, N. W., WASHINGTON, D. C.

Gentlemen: Please send me *Free of Charge* your books as described on preceding page.

Name

Address

PATENTS

Booklet Free Highest References
Promptness Assured Best Results

Send drawing or model.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

Listed Patent Lawyer in the latest editions of the Rand-McNally Directory of Bankers and Bank-Recommended Attorneys, published by Rand-McNally & Co., Chicago, Ill.; The Baggott & Ryall Directory of Guaranteed Attorneys, published by Legal Directory Corporation, Boston, Mass.; Flugel's Law List, published by Legal Directory Publishing Co., St. Louis, Mo.; American Lawyers Annual, published in Cleveland, Ohio; Bankers Service Legal Directory, published by Bankers Service Co., Boston, Mass.; Eyre's Law List, 9 Park Place, New York City; Walters Legal Directory, Omaha, Nebraska, and the National Directory of Attorneys, Baltimore, Maryland.

WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D. C.

PATENTS

PROTECT YOUR IDEAS

Write today for FREE BOOKLET, HOW TO OBTAIN A PATENT and RECORD OF INVENTION—or send Drawing or Model of your Invention for Examination.

Promptness Assured with Best Results

MILLER & MILLER

REGISTERED PATENT ATTORNEYS

Former Members Examining Corps U. S. Patent Office
Dept. A-1006 Woolworth Bldg. New York
255 McGill Building Washington, D. C.

PATENT-PROTECTION

Inventors—
DON'T EXPECT YOUR
PATENT ATTORNEY
to protect you on imaginary
details of construction.
GIVE HIM A PERFECT MODEL.



WE SHOW YOU HOW
to protect yourself without
cost, without loss of time,
without disclosing to any-
one, even to us.

Guarantee - References - Circulars - Free
BERNARD & HELLER 31 East 17 St. N. Y. C.

TRADE MARKS PATENTS COPY-RIGHTS

BEST RESULTS. LOW FEES. PARTIAL PAYMENT PLAN

Write today for free information—No obligation, sending sketches and description of invention.

HARRY W. JOHNSON

Registered Patent and Trade Mark Attorney

FORMERLY MEMBER EXAMINING CORPS U. S. PATENT OFFICE
Member of the Bar: Supreme Court of the District of Columbia, The Court of Appeals of the District of Columbia, and the U. S. Court of Customs and Patent Appeals.

219 MCGILL BUILDING, WASHINGTON, D. C.



PATENTS

TRADE-MARKS

Don't Lose Your Rights
To Patent Protection

Before disclosing your invention to anyone send for blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed.

LANCASTER, ALLWINE & ROMMEL
430 Ouray Bldg. WASHINGTON, D. C.
Originators of form "Evidence of Conception."

PATENTS

TO THE MAN WITH AN IDEA

Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request.

IRVING L. McCATHRAN, Patent Lawyer

Formerly with and successor to RICHARD S. OWEN

750 International Bldg. Washington, D. C.
41-E Park Row New York City

TRADE-MARKS

PATENTS

As one of the oldest patent firms in America we give inventors at lowest consistent charge, a service noted for results, evidenced by many well-known Patents of extraordinary value. Book, Patent-Sense, free.

Lacey & Lacey, 635 F St. N. W., Dept. 5, Wash., D. C. Estb. 1869

Big 3 ft. Telescope Five Sections, Brass bound. Powerful Lenses. 10-Mile range. Special Eye Piece for looking at the Sun, included FREE. Can be used as a Microscope. Guaranteed. Big value. Postpaid, \$1.75. C. O. D. 15c extra. **Banner & Company, T-43, Trenton, N. J.**

PATENTS SECURED

TRADE-MARKS REGISTERED

High-class professional service for Inventors and Trade-Mark Users is necessary for PROPER PROTECTION. We Offer you our facilities on Reasonable Terms. If you have an invention send us a model or sketch and description and we will give you our OPINION whether your invention comes within the provisions of the Patent Law. Our book, "HOW TO GET YOUR PATENT" and Record of Invention Certificate sent on request. DELAYS are DANGEROUS in Patent Matters.

Terms Reasonable.

Best References.

WRITE TODAY

RANDOLPH & COMPANY, Patent Attorneys

301 VICTOR BUILDING, WASHINGTON, D. C.

Name.....

Address.....

BIG MONEY MAKER



Selling Kit Furnished

"A great idea!"

Something different—an original idea—never before seen on the market. Every man and boy a prospect.

Hook-Fast Belt and Buckle made to individual order—no two alike. Every buckle with personal initials and emblems—according to individual taste. Splendid profits made easily—**HANDSOME SELLING OUTFIT FURNISHED**—contains actual samples.

Become the official representative of Hook-Fast Belt and Buckle in your locality—Make big money—Sells itself.

Belt made of genuine English cowhide—never wears out—Buckle made of attractive plasti-croyd—lasts a life time, bright and untarnished—Specially patented Hook-Fast catch never slips.

Red-Hot selling proposition. Get in on it now! Write for free particulars.

NATIONAL CRAFTS COMPANY
20 West 27th Street Dept. 25 New York City

\$10⁰⁰ DOWN
Brings this Lathe to You

Lathes \$6.00 to \$75.00. Largest line of small lathes in America. Send ten cents for 32 page catalog No. DB2 of lathes, drill presses, benchsaws, jig saws, bandsaws, etc.

SYPPER-ARCON CO. 1514 Fernwood Toledo, Ohio

DO YOU WANT a new business profession of your own, with all the trade you can attend to? Then become a foot correctionist, and in a few weeks earn big income in service fees,—not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. Address Stephenson Laboratory, 1 Back Bay, Boston, Mass.

PATENTS

Trade Marks, Copyrights, Patent Litigation Handbook with illustrations, 100 mechanical movements. Sent free on request.

ALBERT E. DIETERICH

Successor to Fred G. Dieterich & Co.

formerly member Examining Corps, U. S. Patent Office

REGISTERED

PATENT LAWYER and SOLICITOR

621-A, Ouray Bldg.

30 Years' Experience Washington, D. C.

Part Time Men Get This FREE SUIT PLAN

CASH PROFITS ALSO

To introduce our new amazing values, classy styles and perfect tailoring, we make this introductory free suit offer—something different, better, bigger, more liberal than any other offer ever made. **Prices slashed. Amazing values.** Two-piece suits, made to order at \$17.75 and up, with fit and satisfaction fully guaranteed. **\$45.00 A WEEK AND MORE.** Besides, Big cash profits come easy for you.

No experience needed, we show you how. Costs you nothing to get started. Our selling outfit is FREE. Write at once for our FREE SUIT OFFER and Cash Profit Plan.

PROGRESS TAILORING CO.
Dept. B-216 Chicago, Ill.

Big free Outfit



OLD MONEY WANTED

We Paid \$200
to J. D. Martin of Virginia
FOR JUST ONE COPPER CENT

"Please accept my thanks for your check for \$200.00 in payment for the copper cent I sent you. I appreciate the interest you have given this transaction. It is a pleasure to do business with a firm that handles matters as you do.—JULIAN D. MARTIN, Virginia

Post yourself! It Pays! We paid Mr. Manning New York \$2500 for a single silver dollar, Mrs. G. F. Adams, \$740 for some old coins, W. F. Wilharm, Pennsylvania, \$13,500 for his rare coins. In the last 20 years we have paid hundreds of others handsome premiums.

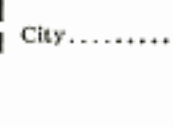
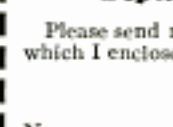
All Kinds of Old Coins, Medals, Bills and Stamps Wanted

\$1.00 to \$1,000 paid for certain old cents, nickels, dimes, quarters, etc. Right now we'll pay \$50 for 1913 Liberty Head nickels (not Buffalo) \$100 for 1894 dimes, "S" Mint, \$8.00 for 1853 quarters, no arrows, \$10 for 1866 quarters, no motto, \$200 each for 1884 and 1885 Silver Trade Dollars, 10 cents each for 1912 "S" Mint nickels, etc.

Big Cash Premiums for Hundreds of Coins Now Circulating

There are literally thousands of old coins and bills that we want at once and for which we will pay big cash premiums. Many of these coins are now passing from hand to hand in circulation. Today or tomorrow a valuable coin may come into your possession. Watch Your Change. Know what to look for.

You'll Open Your Eyes When You Read Our Big Illustrated Coin Folder Send 4 cents. We will send at once our highly illustrated and interesting Coin Folder. WRITE TODAY for this eye-opening, valuable wealth of information on profits that have been made from old money. No obligation on your part. You have nothing to lose—everything to gain



Send this COUPON NOW

Numismatic Company of Texas
Dept. 220, Fort Worth, Texas

Please send me your large Illustrated Coin Folder for which I enclose 4 cents.

Name

Address

City.....State.....



SAFE

For

RHEUMATISM

Prompt relief from HEADACHE,
COLDS, LUMBAGO, NEURALGIA,
RHEUMATISM, SORE THROAT,
NEURITIS, ACHES and PAINS



DOES NOT HARM THE HEART

BAYER ASPIRIN

Accept only "Bayer" package which contains proven directions. Handy "Bayer" boxes of 12 tablets. Also bottles of 24 and 100—All druggists.



Complete Building Plans of a 26 foot Sea Skiff in
The **JANUARY ISSUE** of

SINGLE COPIES 35 cents

THE RUDDER

The Magazine for Yachtsmen

\$3.00 A YEAR

A complete description of the boat and engine exhibits at the 1931 National Motor Boat Show. Illustrations of new yachts. Plans of new boats, built and building. Cruises at home and abroad.

Send for complete catalog of boating books and plans for amateur boatbuilders

THE RUDDER PUBLISHING COMPANY
15 Murray Street, New York, N. Y.

WASH-UP KIT 10¢

12 soap papers impregnated with pure coconut oil soap, 12 double paper towels (24 sheets), in handy package. Ideal for shop, garage, traveling, etc. Fits into pocket of automobile. 10 CENTS POSTPAID.

RODWAY SALES CORP., 60 Warren St., New York City

Make Your FORD Into The "ACE"

GET READY FOR SPRING—BUILD YOUR ACE NOW—
\$5.99 Red-i-Kut life size patterns Class—Snap



38-inch Easy Riding Seat

Exciting new 31 RED-I-KUT life-size patterns and picture instructions show how you can easily convert your Ford into this Fast, Sporty, Sport-Car as thousands have done with easily obtained materials. No need to lay up the car. Makes wonderful 4-passenger car. Send 10c coin for actual photo of sport car and see maximum of distinctive sport car patterns from \$5.99 up—RED-I-KUT "Sporting-Lo" dress. Type, Windbreak and many sport accessories. ORDER RIGHT NOW and get a real thrill.

KUEMPEL COMPANY, 129 Kuempel Bldg., GUTTENBERG, IOWA

30 Days' Free Trial on all MEAD Bicycles

New RANGER Models now ready for delivery direct from our factory. Astonishing new prices and terms. Do not buy until you get them.

RIDER AGENTS WANTED to ride and exhibit sample. Save big money. Many models, styles.

Tires wheels, lamps, horns, equipment at half usual prices. Easy Payments.

Write for our marvelous prices and terms.

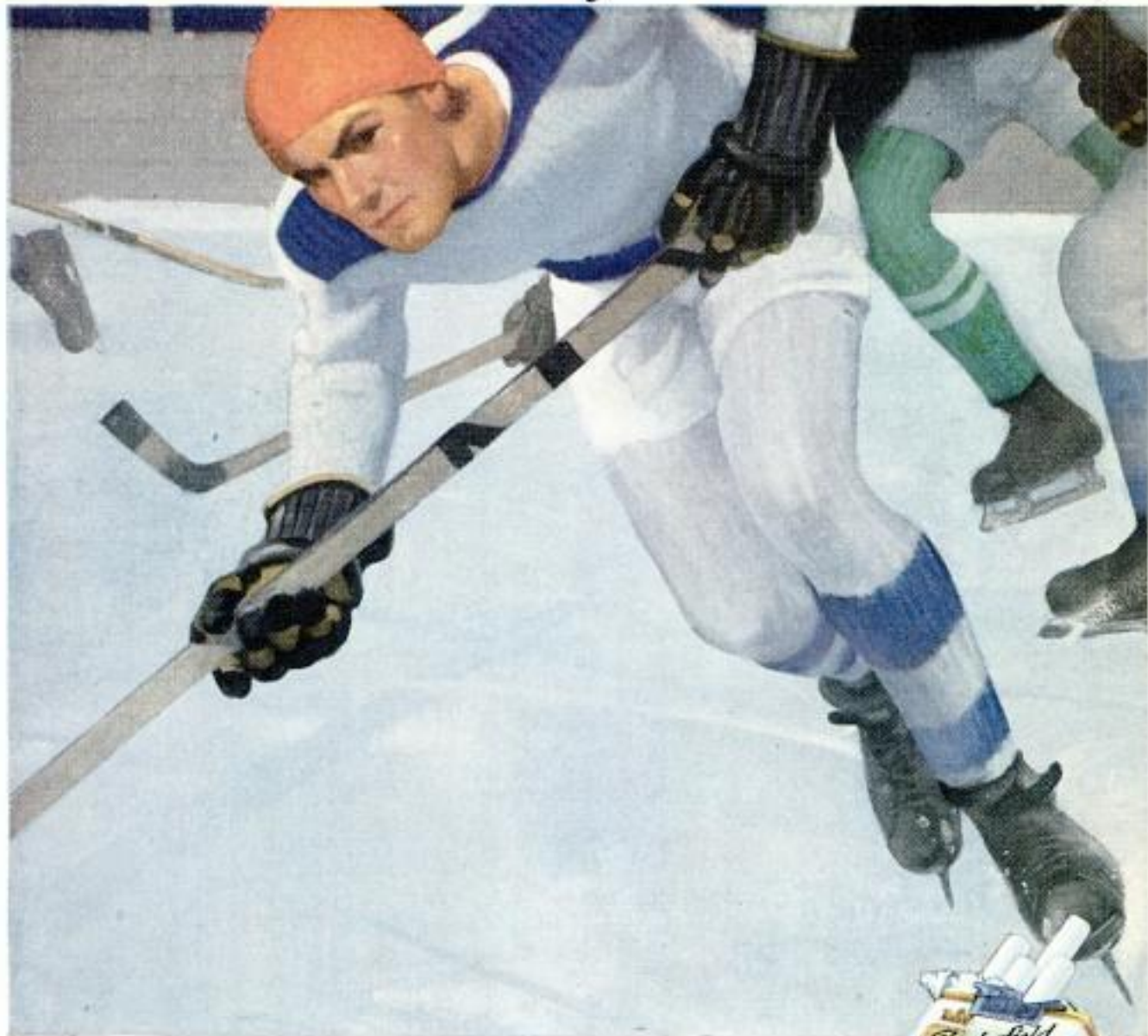
Mead CYCLE COMPANY Write us today for free Catalog

DEPT. A111 CHICAGO



Build your own outboard hydroplane motor or sail boat. Use our plans or knock-down frames and machined parts. Many models to select from. Write for new catalog. Please enclose 10c for catalog.
J. B. WELCH, Inc., Dept. B, 1351 41st St., Milwaukee, Wis.

ONE *will always stand out!*



Straight to the goal . . .

Streaking over a mirror of ice, the hockey star seems everywhere at once . . . but he never forgets that the winning shot must go straight for the net.

Chesterfield, too, takes the sure, undeviating course to the one goal that counts in a cigarette—mildness and better taste—the fragrant mildness and richer aroma of fully ripened, first-quality tobaccos—

A COOL . . . and COMFORTABLE SMOKE



They Satisfy
—that's Why!

Chesterfield

FREE AS A HAWK ON WING

SOAR away — wherever fancy calls you. Swoop down to that little lake you've glimpsed from the highway. Wing your swift and easy way over roads and trails to new adventures — to new cities worth seeing, and new people worth meeting.

Free as a hawk you are, when you're riding a Harley-Davidson. All roads are yours. You breeze by car parades, and flit through traffic jams. You can ride as much and as far as you like, for Harley-Davidson cost-per-mile is next to nothing!

See the 1911 Harley-Davidson models at your nearest dealer's. Ask about his Pay-As-You-Ride Plan. Mail Coupon to us for free literature.



Ride a
HARLEY-DAVIDSON

Mail the Coupon

HARLEY-DAVIDSON MOTOR COMPANY
Dept. P., Milwaukee, Wis.
Interested in your motorcycles. Send literature.

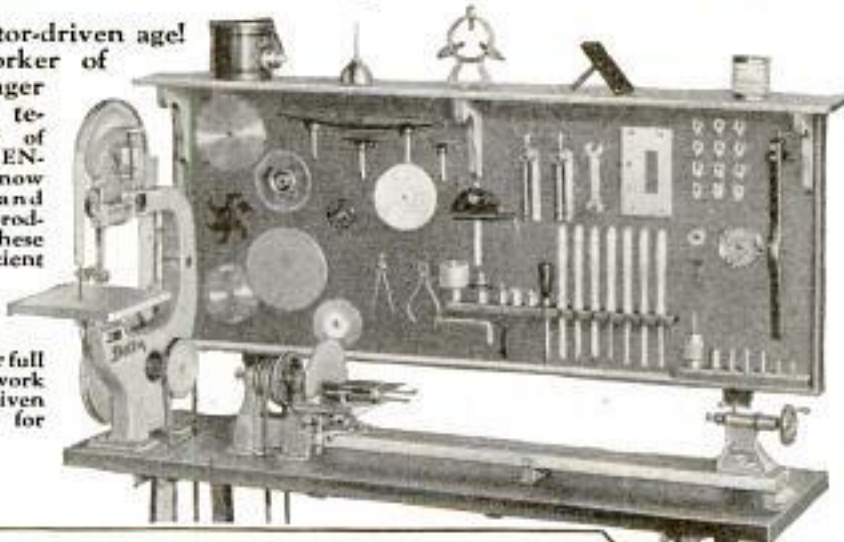
Name.....

Address.....

My age is 16-19 years, 20-30 years, 31
years and up, under 16 years.
Check your age group.

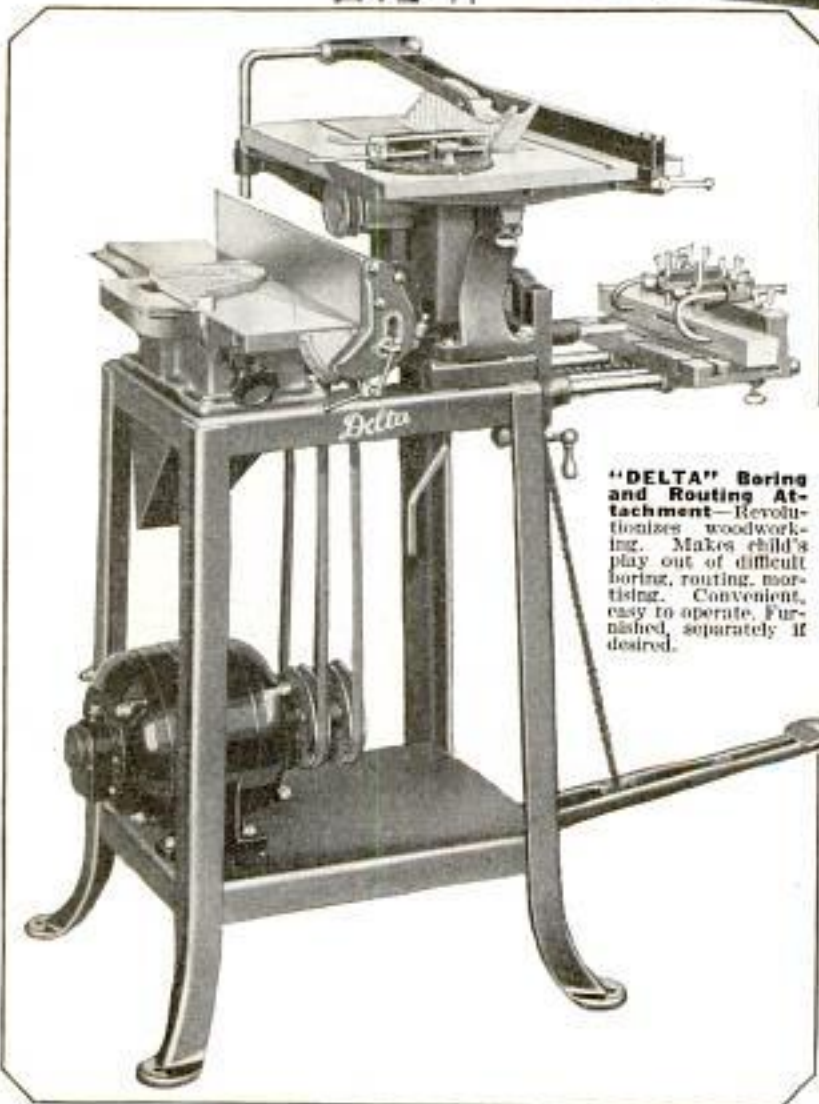
"Delta" Motor-Driven Units..the Modern Way of Woodworking

This is a motor-driven age! The woodworker of today no longer endures the tedious drudgery of handwork. He ENJOYS his work now—saves time and turns out better products—by using these compact and efficient machines, so moderately priced as to be within the reach of all. For full or spare-time work Delta motor-driven tools soon pay for themselves.



"DELTA" Band Saw has many exclusive features.

"DELTA" De Luxe Workshop, the last word in motor-driven workshops. Includes a 4-speed Lathe, Band Saw, Circular Saw, Jointer.



"DELTA" Boring and Routing Attachment—Revolutions in woodworking. Makes child's play out of difficult boring, routing, mortising. Convenient, easy to operate. Furnished, separately if desired.

DELTA EFFICIENCY

Every Delta woodworking machine is built up to this standard—it must perform its work *efficiently, quickly, and conveniently*. There are no hidden "bugs" in Delta Tools, no awkward, time-consuming operations, no bothersome dismantlings. Instead, there are thoroughly practical design, quality in workmanship and materials throughout (even where it cannot be seen), and numerous exclusive constructional features. That's why woodworkers everywhere say that Delta gives the most machine value for the dollar. That's why Delta owners are enthusiastic Delta boosters.

10 Day Trial—Easy Terms

Send coupon today for *free* illustrated literature describing the new 1931 "Delta" line. Also details of 10-Day Trial Offer and Easy Payment Plan.

DELTA SPECIALTY COMPANY

Division of DELTA MFG. CO.
3775 Holton St. Dept. A-231 Milwaukee, Wis.

Delta Specialty Co., 3775 Holton Street
Milwaukee, Wis., Dept. A-231.

Gentlemen: Please send me *FREE* illustrated literature describing 1931 "Delta" line and details of 10-day Trial Offer and Easy Payment Plan.

Name.....

Address..... ARD.....

"DELTA" COMBINATION JOINTER AND CIRCULAR SAW—Complete, on sturdy stand of convenient height. Jointer and Circular Saw can be operated separately or together without interference. This "DELTA" Unit is furnished with or without motor. Both the Jointer and Circular Saw can be secured as separate, individual units if desired.



You can do it-Easy

How long would it take you to pick out "Home, Sweet Home," with one finger, at the piano? That's how long it will take you to play it on a Buescher Sax! Three lessons, given, start you right off. Play popular tunes in a week. Join a dance band in 90 days. Make real money. Get what you want.

TAKE ONE HOME ON FREE TRIAL

Ask your local dealer for any Buescher instrument, Sax, Trumpet, Trombone, Clarinet, etc., on 6 days' free trial. Test yourself. See what you can do. Or send coupon for free Catalog. Mention favorite instrument. Easy Terms. Get started now for big future.

BUESCHER BAND INSTRUMENT COMPANY

210 Buescher Block, Elkhart, Indiana 1577

Without obligating me in any way, please send catalog of
 Saxophones Trumpets Trombones Clarinets

Mention any other _____ My age is _____

Name _____

Street Address _____

Town _____ State _____

RADIO



BOTH GIVEN

Powerful Six Tube Radio set—built under RCA Patents. Beautiful large cabinet—or Hamilton 22-calibre Rifle. Given for selling only 12 boxes UCA-Mentho Healing and Vapor Salve at 25c ea. with purchase free to buyers, remitting as per plan in promotion catalog. Send no money. We trust you. UCA-MENTHO Co., Dept. J-13, Chicago



22 CAL. RIFLE
GIVEN

ARTISTIC ENLARGEMENTS

SIZE 16 x 20 INCHES
(or smaller if desired)

FROM ANY PHOTO
snapshot, tintype, etc.

only **98¢** each



Send as many pictures as you wish—of Mother, Dad, Baby or Friend, landscape or pet animals. You can have full figure, bust or group or any part of a group. High grade LIFELIKE reproductions guaranteed. Regular \$5.00 Value.

GIVEN A beautiful Highly Glazed Hand Painted MINIATURE

reproduced from your photo will also be given with each enlargement ordered.

SEND NO MONEY. Simply mail us photo (any size) and in a week you will receive the beautiful enlargement and miniature. Pay postman 98c plus postage or send one dollar with order and we pay postage. Your original photo will be returned unharmed. Money back if not delighted. Take advantage of this AMAZING OFFER and send photo today—DO IT NOW.

ALTON ART STUDIOS, Dept. 14,
5707 W. Lake Street Chicago, Ill. 130 W. 42nd Street
New York City

Please send _____ enlargements from enclosed photo. I will pay postman 98c plus postage for each enlargement and miniature. (If \$1.00 cash for each enlargement is enclosed with this order, we pay postage.)

Name _____

Address _____

Town _____ State _____

Check Size
Wanted

16x20 in.

10x16 in.

11x14 in.

8x10 in.

Get Into The Shoe Business Without Investment!

We start you. Inexperienced workers earn big money with our direct to wear-er plan. Easy to take orders. Just show the famous Tanners line of shoes and bootery for Men, Women and Children. We tell how and where to sell. Patented Measure-Ment system insures perfect fit. Big profits guarantee prompt deliveries. You collect rest per day. We furnish 10000 pairs containing actual shoes and actual store. We larger variety of styles and more than any store. Send for free book "Getting Around" and full particulars. No obligation. Write now!

TANNERS SHOE CO.
872 C Street, Boston, Mass.

Experience Unnecessary!

DEAFNESS IS MISERY



Many people with defective hearing and Head Noises enjoy conversation, go to Theatre and Church because they use Leonard Invisible Ear Drums which resemble Tiny Megaphones fitting in the Ear entirely out of sight. No wires, batteries or head piece. They are inexpensive. Write for booklet and sworn statement of the inventor, himself deaf.



A.O. LEONARD, Inc., Suite 699, 70 5th Ave., New York



Do Your PRINTING

Cards, stationery, circulars, tags, labels, advertising, etc. Save money. Print for others, big profits; easy rules sent. Will do popular Raised Printing like Engraving, Junior Press, \$5.90. Job Presses \$11 up. Power \$14.95. Write for free catalog. THE KELSEY CO., Y-37, Meriden, Conn.

Send for Free Catalog



2000 illustrations—Diamonds, Watches, Jewelry. Largest Diamond & Watch Credit House in the World.

LOFTIS BROS. & CO.

Dept. K-534

108 No. State St., Chicago, Illinois

AGENTS AND SIGN MEN

Earn up to \$100 Weekly, and over, Putting up OUR GENUINE GOLD LEAF SIGN LETTERS



—on store and office windows, board signs, trucks and glass signs. We also make to order script signs and business emblems singly or by the thousands. A permanent business. No capital or experience required. Big demand in every City. Samples and Literature Free.

CONSOLIDATED SIGN LETTER CO. 75-X W. Van Buren CHICAGO, ILLINOIS

MAKE

\$100.00 A WEEK
FOR ONLY 2 SALES DAILY



Take orders for my wonder value all-wool suits, tailored-to-measure. Union made. New low prices. Bigger commissions than ever, paid daily. Generous bonus to producers. Style creations to please critical men. A big selling, big profit line. No experience needed. Write now for FREE outfit of large swatch samples. You are under no obligation. W. Z. GIBSON, Inc., Dept. 8-515, 500 Throop St., Chicago, Ill.



On October 13, 1930, Brown wrote us that he sold \$1000 worth of Candy Crispettes in One Day. Another man, Nazer, of Massachusetts, recently reported "\$3000 Profit in three Months."

\$351 Cleared in One Day!

by W. H. Adams of Ohio. Jacob Gordon, N. J., reports \$4000 profit in two months. And in 3 months A. Marini, Cal., sold \$11,275 worth. Branco bought one outfit for making Crispettes on April 5th and ordered seven more by August. Twnts & Co., started with one outfit and bought ten more the next year. John Culp writes: "Everything going lovely. Crispette wrappers all over town. It's a good old world after all." We do not claim everyone will do so well but half these profits should satisfy any reasonable man.

Start a Crispette Business Now!

Be independent by making Crispettes at home. Start in spare time. No experience needed; little capital required. No canvassing necessary. Proven sales plans insure your success from start: selling to stores, stands, by boys calling on homes. Everybody likes Crispettes. Raw material cheap. Your profits 200% to 800%. Is it any wonder E. R. Nabor, Mass., writes: "Averaging \$3000 profit for 3 summer months."

Quick Success Possible!

Start anywhere—cities, towns, villages, crowded streets, midget golf courses. Open a little retail store or begin at home. Sell at wholesale to stores, grocers, bakers, druggists, wayside stands or lunch counters.

We Will Give You Flying Start!

We'll furnish the secret formula, raw material and equipment—give you best selling system—help you build your own business. Send postal for Book of FACTS—it's FREE! Contains success letters from others—shows their places of business—tells how, when, where to start your own big profit business. Write now.

LONG-EAKINS CO.

226 High Street

Springfield, Ohio



Direct to you at wholesale prices

Send 10c today for the latest Illustrated Bulletin and Confidential Price List of Guaranteed Indians Harleys Hendersons SuperX etc.

(Sold on easy terms if desired)

CRANDALL CYCLE CO., 826-28 State St. Springfield, Mass. (part of the world)
Motorcycles Since 1905

Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized STEEL WIRE TRAP. Write for our FREE TRAP OFFER and Bargain Catalog. 51 Box of our famous Fish Bait FREE to introduce our traps. **WALTON SUPPLY CO., 3502 JUNIATA AVE., ST. LOUIS, MO.**

BUILD MODEL SHIPS OF THE BETTER KIND

We can supply construction sets and all sorts of parts such as semi-finished hulls, blocks, denderes, special flags, anchors, steering wheels, capstans, figureheads, blue prints, books, etc., for building real fine scale models of the Flying Cloud, Constitution, Spanish Galleon, Mississippi River Steamboat, Sovereign of the Seas, Hancock, U. S. Destroyer and many others. Also special construction sets for motor and boats, power boats, model steam engines, propellers, etc., and fine tools for the model maker. Our large 48-page photographically illustrated booklet contains valuable information and hints for building ship models in addition to prices and full description of the above articles. Many people are slightly interested in models have become greatly enthused upon receiving this booklet. A copy will be sent postpaid upon receipt of 15 cts. (coin preferred).

MODEL SHIP SUPPLY CO., Dept. C, Mineola, N. Y.

Here's Your Opportunity To Make BIG MONEY



Be Independent!

Have Your Own Business

Sharpening lawn mowers by the Foley Electrakeen System gives you 99c PROFIT out of every dollar you take in. It is the chance of a lifetime for you. Here's exactly the thing you've been looking for, to make a clean-up this summer and have a well established business of your own. *Morse made \$1,520 in five months last year!*

Foley Electrakeen Lawn Mower Sharpener

This remarkable machine sharpens all kinds and sizes of lawn mowers with the same method used by leading lawn mower manufacturers. Does a perfect job in from 15 to 20 minutes, sharpening all blades and the cutter bar at the same time. You get \$1.00 to \$2.50 a job—\$3 to \$10 an hour, and most of it CLEAR PROFIT!

These Men Are Making Money!

J. H. Harbeck writes, "Last year I ground 1,389 mowers." R. E. Linkfield says, "I average 15 mowers a day, and people bring them from all over." . . . "Made enough money to pay for the machine and all expenses in three weeks," writes Walter Dambek.

Why don't YOU make BIG MONEY, too? Get started early. FREE PLAN tells you how. Send coupon TODAY!

Mail This Coupon NOW!

FOLEY MANUFACTURING CO.

1507 Foley Bldg., 11 Main St. N. E., Minneapolis, Minn.

Please send me FREE PLAN and tell me how I can make BIG MONEY with the Foley Electrakeen Lawn Mower Sharpener.

Name.....

Address.....



Man, you can't get a hand like that clean with ordinary soap. What you need is Lava Soap — the best hand-friend a man can have. Get a cake of Lava tonight and watch its pumice-filled lather go after the dirt and grease — without hurting your skin.



*George,
the
Lava
Soap
Man*

SILVER ACE



Flying Models

Boy Scouts of America Official Kits
Model Supplies
Catalog 5 cents

AERO MODEL COMPANY
Dept. M2 111 North Wacker Drive CHICAGO

START A BUSINESS HOME MANUFACTURING



EASY MONEY

Manufacture Ornamental Products in permanent colors and shades, that practically sell on sight. Over 30 charming designs for porches, gardens, lawns, cemeteries, golf courses, etc. Fascinating. Easy. No experience necessary.

BIG PROFITS

O'Shea of Penna. made \$1,011 with 4 designs. Dupont of Ill., a trucker, made \$1,098 with 6 designs. Minbrough of Va. sold 3,000 pieces of 2 designs, etc., etc. All of the above in spare time.

START NOW

Now is the time to start—on any scale desired— spare, part, or full time. Expand from earnings. Equipment shipped on 15 days trial. Don't let someone else beat you in this fast-growing, exclusive business. Send today for free 32-page book, in colors.

Colorcrete Industries

570 Ottawa Ave.
Holland Michigan

START IN BASEMENT, GARAGE OR FACTORY



DEDO COCK ROACH KILLER

Guaranteed to kill roaches of all species, bed bugs, flies, mosquitoes, etc. This is an exterminator that kills. Does not stain paper, furniture, etc. Price 1 qt. \$1.25. Prepaid.

DEDO CO. 6418 Lowe Ave. CHICAGO

15 JEWEL WALTHAM



Sent for \$1

Estab 1895

10 MONTHS TO PAY

Send only \$1 and this fine looking Waltham watch comes to you postage prepaid—no C. O. D. to pay on arrival.

\$32.50

NEW CATALOGUE

Free to Adults. Remarkable values in standard watches, genuine diamonds, and fine jewelry. Fully illustrated. Write for free copy today.

10 DAYS FREE TRIAL

After examination and 10 DAYS FREE TRIAL pay balance in 10 equal monthly payments.

EP-4T . . . Nationally advertised 15 jewel Waltham movement. Handsomely engraved, white, lifetime case with newest style adjustable metal link bracelet. Tested, regulated and fully guaranteed. Only \$3.35 a mo.

SATISFACTION GUARANTEED

All transactions strictly confidential. You take no risk. Satisfaction absolutely guaranteed or money back. No interest—no extras—no red tape.

ROYAL DIAMOND & WATCH CO.

ADDRESS DEPT. 11-P, 170 BROADWAY, N.Y.

A SHIP MODEL OR COACH MODEL for \$4⁹⁸

You Can
Build
One



FREE
Illustrated
Catalog



All parts are cut to fit and ready to put together with diagrams and instructions so clear that with only a small hammer you can complete the work in a few hours. The kits contain everything needed. The hulls of ships and the bodies of coach models are made of California Redwood which can be given a beautiful finish, making a real ornament.

All models sent C. O. D. plus a few cents postage by parcel post to anywhere in the United States and Canada. Other foreign orders must be accompanied by check or money order.

MINIATURE SHIP MODELS, Inc.

Dept. RT, Perkasio, Penna.

Canadian Office: 90 King Street West, Toronto

From our former address in Philadelphia we have, during the past five years, supplied ship model parts to thousands of satisfied customers. As a result of growing demand we have located in our new factory.

Santa Maria	27" long	\$4.98
Mayflower	26" long	4.98
Constitution	33" long	6.98
Flying Cloud	27" long	4.00
La Pinta	26" long	4.98
Concord Coach	16" long	4.98
Covered Wagon	20" long	4.98

Miniature Ship Models, Inc., Dept. RT,
Perkasio, Pennsylvania.

Please send me complete parts, cut to fit and ready to put together for model.....

I will pay postman \$.....plus a few cents postage.

Name.....

Street or R. F. D.....

City.....State.....

AGENTS! SELLS LIKE WILD FIRE

FILL RESERVOIR WITH WATER. MOUSE SPRINGS TO CLEAN SO WINDOWS.

WATER FEELS THRU FELT TO WINDOW FRAME.



REMOVABLE RUBBER SQUEEGEE DRIES, CLEANS, POLISHES WITH ONE STROKE.

WIND-PROOF FOOL-PROOF LASTS FOREVER.

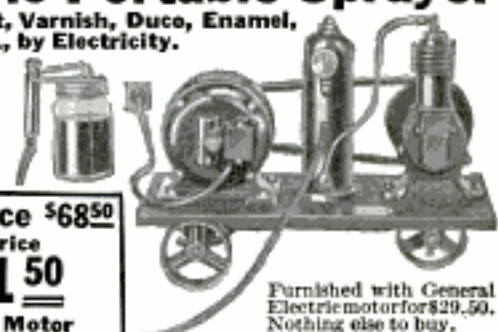
REMOVES LIP AND SHEET IRON HANDLE FOR HIGH REACH.

New Improved Window Washer. Cleans, dries, and polishes. Eliminates all muss. Approved by GOOD HOUSEKEEPING. 10 sales daily net \$380 monthly. Write today.
CARTER PRODUCTS CORPORATION, 998 Front Ave., Cleveland, O.

Electric Portable Sprayer

Sprays Paint, Varnish, Duco, Enamel, Lacquer, etc., by Electricity.

Attach to light socket, turn on switch and paint the power way. Does work of 5 men.



Reg. Price \$68⁵⁰
our Price
\$21⁵⁰
without Motor

Furnished with General Electric motor for \$29.50. Nothing else to buy.

Has Kellogg air cooled compressor that operates spray gun continuously at 30 to 40-pound pressure. Outfit includes air filter tank, pressure gauge, pop-off valve, connectors, 12 feet of hose and spray gun. Entire outfit mounted on all steel base on 3 steel wheels. Weight 70 lbs. Send \$5.00 deposit with order—balance C. O. D. Write for circular.

NATIONAL JOBBING AND EXPORT CO.
152 N. Clark Street Dept. 23 CHICAGO, ILL.

22 Cal. Blank Automatic

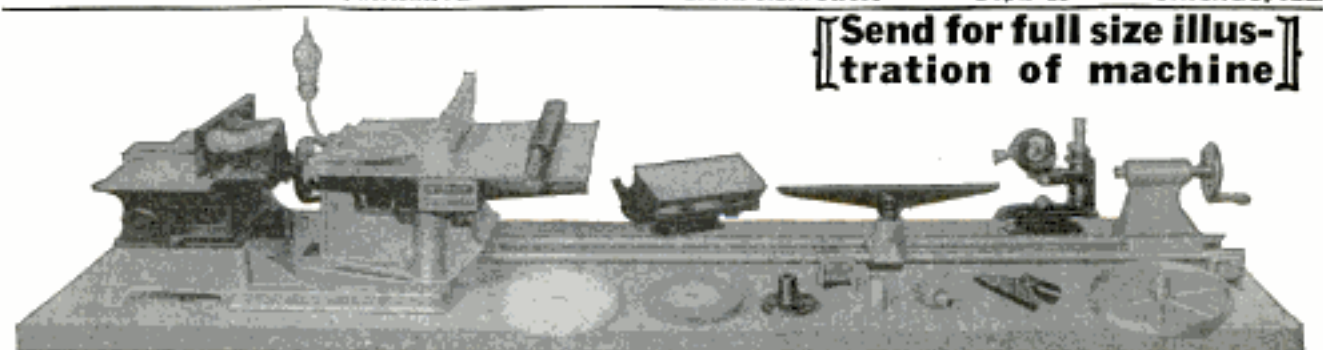
NO PERMIT REQUIRED

You can own this 22-caliber Automatic (see Blanks only) without a license. Get one for less or real protection. It features all traps and drives and starts deep away. Mounted in construction and appearance to genuine Automatic Pistol. Load report. Full size steel finish, subcompact. Send no money. Pay on program \$4.89, plus express charges. 3 for only \$11.89. Address WINEHOLT MAIL ORDER, Box B-25, Woodbine, Pa.



WITH 100 CARTRIDGES FREE!
\$4⁸⁹

Send for full size illustration of machine



New Model WORKACE WOODWORKER

COMPLETE 5 FT. ELECTRIC WOODSHOP FOR HOBBY OR INCOME

FREE
JIG SAW &
GUARDS

\$14.00 worth of extra value free if you act quickly.

Make hundreds of things with the Workace Electric Woodworker. Under the magic of the saw, planer, jig saw, lathe, sander, drill, grinder and buffing wheel (all included in the Workace Woodworker) raw lumber is easily converted into furniture, household necessities and countless other articles. Work out your ideas with your own complete electric workshop for fun or profit.

There's no better gift for the growing boy than Workace. It provides a wholesome man-building outlet for his energy and enthusiasm. Man or boy will appreciate Workace. \$9.00 down will bring it. Send now for details.

J. D. WALLACE & CO., Adams St. and California Ave., Chicago, Ill.

Write Name and Address on blank space below

\$9⁰⁰ DOWN
and \$9.00 A Month
for 10 Months
\$89⁰⁰ CASH

Homes

\$366-up



Garages

\$92 up



Summer Cottages

\$179 up



WE PAY FREIGHT

Direct from **ALADDIN MILLS** at Big Savings

Prices Include all lumber ready-cut, millwork, windows, doors, interior woodwork, hardware, roofing, glass, nails, paints, varnish and stains. All materials shipped in a sealed box car direct from the big Aladdin Mills by **prepaid freight**. Safe arrival guaranteed. Aladdin's Read-Cut System has revolutionized home building methods and costs. You save 18% lumber waste and 30% labor cost. All lumber is cut-to-fit at the Mill on huge labor-saving machines, instead of on the job, where labor and lumber waste costs dearly. Complete instructions and drawings enable you to build an Aladdin yourself if you are handy with tools.

The ALADDIN CO. Mail this Coupon

Bay City, Mich. (Address nearest office) Portland, Ore.
Send free, without obligation, new Catalog of Homes, Summer Cottages and Garages, No. 169.

Name _____
Address _____
City _____ State _____

Catalog FREE

Return the Coupon TODAY for FREE Book of Aladdin Homes, Summer Cottages, Garages, Filling Stations, Tourist Cottages and Roadside Stores. Overflowing with interest. A revelation to prospective home builders. Address nearest office. No obligation. Send now.

THE ALADDIN COMPANY

Bay City, Mich. • • Portland, Ore.

SHOOT A CLEAN GUN

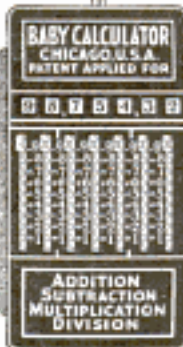
Hoppe's Gun Cleaning Pack, with No. 9 Solvent; Lubricating Oil & Gun Grease, keep guns free from rust and residue. At all dealers or direct, \$1. Send 10c for No. 9 sample. New 16 page Guide for Gun Protection FREE.

FRANK A. HOPPE, Inc. 2309 N. 8th St., Phila., Pa.



NEW VEST POCKET ADDING MACHINE

Guaranteed 5 yrs.



\$2.50
Total Cost

ADDS, SUBTRACTS, MULTIPLIES, DIVIDES

Costs only \$2.50 each, yet does work of \$300 machine. Not a Toy but a real adding machine that everyone should carry. Made of steel and indestructible. Million dollar capacity. Fits in pocket. Weighs 8 ounces. Will not make mistakes. So simple child can operate. Instructions furnished. Be modern in dealing with figures—order your machine today.

Free Trial

SEND NO MONEY—

Just name and address. We will ship Calculator immediately. On delivery pay postman \$2.50 (Plus few cents Postage). (If outside U. S. send cash.) 10c addition in Leatherette Case. If not satisfied after 15 day trial you get your money back. THOUSANDS OF SATISFIED USERS. This is the lowest priced practical calculator made. Why pay more for inferior imitations? Order from this ad.

Mail Coupon Today

BABY CALCULATOR MACHINE CO. (Manufacturers)
Dept. 71, P. O. Box 1118, CHICAGO, ILL., U. S. A.
 I am enclosing \$2.50—send adding machine prepaid.
 Send Adding Machine C. O. D. \$2.50 plus 18c postage. (10c additional in Leatherette Case)

Name _____
Address _____
City _____ State _____

AGENTS Write for big commissions and territory propositions.

HAENEL AIR PISTOL

Most powerful; ideal for target and small game; no powder, noise, cleaning or license required. Rifled barrel, accurate, perfect balance; 10 1/2" over all; weight 2 1/4 lbs. Ammunition cost is trifling. Guaranteed.

.177 and .22 Cal.; 500 lead pellets FREE—\$11.75.

Write for complete catalog "H"; Guns, Rifles, etc.
HUDSON SPORTING GDS. CO., W-52 Warren St., New York



Be a MASTER CRAFTSMAN

Earn extra money at home in spare hours. Capitalize on the popular demand for woodcraft articles. With H & A Wood Lathe you can easily turn out beautiful cabinet and pattern designs. Machine perfect. Yet built to handle heaviest jobs. Portable. Electric. For home or shop. Write for FREE catalog—complete line—band, rip, and scroll saws, jointers, lathes, etc.

HESTON & ANDERSON

602 Stone Street

FAIRFIELD, IOWA

SHIRTS

Sell Quickly!

Sell Bostonian Shirts—the shirts of real value—and make money every week. Made of fine quality broadcloth, guaranteed fast color. Newest styles, 4 popular colors. Just one price—3 shirts for \$5.95.—and a liberal commission in advance for you on every sale. No investment or training necessary. We give you FREE compact Selling Outfit. Excellent opportunity to develop a steady, profitable business. Write at once for FREE OUTFIT.

BIG money for AGENTS,

BOSTONIAN
Manufacturing Co.
89 Bickford Street
Dept. B-328
Boston, Mass.

BIG free OUTFIT

Enjoy Skiing
the "he-man's"
sport, on swift,
dependable

NORTHLAND SKIS

Best on the levels, fastest on the hills, surest on the jumps. To excel in skiing, choose Northlands as your personal skis. Write for free booklet, "How to Ski".

Northland Ski Mfg. Co.

World's Largest Ski Mfrs.

95 Merian Pl.
St. Paul,
Minn.



WORLD-WIDE

ONLY \$6.45

SHORT WAVE RECEIVER

Span the World with this Set!

A new radio thrill for you! Listen in DIRECT to London, Paris, Berlin, Buenos Aires and other broadcasting stations throughout the world via short waves. Enjoy unique foreign programs from strange lands. Your ordinary receiver cannot tune in these low wave stations. WORLD-WIDE RECEIVER gets 14 to 550 meter stations with surprising clarity. **SEND NO MONEY!** Just write your name and address on a postcard and ask us to send you this wonderful guaranteed short wave set. Pay postman \$6.45 plus a small delivery charge. All orders west of Rockies must be accompanied by \$1.00 deposit. Foreign countries \$2.00 extra, postpaid. Write today for new catalog of radio bargains.

CHAS. HOODWIN CO.

4240 Lincoln Ave., Dept. B.2

CHICAGO



NEO-TONE JR.

The outstanding 7 tube radio of the season. Radio reception as it should be. Built by the makers of the famous Neo-Tone Auto Radio.

Write for descriptive matter. Agents wanted.

SCHIFFMANN BROS.

3840 N. Ashland Ave. Chicago

BUILD YOUR OWN

AUTOMATIC ELECTRIC REFRIGERATOR

Why pay \$200.00 and upwards? You can use your present ice-box - We supply special parts - Costs only \$34.50 complete - Easily made - No special tools required - Operating cost, quality and size of machine same as well known makes - Complete blue-prints and thorough instructions - \$1.00.

B.&L. ENGINEERING Co. 62 Greenville Ave. Jersey City, N.J.

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

ENGINES

Lifetime Guarantee
All Sizes and Styles

300,000 In World-Wide Use

The WITTE (Magneto Equipped) provides cheapest reliable power for farm and ranch. Does more work in less time at less cost. Put one to work - will pay for itself. Send for Big Free Catalog.

WITTE ENGINE WORKS
1742 Oakland Avenue, KANSAS CITY, MO.

Lowest Price Ever Offered



World's Only Ball-Bearing Typewriter

Now's the time to buy that typewriter! By filling out the coupon you'll receive a genuine L. C. Smith at the lowest price and on the easiest terms ever made on this famous typewriter. For 20 years it has been recognized as the fastest running, easiest writing and longest lasting typewriter. The choice of railroads, big corporations like the Standard Oil. The U. S. Government uses over 50,000.

\$3⁰⁰ DOWN
BALANCE EASY TERMS

10 Days' Trial Easy Payments

Once you try this superb typewriter, you'll want to keep it. Only the L. C. Smith has these vital features: ball bearings at every point of friction, all the writing visible all the time, basket shift, back spacer, 2-color ribbon, and all the latest operating attachments. Beautifully renewed. IT IS THE WORLD'S ONLY BALL BEARING TYPEWRITER—Manufacturer's Guarantee.

Fill out—mail the coupon, and we will send you one of these superb rebuilt machines. Try it in your own home or office for 10 days. Put it to any test. Use it just as if it were your own machine. Compare the work it turns out. If you're not delighted, return it.

Send This Coupon

The L. C. Smith at this price, on these terms, may never be repeated. Act now! Mail coupon today. Save money. \$3 worth of extras and valuable Touch Typewriting Course included.

SMITH TYPEWRITER SALES CORP.

112 469 E. Ohio St., Chicago, Ill.

Ship me the L. C. Smith, F. O. B. Chicago. On arrival I'll deposit \$3 with express agent. If I keep machine, I'll send you \$4 a month until the \$36.90 balance of \$39.90 price is paid; the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent, who will return my \$3. You are to give your standard guarantee. (Cash Price, \$36.40.)

Name.....

Address.....

City..... State.....

Employed by.....

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night

The very latest discovery in the scientific world, luminous paint, practically unobtainable until now, has succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, renders it perfectly visible in the dark. THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES. Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons of your electric lights, match boxes, and lamp shades. Other articles made your own Luminous Christmas, Luminous Bookcase, etc. Small boxes, price 25c. Largest size, 50c and \$1 postpaid. JOHNSON SMITH & CO., Dept. 810 RACINE, WIS.



Cigarette Maker

Roll your own and save money. Better and quicker; saves more than half. Use your favorite brand of tobacco. No oil, water, heat. Pocket size, weighs 1/2 oz. Made entirely of metal, nickel plated. 25c, 3 for 65c.



GOOD LUCK RING

Very striking, quaint and unobtrusive. Silver finish; oval and crescent design. Two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. Only 25c per doz.



Exploding Cigarettes

Box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mirth producer yet entirely harmless. Price 25c per doz.



U. S. BABY TANK



It goes with real Yankee Pop—by its own power. Most remarkable toy ever invented. By drawing the Tank backward, either with the hand or over the floor or table and then placing it down, it will crawl along, overcoming all obstacles, in the same life-like manner as the latter Tank that proved so deadly in the great war. What makes it go is somewhat of a mystery, for there is no mechanism to wind up as is usually understood with mechanical toys, yet it will perform a number of the most wonderful stunts; 2 1/2 inches long. Price only 25c per doz. Postage Stamps accepted in payment of all orders.

NOVELTY BADGES



Rising Permit 10c. Garter Inspector 10c. Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.

MIDGET BIBLE



GREAT CURIOSITY Readable in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A creative work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for \$1.35, 100 for \$7.50. Also obtainable in leather binding, with gold edges. Price 50c each, 3 for \$1.25, \$4.50 per doz. Magnifying Glass for use with Midget Bible 15c.

STAGE MONEY



With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 25c, 120 for 50c, or \$3.50 thousand postpaid.

MAGIC MADE EASY 250 MAGIC TRICKS 10c



An excellent little book containing 250 Fun for Tricks, tricks with cards, coins, and handkerchiefs, eggs, rings, glasses, etc. Ample material for a child can perform them. Price 10c, 3 for 25c. Postage Stamps accepted in payment of all orders.

Wonderful X-Ray Tube



A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the back of your fingers, the end of a lead pencil, the inner opening in a pipe stem, and many other similar illusions. Price 10c, 3 for 25c.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. As the victim tries to light one he gets quite a surprise. Price 10c per box, 3 boxes for 25c, 12 for 75c.



Motto Ring

Lots of harmless fun and amusement wearing these rings. Made in plated metal (to resemble platinum), with wording engraved as illustrated. Only 25c Postpaid.

BLANK CARTRIDGE PISTOL



Well made and effective, modified on latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard .22 Cal. Blank Cartridge—obtainable everywhere. Special cash with order offer: 1 Superior quality Blank Cartridge Pistol, 100 Blank Cartridges, and our new \$50 value De Luxe Catalog of latest novelties; all for ONLY \$1.50. Shipped by Express only. Cannot go by parcel post. Extra Blank Cartridges 50c per 100. Special Holster (Cowboy Type) for pistol 50c. No C. O. D. shipments.

LOOK 35c LOOK Wonderful Instrument.



Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, Curious and Interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. Only 35c or 3 for \$1.00

THROW YOUR VOICE



Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends. **THE VENTRILIST** a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it.

Never Fails. A 16-page course on ventriloquism, the Ventrilo. ALL FOR 10 CENTS

PISTOL CIGARETTE CASE



It looks like a deadly weapon, but it is merely a novel Cigarette Case. This clever contrivance has proved itself better than the real thing in many an awkward encounter. Great fun "stealing up" your friends. They squirm and protest it might be loaded. Pull the trigger and the slide flies open disclosing the cigarettes. Well made, light and compact. Weight only 2 ounces. **PRICE POSTPAID 25c**

MAGICIAN'S BOX OF TRICKS



Apparatus and Directions for a Number of Mysterious Tricks, Enough for an Entire Evening. \$1.00 Entertainment... Anyone Can Do Them. It is great fun surprising your friends. Get this Conjuror's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for ten first-class tricks, including THE MAGIC BALL AND VASE TRICK (a wooden ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); THE HINDOO TRICK CARDS (can be made to change completely no less than five times); DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely or changes into a coin of another denomination); THE GLASS COINBOX TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); THE RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth); THE DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes); THE WEARDER'S RING COIN TRICK; the ENCHANTED BOTTLE TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); THE GREAT HAT AND DICE TRICK (a large die is placed on top of a hat, disappears, and is found underneath yet so no one has touched the hat), and last, but not least, the GREAT PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are sent for performing each trick. In addition to the above, a number of other feats and illusions are fully explained for which you can easily make or procure the necessary apparatus. Price complete \$1.00 postpaid. Postage Stamps accepted. **JOHNSON SMITH & CO., Dept. 810, RACINE, WIS.**



JOHNSON SMITH & CO.
Dept. 810 RACINE, WIS.
A De Luxe Edition of our new CATALOG mailed on receipt of 25c. Wonderful binding. Bigger and better than ever. Only book of its kind in existence. Nearly 600 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., appreciable elsewhere. Result by Cash, Money Order, Check or issued U. S. Canadian and Foreign Stamps for all articles listed above.

The Very Latest in Bench Machinery

The practical experience gained through 20 years' continuous experience in designing and building bench woodworking machinery is behind the latest improved 1931 BOICE-CRANE line of—

HANDSAWS - LATHES - JOINTERS BAND SAWS - JIG SAWS - SHAPER and HOLLOW CHISEL MORTISER

Everything you need to make spare hours fascinating and profitable. Strong, sturdy equipment—fast and accurate—turns spare moments into profit. W. L. Muir averages \$1 an hour; M. W. Cushing runs around \$2 an hour. Frank Whitaker sold 23d ship model for \$125.00. W. B. Duer earns high as \$25 day. All this possible for you. Get our catalog, select machines, rush order and within few weeks have humming saw, whirling lathe, buzzing jointer, zooming band saw and eager jig saw all busily running in your shop. You work with clean, fragrant lumber—making and selling screens, odd pieces of furniture, clever toys, unique novelties. Delightful minutes fairly fly. Our big free catalog explains everything—describes equipment, gives important woodworking data, tells of our achievement contests, shows several views of home and commercial shops, gives long list of interesting books of instructions and designs selling at attractive prices.

Big Jig Saw Only \$25

Large, massive and heavy. 20" capacity. Glutton for work. 15" dia. tilting table. Has improved hold-down shoe with blower. Blades swing to any angle. Weighs 70 pounds. Also 10" model priced at \$12.00.



Universal Handisaw \$30

Wonderful value. Will rip, grind, dado, bore, mitre, rabbet, joint, sand and mortise.



Buy Now
Pay Later

Brand New Shaper



17" table cast integral with pedestal. Rigid and solid.

Ball Bearing

ONLY

Correct Design. Spindle raises and lowers.

7000r.p.m

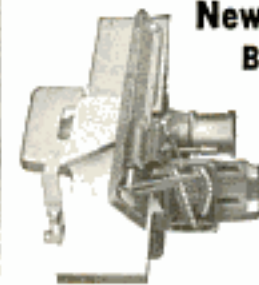
\$49

Cuts mouldings on straight and curved pieces. Dovetails, routs, dados, joints and rabbets. Weighs 80 pounds.



12" Band Saw less guards, \$32.50

Table tilts 45 degrees. Saws 4 1/2" thick. Bronze bearings. Very rigid frame. Blades for wood, metal or composition cutting.



New 4" Jointer Ball Bearing \$25 Less Guard

Nothing on earth like it. Graduated fence tilts two ways. Long tables. Wide rabbet arm.

New Plan—Shop Pays for Self!

BOICE-CRANE demonstrating shops needed in hundreds of towns. Your territory may be open. Get details. Learn how you can have self-paying shop of humming machinery. Following are high spots of plan. **1st**—You order in regular way. Send usual deposit. We ship machines and send you demonstrator appointment. **2d**—We send men to your shop who want to buy. You demonstrate. We do the selling. **3d**—You get commissions on all sales to prospects to whom you demonstrate. Makes it easy for you to meet payments. After payments for equipment are fully made, you still get commissions. Affords steady income long as you demonstrate. Get the details.

W. B. & J. E. Boice
Dept. P.M.—2G, Toledo, Ohio

Rush your big Free catalog only. Not interested in Demonstrator plan.

Rush catalog, also details of Demonstrator plan.

Name

Street

City

County

State

Send for Catalog—Use the Coupon

One of largest and most complete books on bench woodworking equipment. 52 large 8 1/2" x 11" pages. Filled with interesting information. Fully pictures and describes the very latest in bench machinery. Sent FREE. Use the coupon. Send it NOW.

W. B. & J. E. BOICE, Dept. P. M., 2G, Toledo, Ohio

Learn to **PAINT SIGNS and SHOW CARDS**

We quickly teach you by mail, or at school, in spare time. Big demand. Big future. Interesting work. Highest, foremost school. **EARN \$50 TO \$200 WEEKLY**

Otto Wisegrad, Md., home-study graduate, made \$12,000 from his business in one year. John Vannoy, N. Y., sets \$25 for a show card. Crawford, B. C., writes: "Earned \$250 while taking course." Write for complete information.

DETROIT SCHOOL OF LETTERING
150 Stinson Ave. Est. 1899 DETROIT, MICH.

FREE "Book of Facts" — Write For It

COACH BUILDING MADE EASY

You can build a beautiful coach model in a few hours. We supply all the parts, cut to fit and ready to put together, of the George Washington coach, the Tally-Ho, or the Dead-wood coach (famous Western stage) for \$4.98. Full instructions for building included with each kit. Build coaches for pleasure or profit. Models sent C.O.D. plus a few cents postage. Foreign orders must be accompanied by U. S. check or money order.

HISTORICAL COACH MODELS, INC.
Dep. P. M. 19, 2208 Fairmount Ave., Philadelphia, Pa.

Earn Big Profits Making Keys

BUILD A PERMANENT BUSINESS OF YOUR OWN!

One girl took in \$98.30 her first week! Be independent. Let us show you how!

WRITE TODAY

Duplicate any type of key in one minute. Make new keys from lock number. New patented key cutting machine is simple, easily operated and fully guaranteed. No experience is needed. A boy or girl can cut perfect keys with it. Everyone needs keys. Be the one to fill the demand in your territory. Full information FREE, regarding machine and liberal time payment plan.



Beisser Key Machine Co.
Woodward at Selden
Detroit
Michigan

WRITE for FREE CIRCULAR

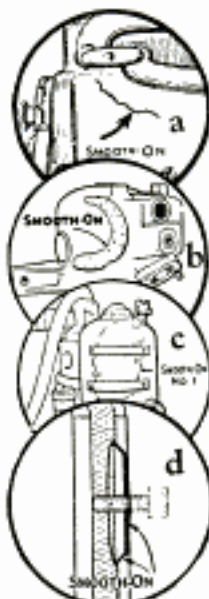
How To Repair a Cracked Water Jacket

with Smooth-On No. 1

No disassembling and no heat!

- A. Simple crack.** Force Smooth-On No. 1 into the crack and give it a few minutes to metallize.
- B. Long crack.** Put the Smooth-On under a metal plate, held with cap screws.
- C. Piece broken out.** Fit the piece back with Smooth-On in the break, and bind with metal straps.
- D. Holes or thin spots.** Cut weak metal away bevel, back, fit with manhole plate, and force the Smooth-On in tight with screw. To make an extra neat job, cut off outer end of screw.

Use Smooth-On also for stopping all water, oil, gasoline or exhaust gas leaks and for tight hold at screw threads of nuts, hub caps, etc.



Get Smooth-On No. 1 in 7 oz., 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.



Write for
FREE BOOK



Do it with **SMOOTH-ON**

SMOOTH-ON MFG. CO., Dept. 37,
574 Communipaw Ave., Jersey City, N. J.

Please send the free Smooth-On Repair Book.

Name.....

Address.....

Return this coupon for a
FREE copy of Booklet

2-31

PLYWOOD

for
HOME JOBS,
delivered at your door!

Now, you can easily get this most widely imitated of all materials for your own carpentry, cabinet-making and trim jobs from the organization which supplies the country's biggest industrial users (including the U. S. Army and the U. S. Navy)—fifteen different woods—genuine aircraft plywood—hundreds of sizes and constructions—any quantity shipped from one of our seven conveniently located warehouses.

Send for
FREE HANDBOOK
on PLYWOOD

Tells you just what wood to use and HOW to use it. Plywood is easier to work than lumber—it is far stronger and much lighter in weight. Plywood is BETTER for all kinds of cabinet work or interior trim—it does not split or check—requires no special tools for handling.

Industrial users please communicate

UNITED STATES PLYWOOD CO. INC.
607 West 36th Street, New York

New Way to Learn Drafting.



Tool Designing—Production Eng'g

You can't learn them by merely reading books or copying drawings. We teach you by giving you actual work to do. When you graduate, you have a college degree and are fitted to become a high salaried executive. Day and evening classes—also personal training course by mail. Old, established college. Write today for FREE Book.

Detroit College of Applied Science

8213 Woodward Ave.

Detroit, Mich.

FREE
BOOK

New Complete "Wonder" Workshop

\$1830 BUY DIRECT. SAVE 35% TO 60%

All Without Motors	Plain	Motor Drive
12' Band Saw ..	\$24.75	\$31.35
11' Lathe	21.00	29.25
4' to 36" Scroll Saw ..	4.80	13.44
6" BB Jointer	44.00	54.25
Home Workshop—11"-3 spd. lathe, 7" saw table, 8" scroll saw		\$54.00

Write for Circular, **S & B MFG. CO.**
4611 W. 20th St. CHICAGO, ILL.

EASY to PLAY

ANYONE who can whistle a tune can learn quickly on a Conn. Conns are the choice of Bosses and the world's greatest artists. Many exclusive features. Yet they cost no more.

FREE Trial, Easy Payments make purchase easy. Write for free book on your favorite instrument. Full of interesting facts. Illustrates latest models. Mention Instrument. **C. G. Conn. Ltd.**
231 Conn Bldg., Elkhart, Indiana

EASY TO MAKE TRACTOR FROM ANY FORD



Rear view shows new **HIGH ARCH** which enables tractor to clear tall corn, cultivating 1 to 2 rows at one time.

WE TELL YOU HOW!

For Model "T" and "A" FORDS AND CHEVROLETS



DOES ALL FARM WORK



SHAW on Clark Bros.' farm, Benton, Ill., pulling two 10-in. plows. Plows 5 to 6 acres per day, depth of 5 or 6 in., on 9 to 11 gal. gasoline.

Emil Keller, Pine Grove Mills, Mich., hauling hay with his SHAW-Tractorized Ford.



See how this SHAW, owned by Geo. Masenator, Jr., Plainfield, N. J., discs and harrows at the same time.



"I mowed 11 acres of thick, 5 ft. tall oats in 20 hours with my SHAW."—H. D. Page, Buckley, Wash.

NOW you can easily have a powerful, dependable tractor . . . at surprisingly low cost. An old Ford or Chevrolet **and the inexpensive SHAW Tractor Equipment** is all you need! And tests have proved that the SHAW-Tractorized Ford or Chevrolet does all ordinary farm work as well as a big, expensive tractor.

Look at this Performance! . . .

The SHAW does more for the small amount of money invested than any other tractor on the market. Cultivates 15 to 20 acres per day. Handles 16-in. plow or two 12-in. plows nicely. Easily pulls 7-ft. disc harrow. Pulls five 31-in. lawn mowers. Pulls heavy, steel road drag. Can also be used for seeding, discing, hauling, etc. And when not in field, can be kept busy running feed grinders, log saws, concrete mixers, pumps and other belt machinery.

New HIGH ARCH feature makes SHAW-Tractorized car especially suitable for cultivating corn. Straddles 30-in. stalks, cultivating 1 or 2 rows at one time, without touching.

Attaches Easily . . . You don't have to be a mechanic to attach SHAW Equipment. You can do it quickly and easily, using only a monkey wrench and screw driver. We furnish all parts. Provide easy-to-follow instructions. Can be attached to full-length or sawed-off chassis.

Costs Little to have a SHAW-Tractorized car. SHAW Equipment costs you surprisingly little at our low factory-to-user price. If you haven't an old Ford, you can pick up an old

Model "T" Ford or Chevrolet for \$5 to \$25; or a Model "A" Ford chassis, which has had the body wrecked, very cheap. Many early Model "A" Fords are now being converted into SHAW Tractors. SHAW Equipment, bought now for a Model "T" Ford, can be used later on a Model "A." Many have attached SHAW Equipment to other makes of cars.

Pays for itself . . . Here's another economy feature of the SHAW-Tractorized car. Owners say it pays for itself in one short season because of time, labor and money saved.

PRICE REDUCED . . . To introduce the new HIGH ARCH Model, we're cutting the price on SHAW Equipment even lower than the regular low factory price. But offer is for short time only! Planting time is only a few months off and the SHAW-Tractorized Car should be at work. So act quickly . . . and save! Mail coupon for details and price NOW!

FREE BOOK

Coupon below brings FREE Book containing full information, and Special Low Introductory Price on new HIGH ARCH Model. Also FREE 32-Page SHAW DU-ALL Garden Tractor Catalog, and Generous Offer to Agents, on request. Mail Coupon today!



SHAW MFG. CO., 4502 Center Street, Galesburg, Kansas

Shaw Du-All Garden Tractor

SHAW DU-ALL Garden Tractor equipped with Briggs and Stratton engine. Great time, labor and money saver for small farms, truck gardens, estates. Write for details.



MAIL COUPON NOW!

SHAW MFG. CO., 4502 Center St., Galesburg, Kans.

Please send me the FREE Literature checked below. I understand there is no obligation on my part.

- Literature on Making Ford or Chevrolet into a Tractor. Big 32-Page SHAW DU-ALL Tractor Catalog. Generous Offer to Agents.

Name.....

Address.....

Town.....State.....

A CLIPPER SHIP for \$4⁵⁰ BUILD FOR PLEASURE OR PROFIT



CLOUD—all at \$4.50 each—CONSTITUTION (Old Ironsides) \$5.95—Flying Cloud with Electric Lights, \$6.98.

We supply all the necessary parts, cut and numbered, ready to put together. Instructions show full details how each numbered part fits into another. You can't go wrong. A few hours pleasant pastime and you will have a beautiful and valuable model. We also have parts for the SANTA MARIA—LA PINTA—MAYFLOWER—FLYING CLOUD.



COACH MODELS

Like our Ship Models all Coach Model parts are cut and numbered ready to put together, with instructions showing full details how each part fits into another. We have kits for the following coach models—TALLY-HO—GEORGE WASHINGTON'S PRIVATE COACH—DEADWOOD STAGE COACH—DEVONPORT to LONDON—PRINCE TO PHILADELPHIA—all at \$4.95 each (see boxes). Horses \$2.00 per pair.

UNEMPLOYMENT need not worry you. There is a ready market for ship and coach models right in your own neighborhood—All kits shipped same day order is received.

MINIATURE GOLF SETS in knockdown form are also sold by us and are described in our illustrated folder.

Literature on any of the above models gladly sent on request.

GUARANTEE—If after assembling any of our models according to our instructions, you are not satisfied, return it to us and we will refund your money. Foreign orders must be accompanied by U. S. Money Order or check.

C. J. BIERBOWER Dept. PM 3216 Baring Street PHILADELPHIA, PA.
Originator of Build-your-own-ship-models

C. J. BIERBOWER, Dept. P.M., 3216 Baring St., Philadelphia, Pa. Please send me all parts, cut to fit and ready to put together for the following: Clipper Ship, ; Santa Maria, ; La Pinta, ; Mayflower, ; Flying Cloud, ; Constitution, ; Tally-Ho, ; George Washington Coach, ; Deadwood Stage Coach, ; Devonport to London, ; Prince to Philadelphia, ; for which I will pay the postage the above prices plus a few cents postage.

Please send me literature pertaining to.....
Name.....
Address.....
City..... State.....



The MINUETTE RADIO \$34⁶⁵

Screen Grid
Super powerful set with nation-wide range and magnificent tone quality.

Complete with Tubes

valued cabinet, 9 1/2 x 13 1/2 x 20 1/2 in.—entirely self contained. For 50-60 cycle 110-120 volts A.C. current. Regular \$59.50 value. Order direct now at this special introductory price \$34.65 complete with tubes—nothing else to buy. Send \$5 with order—pay balance C.O.D. Satisfaction Guaranteed. Local Agents Wanted.

SUPERADIO MANUFACTURING CO.
Dept. 532, 2356 Byron Street CHICAGO

AMAZING NEW GUN

Men all over the country are turning to this full size automatic high power rifle using round steel shot. Light. Speedy. Sporting arm balance and precision.

TRY THE BENJAMIN 25 SHOT AUTOMATIC "THE MYSTERY RIFLE"

OUTSHOTS ALL OTHERS

Companion to the world famous Benjamin Single Shot. Same effective compressed air action with 25 shot automatic feed. 10 to 12 rapid fire shots on one pump. Price \$10.00. Benjamin Single Shot Air Rifle \$5.00. Ask your dealer for demonstration or write for details and "BB MAGIC" FREE.

BENJAMIN AIR RIFLE CO., 605 North Broadway, St. Louis, Mo.



MAKE \$25 A DAY

Get yours! Have steady work and big pay 52 weeks a year. Bosses lay you off. Work for yourself and keep going. No thrill like it. **BE A FLOOR SURFACING MAN AND MAKE BIG MONEY**

Keep busy all winter. Crawford, Colo., made \$134.35 in 74 hours. Ivory, Pa., made \$400.00 on one job. Nowood, Ark., made \$75.00 in 12 hours. Start now. No experience needed. Big demand everywhere for surfacing old and new floors. All you need is an American High Production Sander or a Handy Sander. No office, furniture, help or other expense. By our easy payment plan few dollars starts you. Balance as you earn it. Nice, sweet, easy, warm, inside work all winter.

THIS IS YOUR CHANCE

Be your own boss. Get the big, easy, steady, sure money. Keep going—no layoffs. Keep all the profits on your labor. We start you, furnish complete plans for getting business, instructions, advertising, circulars with your name, prices to charge, etc. Write now.

The American Floor Surfacing Machine Company

523 S. St. Clair St.
TOLEDO,
OHIO



ACTUAL LENGTH - 7 1/2"

NEW TAPERED DUPLEX PIPE CLEANERS

For Smokers—First improvement in 35 years. Little end easily enters bore—big end is pulled thru cleaning and drying bore perfectly. Send 25c stamps or coin for 6 big pkgs. **E. T. GILBERT MFG. CO.** 228 South Avenue, Rochester, N. Y.

FREE RADIO CATALOG

LOWEST WHOLESALE PRICES

168 pages of radio bargains. New 1931 Screen Grid, all-electric A. C. Sets in beautiful Consoles—also battery operated sets. Remote control, phono-combinations, etc. Write today.

ALLIED RADIO CORPORATION
711 W. Lake St. Dept. 866 Chicago



PERSONAL STATIONERY

for Pilots
of this Model Airplane Club

Join the famous National Silver Arrow Flying Club and write to your friends on the private and official stationery of the Club, with your own name and address printed on the letterheads and envelopes! The stationery is fine bond paper, and on both letterheads and envelopes is a striking picture of a giant trans-continental airplane flying into New York, with huge skyscrapers in the background. Here's a real club. Learn how you can become a Master Pilot in it; win flying pilot medals; win handsome certificates. No dues or entrance fees. Just write us saying, "Tell us about club," and we'll send full information, sample of personal stationery and also free movie-scope, described below. Kingsbury Mfg. Co., 83N Myrtle St., Keene, N. H.

KINGSBURY MOTOR TOYS
FREE Novelty Movie-scope, shows motion picture of Silver Arrow plane in flight. Is also complete toy catalog.

Tool Economy!

WHEN you buy a micrometer, rule, or any other accurate measuring tool, you are buying a tool upon which you expect to depend for years of reliable service.

That is one of the important reasons why mechanics consider the purchase of Brown & Sharpe Tools to be real economy. They know from experience that these tools will maintain the same close standard of accuracy year after year.

When you consider tool economy in terms of amount of reliable service per dollar, your choice of tools will invariably be Brown & Sharpe.

Here are a few representative Brown & Sharpe Tools for many different types of work. There are over 2300 others.

Ask your dealer for a copy of our Small Tool Catalog No. 31 listing complete line. If he can't supply you, write to us. Dept. P. M., Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.



Micrometer Caliper
No. 11RS

Range 0 to 1" by thousandths of an inch. Distinctive shape of frame permits measuring over projections or in shallow slots.



Micrometer Caliper
No. 54

Range 0 to 4" by thousandths of an inch. No. 55 - Range 2" to 6" by thousandths of an inch - similar to No. 54 but adapted for larger work.



Screw Pitch Gauge
No. 610

Distinctive shape of blades permits measuring threads of nuts as well as screws.



Thickness Gauge
No. 648

8 tempered blades
4½" long .002",
.003", .004", .006",
.008", .010", .012"
and .015".



Inside Micrometer
No. 264

Range 2" to 8" by thousandths of an inch. The convenient clamping device is a distinctive Brown & Sharpe feature.



Outside and Inside
Spring Calipers
No. 811 and No. 812

Useful tools for general work.



Dial Test Indicator
No. 733

A most useful tool for testing, checking and set-up work.



Tempered Steel
Rule No. 313
with Figured
Graduations

The "right hand man" in the shop.



Brown & Sharpe Tools

"WORLD'S STANDARD OF ACCURACY"



"I had to make more money—for her"

"THREE weeks after I met Ann we were engaged. It was when we began talking about rents and furniture and such things that I woke up.

"I'd been drifting along in a routine office job for years. I knew I didn't deserve a raise. And yet I had to make more money—a lot of it—and quick. It was Ann herself who suggested the International Correspondence Schools. She believed in me so thoroughly that she made me believe in myself, and I started studying the I. C. S. course in Accounting in my spare time.

"That was a year and a half ago. We've been married six months and I just got my third promotion. I'm head of the cost accounting department now. My I. C. S. course was the finest investment I ever made."

Are you one of the thousands of young men who need a bigger salary and a better job? In an hour a day of your spare time you can secure the training that will bring you advancement. Without cost, without obligation, find out what the I. C. S. can do for you. Mark and mail this coupon now!

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"
Box 5527-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Automobile Mechanic |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Plumbing <input type="checkbox"/> Steam Fitting |
| <input type="checkbox"/> Building Estimating | <input type="checkbox"/> Heating <input type="checkbox"/> Ventilation |
| <input type="checkbox"/> Wood Millworking | <input type="checkbox"/> Sheet Metal Worker |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Steam Electric Engineer |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Electrical Engineer | <input type="checkbox"/> Refrigeration |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> R. R. Locomotives |
| <input type="checkbox"/> Welding, Electric and Gas | <input type="checkbox"/> R. R. Section Foreman |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> R. R. Bridge and Building Foreman |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Air Brakes <input type="checkbox"/> Train Operation |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Highway Engineering |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Coal Mining Engineer |
| <input type="checkbox"/> Machinist <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Navigation <input type="checkbox"/> Boilermaker |
| <input type="checkbox"/> Patternmaker | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Pipefitter <input type="checkbox"/> Tinsmith | <input type="checkbox"/> Cotton Manufacturing |
| <input type="checkbox"/> Bridge Engineer | <input type="checkbox"/> Woolen Manufacturing |
| <input type="checkbox"/> Bridge and Building Foreman | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Gas Engines <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Poultry Farming <input type="checkbox"/> Radio |
| <input type="checkbox"/> Aviation Engines | <input type="checkbox"/> Marine Engineer |

BUSINESS TRAINING COURSES

- | | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Business Correspondence |
| <input type="checkbox"/> Office Management | <input type="checkbox"/> Lettering Show Cards <input type="checkbox"/> Signs |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Personnel Management | <input type="checkbox"/> Complete Commercial |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Civil Service <input type="checkbox"/> Mail Carrier |
| <input type="checkbox"/> Accountancy <input type="checkbox"/> Cost Accountant | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> C. P. Accountant | <input type="checkbox"/> Grade School Subjects |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Secretarial Work | <input type="checkbox"/> College Preparatory |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |
| <input type="checkbox"/> Salesmanship <input type="checkbox"/> Advertising | <input type="checkbox"/> Lumber Dealer |

Name.....

Address.....

City..... State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools, Canadian, Limited, Montreal, Canada

ALADDIN PORTABLE ELECTRO-PLATER



Introductory
**AGENTS
OFFER**
1/50

Instantly Applies Real Nickel

Also Electrically Plates Brass, Copper, Silver, Gold, Etc. With the inexpensive Aladdin Outfit you can easily nickel plate the nickel on your car and do a good job of it. The Aladdin Outfit is also a home necessity.

MAKE BIG PROFITS WITH THE ALADDIN

Whether you are interested in the Aladdin for yourself or should you wish to go into business putting real nickel on autos or doing metal plating in your neighborhood, or if you would like to act as our agent in your territory, write us immediately for free particulars.



P. J. F. BATENBURG CO.

DEPT. 198

RACINE, WISCONSIN

CRESCENT
20"
Band
Saw

A high grade, moderately priced band saw for light work; affords all the accuracy, convenience and efficiency of large band saws. Hand loading. Self contained motor operates from light socket; or may be driven from line shaft. Machine finished table, with graduated scale, tilts any angle to 45 degrees. Quick locking device. Saw, with spring tension, is fully guarded. We stock wide line of light machines for cabinet makers, schools, and amateurs, also heavy machines for factories.

THE CRESCENT MACHINE CO.
93 Columbia St. Leotosa, Ohio



Send for **FREE BULLETINS**

SAMPLES OF 33 RARE WOODS
20 Cabinet Woods - \$1.00 ONLY 20¢
Sets labeled and postpaid. Lumber domestic and imported, panels, veneers, inlay woods, turning squares, and supplies. Send 5¢ stamp for large illustrated catalogue.
Craftsman Wood Service Co.,
P.O. 165 W. 74th Street,
Chicago, Illinois.

..... Play and
BE POPULAR

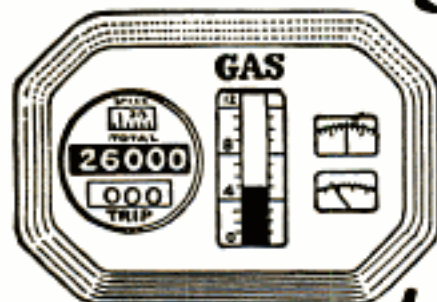


GET into all the fun—parties, dances and occasions of every kind, with a moderately priced, sweet-toned, easy-playing Pan-American instrument. You can play tunes almost at once, join the band or orchestra in a few weeks, and soon enjoy popularity and added income. Pan-Americans are of the highest quality and factory guaranteed.

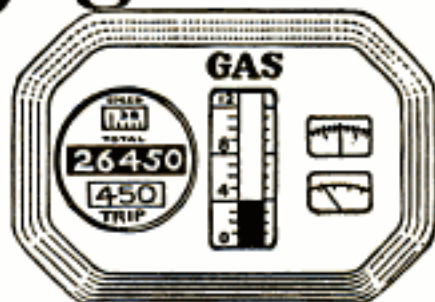
Free Trial; Easy Payments
Write for full details; name instrument.

PAN-AMERICAN Band Inst. & Case Co.
203 Pan-American Bldg., Elkhart, Indiana

450 MILES in a gallon of gas



*startling
statement
of famous
Automotive Engineers*



How to increase gasoline mileage has been a problem that Automotive Engineers have been trying for years to solve. Recently a world famous engineer made the statement that the energy produced by burning a gallon of gasoline would run an auto a distance of 450 miles. Other well known authorities go on record as saying that eventually it may be possible to get over four times as much out of gasoline as in the past.

Amazing Whirlwind Device Saving Millions of Gallons of Gas for Auto Owners

The Whirlwind Carbureting device embodies scientific features which conserves part of the gasoline that formerly went to waste.

Letters coming into the office tell of record mileages resulting in amazing gas savings. Low gasoline mileage is reported on practically every make of car. Greater power and smoother running motors are also noticed by users. The cost of the Whirlwind is so little that, basing its gas saving features even on the most modest reports, it would pay for itself almost immediately and then save many, many dollars for its owner by reducing gasoline consumption.

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN and DISTRIBUTORS WANTED To Make Up To \$100.00 a Week and More

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

WHIRLWIND MANUFACTURING CO.
999-461-A Third Street Milwaukee, Wis.

GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

FREE OFFER COUPON

WHIRLWIND MANUFACTURING CO.,
999-461-A Third Street, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one free. This does not obligate me in any way whatever.

Name.....

Address.....

City.....State.....

() Check here if you are interested in full or part time salesman position.

Think of it! Genuine ^{Late Model} No. 5 UNDERWOOD

Yours for 10 Days TRIAL

Yes—this world-famous Underwood No. 5 is yours for full 10 days' trial. (Positively the lowest price and easiest terms ever offered.) See how beautiful and new it looks—compare its neat, perfect work with any typewriter costing twice as much.

Direct at Less Than 1/2 Mfg's Original Price



Only by an exceedingly fortunate purchase direct from the manufacturer's am I able to offer this amazing low price. While they last—less than half (1/2) the manufacturer's original price—and easy terms besides. (Do not confuse this genuine late model Underwood with inferior or frail machines worth only one-half as much.) This is the full-sized late model Underwood with Standard universal 4-row keyboard of 84 characters and has all late improvements. Manufactured to sell originally for \$102.50. Fully Guaranteed in writing.

Late Model No. 5 Underwood

With Modern Improvements

1. Genuine Underwood No. 5.
2. Standard 4-row Keyboard (84 characters)
3. 2-color Ribbon—Rising Scale
4. Buck Spacer
5. Ribbon Reverse
6. Tabulator
7. Automatic Release
8. Shift Lock Key
9. Lowest Price
10. Easiest Terms
11. 10-Day Trial
12. Fully Guaranteed

Easy Terms—Only 12c a Day

Think of it—a genuine late model Underwood No. 5 reduced to \$44.90 (Cash).

Send only \$1 deposit for a 10-day Trial. Then only 12c a day on my easy year-to-pay plan. Use and enjoy your typewriter all the time. Remember this famous No. 5 Underwood all renewed and refinished is without question one of the greatest values ever offered at this rock-bottom price. (See column to left for its many outstanding features and improvements.)

Money Back Guarantee!

Accept my liberal 10-day trial offer. See for yourself the wonderful bargain this famous Underwood really is. Your deposit returned at once if you are not perfectly satisfied. Send now.

International Typewriter Exchange
231 W. Monroe St., Dept. 201, Chicago

(Refinished)



Now Only



ON EASY TERMS

Complete Course in Speed Touch Typewriting Given During This Offer

Also Office Supply Set

Learn Speed Touch typewriting. Complete Home Study Course of the Famous Van Sant Speed Typewriting System, fully illustrated, given during this offer. Easily learned. Used in schools, business offices everywhere. We also give complete office supply set during this sensational sale.



International Typewriter Exchange,
231 West Monroe St., Chicago, Ill., Dept. 201.

Please send the Underwood No. 5, F. O. B. Chicago, at the special reduced price for 10-day Trial. I am enclosing \$1.00 deposit with the understanding that if I am not perfectly satisfied I can return it Express Collect and get my deposit back. If I keep it I will pay \$3.50 a month until I have paid \$49.90 (term price) in full.

Name.....Age.....

Address.....

Town.....State.....



Three Chicago food experts invent a delightful new food that is revolutionizing the doughnut business.

Here's an Amazing New Business

That Pays **\$1,000** a Month Up to....

Here is a surprising new opportunity. Now you can immediately become the owner of a big business that is paying others from \$75 up to \$250 a week. There is no "Red Tape"—no delay. Wherever you live there are quick, easy profits waiting for you to grab them. Just mail the coupon for full details.

Individual Plans to Fit Every Need

FULL TIME

You can start a Brown Bobby shop with floor space as little as 6 by 6 feet. Sell retail and wholesale.

Thos. Minch, Fla. made \$3,000 his first 3 months.

PART TIME

Invest a few dollars in this new business and get someone else to run it for you. A few hours of your time each week can easily bring you \$50 up to \$150 a week extra cash.

SPARE TIME

Start at home. Make money like Mrs. Nelson, Ill., who sold 90 dozen Brown Bobbys at retail in one week, then went out to triple her profits through wholesale business.

MEN, this is absolutely new! A real red-hot money-making opportunity! Something every red-blooded man has always longed for. It's a chance to jump into business for yourself and make more money every week than the average man makes in a month!

Surprising, yes, almost incredible as it may sound, we actually start you in a **proven business!** The first day's profits often run from \$18 to \$55—and a business of \$350 to \$600 the first month is not exceptional for ambitious men or women.

A Sensational Big-Money Plan

There is just one thing you need to make a "go" of this business, and that is the ambition to make real money. We give you all the plans, advice and help needed to make a big success right from the jump. We supply you with the equipment to make an amazing new food—a **greaseless** doughnut baked by electricity! You sell to homes, bakeries, delicatessens, groceries, restaurants, etc., at a profit of 150% to 600%! No wonder the dollars simply pour in!

A New Food Secret

The **greaseless** doughnut is altogether novel and unique. It's a crispy, flaky, delicious new kind of doughnut cooked without one drop of oil or grease. Easily digested by everyone. More appealing than old-style doughnuts ever were. Yet costs you less to make. This new business is copyrighted under the trade name "BROWN BOBBY," so there is no competition.

Everyone likes doughnuts. Millions of old-style doughnuts are sold every day. Now you can bake and sell the perfect doughnut—the toothsome **BROWN BOBBY greaseless** doughnut that sells four times as fast as any other.

Start At Once—Anywhere

In this limited space I am able to suggest only the bare possibilities. The details are even more sensational than the facts given here can indicate. I am looking for sincere, ambitious, wide-awake men. I offer such men a plan that is a real eye-opener. The first week's profits usually amount to more than your entire investment. After that it is up to you entirely whether you will make \$300 or \$1,000 a month clear profit.

Men and women start in this business daily. You do not obligate yourself in any way by mailing the attached coupon. So get the details of this amazing new idea at once. Decide for independence! Fill out and mail the coupon today—**now—THIS MINUTE!**

FOOD DISPLAY MACHINE CORP.
Dept. 3B, 500-510 N. Dearborn St., Chicago, Ill.

Food Display Machine Corp., Dept. 3B,
500-510 N. Dearborn St., Chicago, Ill.

Rush me details of your plan for a "Brown Bobby" business of my own.

Name.....

Address.....

City.....State.....

FOOD DISPLAY MACHINE CORP.
Dept. 3B, 500-510 N. Dearborn St., Chicago, Ill.

New Million Dollar Can Opening Machine!

Brand New Invention BRINGS FORTUNES TO AGENTS!

Here's Something Brand New! An Amazingly Simple Invention—Yet, Absolutely Revolutionary! For Now, at One Sweep, Millions of Old Style Can Openers are Doomed to the Scrap Heap. No Wonder Agents are Making Astonishing, Almost Incredible Sums—up to \$100 in a week. So Mail the Coupon for All the Facts, and Full Details of My Remarkable FREE TEST OFFER!

ABOUT once in a "blue moon" some genius pops up with a new invention that everyone has been waiting for. Then, presto! Almost like magic, agents' profits go soaring overnight to tremendous heights! And now the cold, hard-boiled facts about this amazing new can opener bear convincing proof!

This queer new device doesn't just cut a ragged hole around the edge of the can. It lifts the entire top completely out, clean as a whistle! The machine holds the can—opens it—flips up the lid so you can grab it—and gives you back the can without a drop spilled, without any jagged edges to hack your fingers—all in a couple of seconds!

The Secret of Big Money

Women hate the old-style can opener—and with good reason, too. It's the last relic of barbarism in the modern kitchen. Yet every day millions of women have to open cans the dangerous, laborious old-fashioned way. Food is spilled and wasted. Fingers are cut and torn—often followed by infections and blood poisoning that result in expensive doctor bills. No wonder, women—and men, too—simply go wild over it!

I want you to see this surprising new invention with your own eyes. I want you to know why everyone falls for it the instant they see it. Whether you are an experienced salesman or never sold a penny's worth of anything in your life—I want to tell you about a remarkable new sales plan that wins you a profit on every call you make. This plan is made possible by another spectacular money maker in the Speedo line and offers you a steady income of up to \$100 a week!

Free Test—Act Quickly

If you are ambitious—if a new, but tested and proved opportunity to make up to \$75 to \$150 a week interests you—act at once before some other live wire beats you to this lifetime opportunity. Without obligation learn about these amazing new patented inventions, and get my FREE TEST OFFER. Just mail the coupon today—NOW!

CENTRAL STATES MFG. CO.
4500 Mary Ave., Dept. B-704, St. Louis, Mo.



WORKS LIKE A CHARM

Just insert can in holder and turn crank. So simple a child can operate with perfect safety.



FULL TIME \$265 In a Week

"Here is my record for first 30 days with Speedo:—
June 13, 60 Speedos;
June 20, 84 Speedos;
June 30, 192 Speedos;
July 6, 288 Speedos. I made \$265 in a week."
M. O'neil, Va.

SPARE TIME

"The first afternoon I received my Speedo outfit I made \$0.00."
Mrs. R. Spain, Kans.

PART TIME

"I worked about three hours and took 25 orders. This is certainly a money-maker." O. C. Gregg, Wyo.



NO JAGGED EDGES

Speedo cuts the top out, smooth, slick, and clean. Ends danger of infection from cuts.



FOOD POURS RIGHT OUT

No fuss or muss. A food pours right out of can without scraping or "spooning."

SPEEDO

CENTRAL STATES MFG. CO.
4500 Mary Ave., Dept. B-704, St. Louis, Mo.

Yes, rush me full details of your FREE TEST OFFER.

Name.....

Address.....

City..... State.....

() Check here if interested only in one for your own home.

Copyrighted material