

POPULAR MECHANICS

MAGAZINE

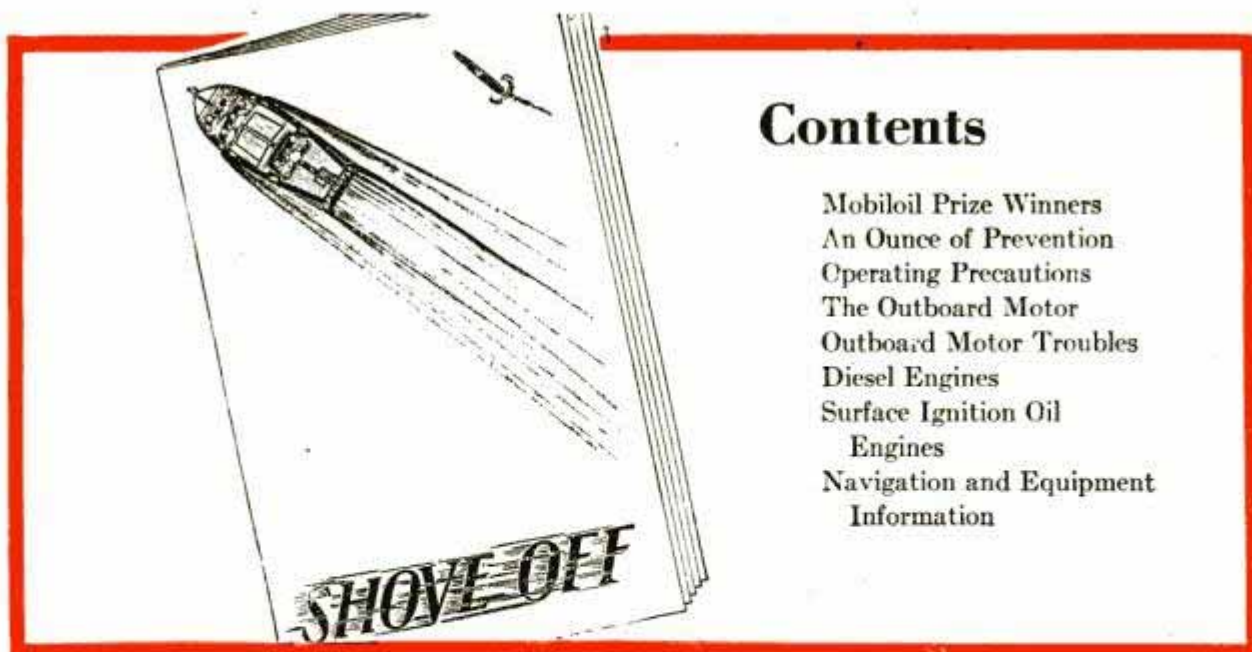
WRITTEN SO YOU CAN UNDERSTAND IT

GREAT BRITAIN, NO. 40420

U.S. PAT. OFF.



The Latest Outboard Motor Sport
SEE PAGE 895



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Mobiloil Prize Winners
 An Ounce of Prevention
 Operating Precautions
 The Outboard Motor
 Outboard Motor Troubles
 Diesel Engines
 Surface Ignition Oil
 Engines
 Navigation and Equipment
 Information

What every motorboat owner should know

What's wrong

when your engine suddenly overheats?
 when it lacks power?
 when it goes dead?

PROBABLY

1. Trouble in lubrication or cooling system.
2. Excessive carbon deposits.
3. Improper carburetor adjustments.
4. Retarded spark.
5. Incorrect valve or ignition timing.
6. Stuffing box too tight.

But, it might be any one of a number of other common difficulties, easily avoided—

all of which are thoroughly explained in "Shove Off," the Vacuum Oil Company's new handbook for motorboat owners.

Read what the world's leading specialists in scientific lubrication have to say about the proper care and efficient operation of motorboat engines. You'll find "Shove Off" packed with handy information on every engine problem.

We will gladly send a copy free of charge.



Mobiloil

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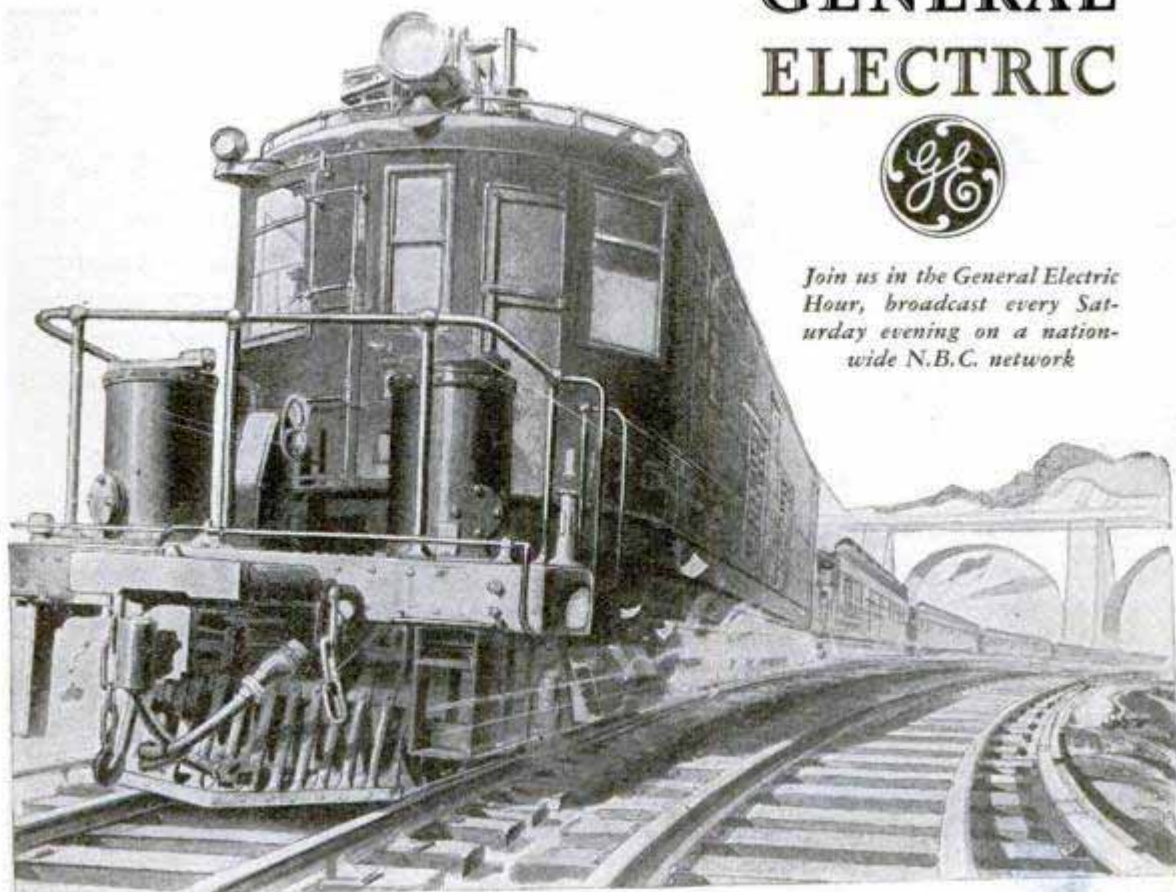
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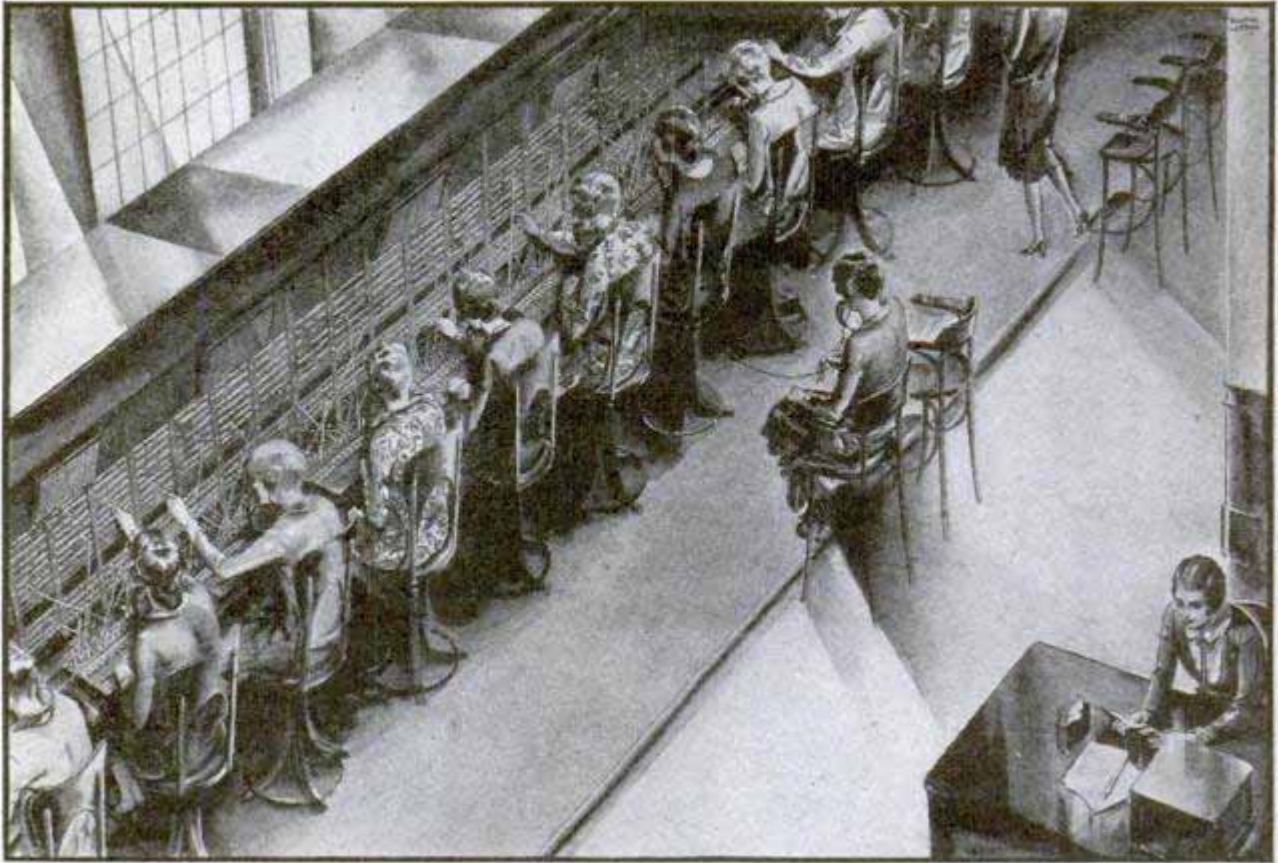
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Clever New Invention.. Closes Any Door Without a **SLAM!**

Saves Glass, Saves Nerves, Saves Door, Saves Fuel

Here's a great new summer seller! Now two of the worst nuisances in every home, store, office and factory can be banished—Slamming Doors and Doors left Ajar. Close-a-Door, a clever new device, closes any door swiftly, securely, silently. Read how it saves money, fuel, nerves. Then mail the coupon for agents' introductory offer at once.

Costs Less Than Other Kinds of Door Checks

Every home, office, store and factory can afford to equip every door with this astonishing new invention because it costs two-thirds less. Slamming, banging doors wreck nerves, ruin doors, smash glass. Doors left ajar cause drafts and colds, waste heat and coal and invite intruders. Screen doors equipped with Close-a-Door close securely and silently—and you never see bulging or broken screens.

Fits Any Door in 3 Minutes

Any boy who can use an ordinary screw driver can attach Close-a-Door in a jiffy. It operates automatically and never needs attention. Built of materials that last years and years. Designed on a peculiar patented engineering principle that insures perfect operation all times. It is neat, compact and takes up very little space on any door.

Protect Your Family Against Intruders

Every outside door should be protected with a Close-a-Door to keep the doors always closed securely against sneak thieves and intruders. Every office and factory door should be silenced with Close-a-Door to increase efficiency and save time. Don't confuse Close-a-Door with expensive, big, cumbersome devices. It is NEW! BETTER! CHEAPER!

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CLOSE-A-DOOR
Closes Any Door Without a SLAM



Big Money for Agents Full-Time or Spare-Time

Close-a-Door has been such an amazing sales sensation that we have decided to open hundreds of new territories. Now we want live wire full-time or part-time men to demonstrate Close-a-Door to homes, offices, stores and factories and take orders. We supply miniature door equipped with Close-a-Door that makes fascinating demonstration. Just walk into every home and building and you have a chance to come out with one to a dozen profits. Thousands of doors in your territory need Close-a-Door. Sales are easy the minute people see how cleverly it works. You make money right from the start, and an opportunity is offered to build a permanent lucrative business of your own. Mail the coupon for new sales plan and demonstrator offer.

PATENTED

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Send me
a-Door,

Name.....

Address.....

City.....

State.....

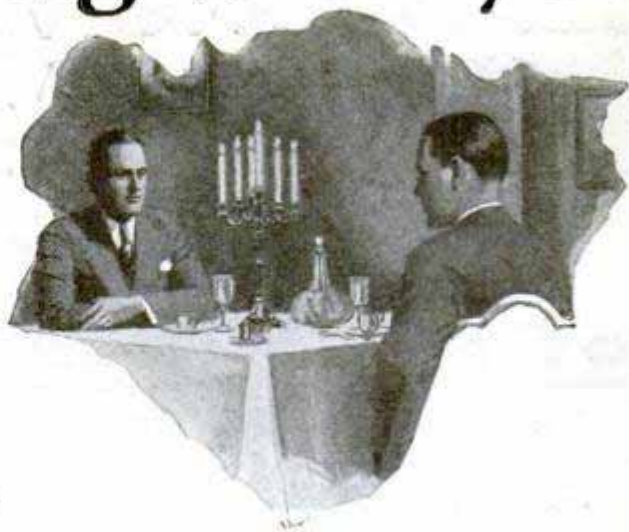
This One



6TYN-NZX-KFA3

What's wrong with you?

Why aren't you making more money?



THAT'S not a new question. You've asked yourself that a hundred times or more.

- But most men don't get ahead because they stop with asking the question—make no real effort to answer it—let "I'm unlucky" or "just not getting the breaks" take the place of any real plan for progress.

Here's what's wrong with the majority. Judge for yourself whether or not it fits your case.

Most men—and women—are getting what their services are worth. They're in the kind of jobs where a dozen applicants are available for every vacancy.

Is that what's wrong with you—is that why you're not getting ahead?

The remedy is simple. Train yourself for the specialized fields where rewards are large and certain and where the number of men available fall far short of the requirements of business.

You can train at home—and—doubled and tripled incomes are not unusual rewards for serious, earnest effort.

The rewards will come to you as they have come to hundreds and thousands of others—just as they came to these four typical cases from our files.

Stenographer becomes Comptroller Retail clerk becomes Assistant Comptroller

Just a few years ago, F. R. Griffiths was a stenographer and D. F. Crammond a retail clerk. Neither knew more than the simplest elements of bookkeeping.

Today, Mr. Griffiths as Comptroller and Mr. Crammond as Assistant Comptroller of the Rainier National Park Company in Washington supervise the multitudes of accounting records necessitated by the varied activities of this large company—operating the hotels, camps, inns, transportation facilities, garages, guide service, etc., within this national park.

"LaSalle training in Higher Accounting," write both, "was the important factor in our rapid climb. It helped us make more money."

600 per cent increase in income in three years

When our representative first met Albert L. Russell three years ago, he was a clerk in a radio store in Victoria, B. C., Canada—working on a small salary. Three months after starting our spare time training in Modern Salesmanship, he had increased his earning by more than 100 per cent and had become an outside salesman. A bigger house, attracted by his sales record, hired him and inside of a year he was their head salesman with another increase of 100 per cent.

Today, he is an outstandingly successful salesman and his income is about 600 per cent larger than when he started training—he has solved the problem of making more money.

Traffic clerk moves up to traffic manager

"How can I stick to my present job and still advance to a responsible executive position?"

That was Walter Baker's problem when, as traffic clerk with one of the largest wholesale grocers in New England, he enrolled for home study training in Traffic Management.

"I had been handling traffic work for two years," writes Mr. Baker, "but I really had very little knowledge of what it was

all about. Within one month after receiving the first lesson, I learned more about traffic management than I had picked up in two years' experience.

"As I progressed, my training in scientific traffic management enabled me to make a complete study of the firm's transportation methods and policies, and I was able to make certain modifications which increased our selling area. Later I had opportunity to make an important study of warehousing and refrigeration.

"Since taking LaSalle training, I can claim entrance to the '100% Club'—and what is probably of even more value, an acquaintance with numerous executives in the traffic field that I prize highly."

Do you really want to make more money?

Then why not stop wishing and begin acting?

If there is a training that will help you make more money, you want it, of course. But how can you be sure unless you have full information? Our new 64-page illustrated booklet will give you complete details about the training that helped Griffiths, Crammond, Russell, Baker and thousands of others speed up their progress and insure larger success.

Getting the booklet will cost you two minutes and two cents—will you spend that much to find out what LaSalle training can do for you?

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The World's Largest Business Training Institution

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I would welcome an outline of the LaSalle plan, together with a copy of "Ten Years' Promotion in One," all without obligation.

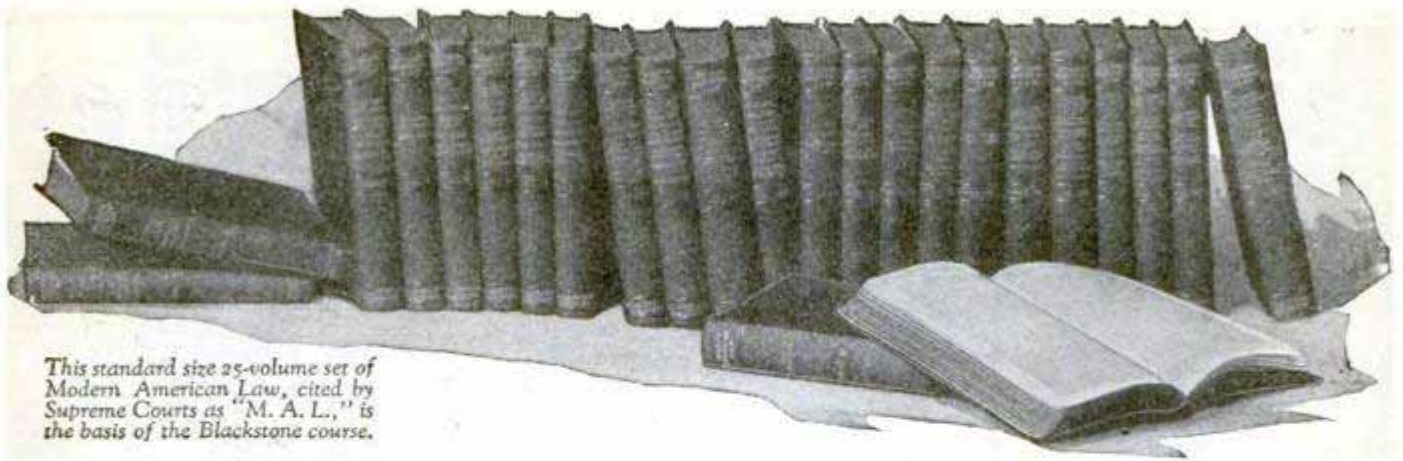
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Ten years' promotion in one

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Present Position.....

Address.....



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But the set of text books is only one part of this rather unusual course. There is, in addition, the elaborate lesson material mailed at regular intervals. The lessons direct the student's study efforts care-

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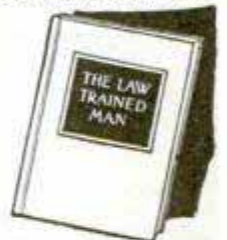
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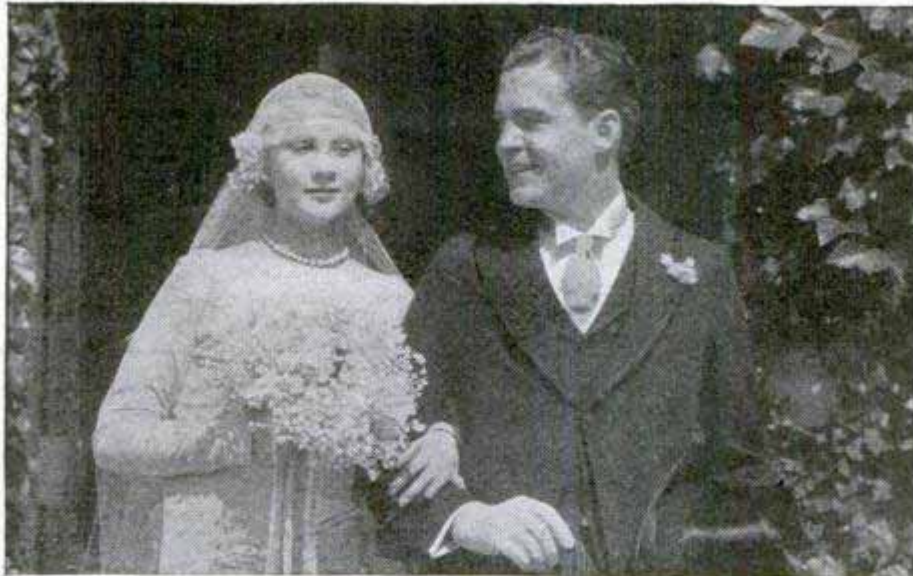
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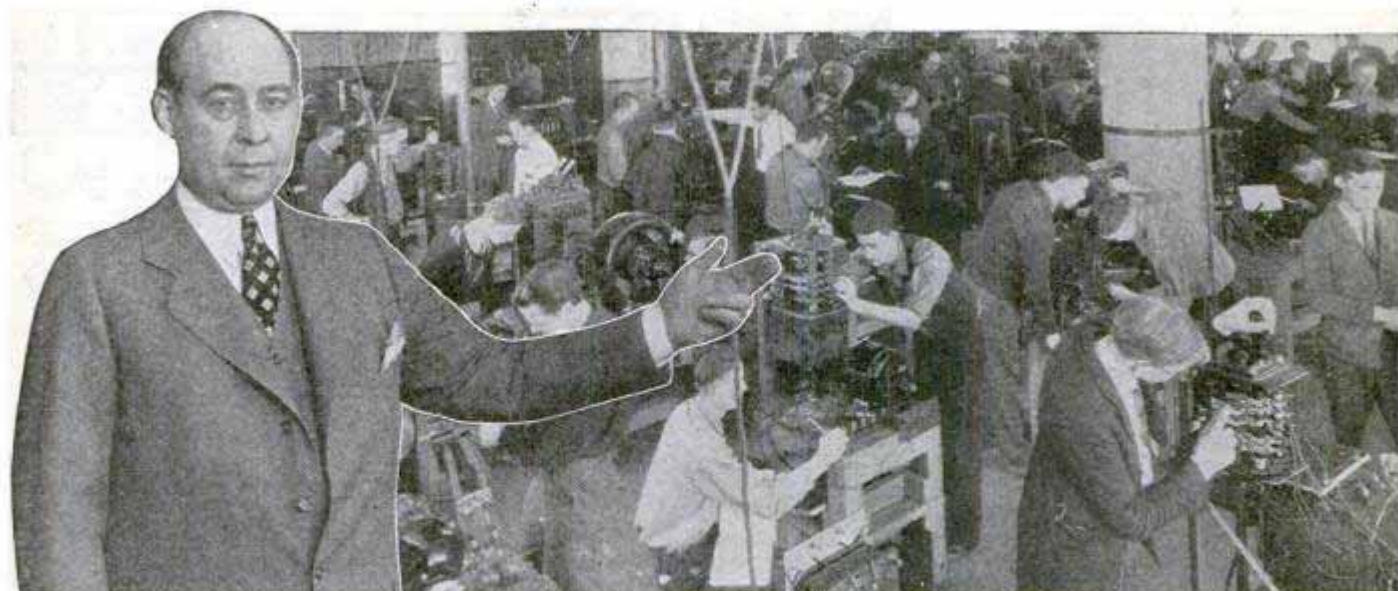
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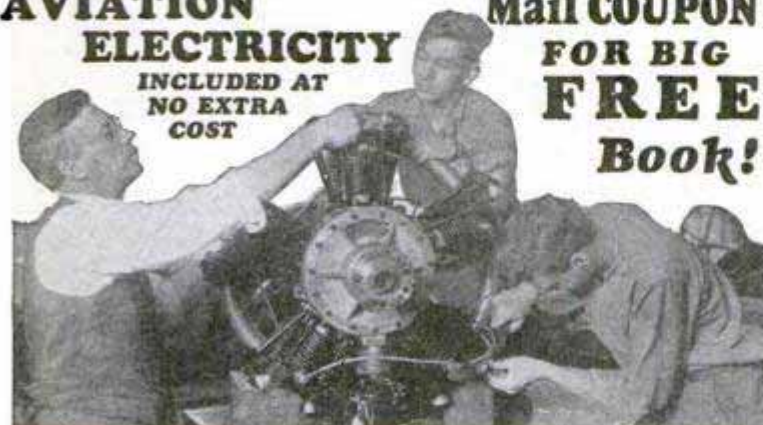
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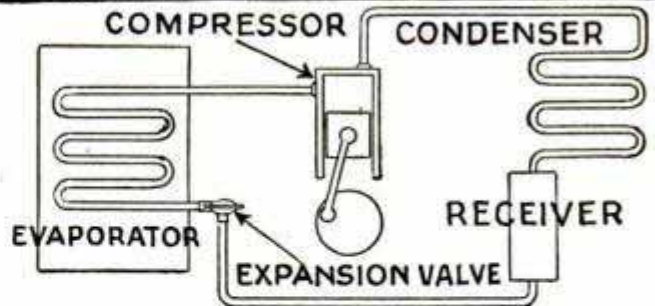
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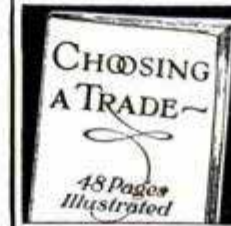
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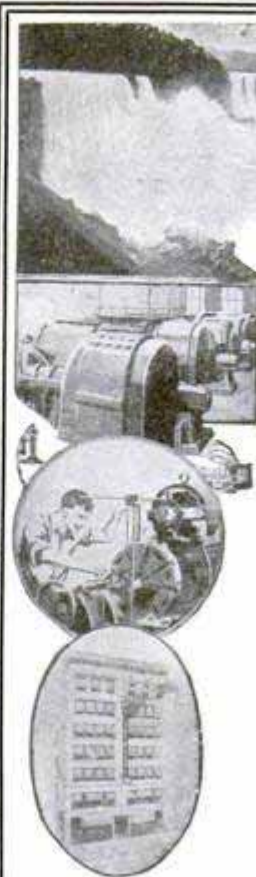
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The Truth About Health and Vitality

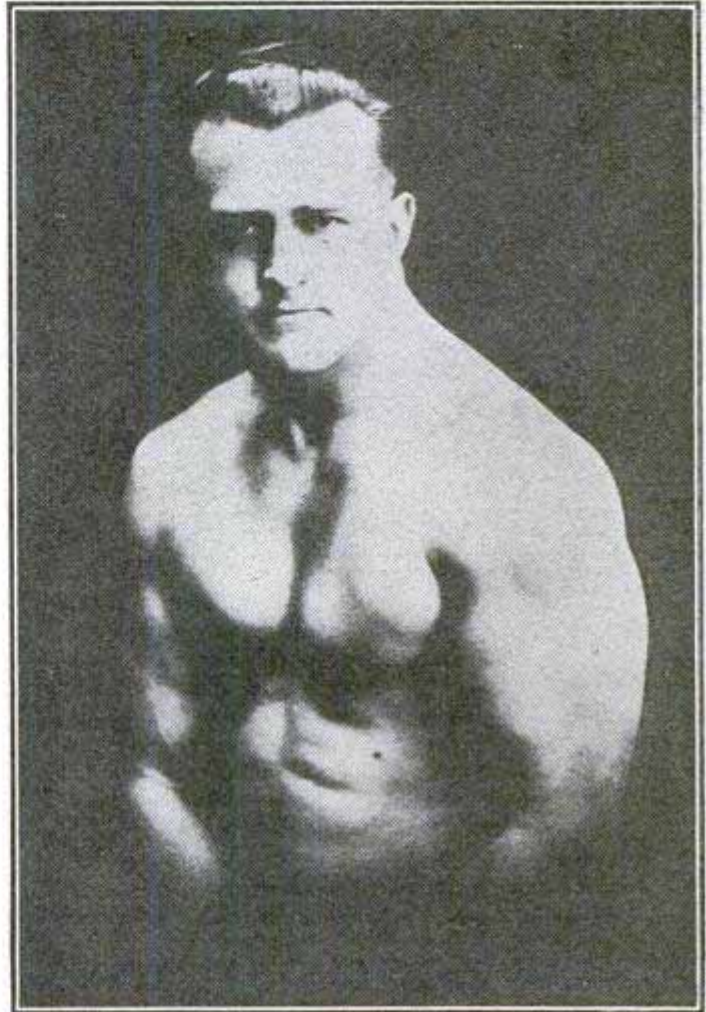
Some have an erroneous idea that exercise exhausts and takes away from the stamina and energy. On the contrary. Exercise is nature's way of stimulating the internal organs and, remember, for every action there is a reaction. Each time you affect the respiratory system you are benefitting your lungs. Each time you perform proper abdominal movements you are stimulating most of your internal organs and when the lumbar region, which is the seat of the central nervous system, receives systematic and scientific work, you positively stimulate your vital energy, which in turn fills you with that mysterious power—that force called "vitality," and arriving with this—and it just has to come—is perfect robust health. That is the truth about health and vitality.

The Truth About Ability

By obtaining a well-developed, strong, vigorous, healthy body, you will be able to accomplish much more in life than you ever have done previously. Do you realize what this means? Not only forging ahead financially but increasing your personal magnetism by changing your appearance into a well-formed person who will command the respect of those who are physically inferior. You will find it a pleasing situation to stand out among your fellow men like a bright star in the evening sky or like your favorite baseball or football hero. Your accomplishments will be recognized and things that seem so difficult now will in time become easy. What an alluring prospect for the weakling! That is the truth about ability.

The Truth About Earle Liederman

In conclusion, you should make sure that your instructor is one who is qualified in every respect to guide you. You should have a man who is a full-fledged teacher with sufficient experience behind him to know the ins and outs of all the minor perplexities that confront the beginner. He should be one whom you can respect and like and one who will take a personal interest in your individual welfare. He should be a college man of wide experience in travel, so he will know the conditions in various parts of the world for, remember, the exercises performed by tropical students should not correspond with those in the far north. He should have at least 20 or more years of experience and have at least a hundred thousand or more students to enlarge his practical knowledge. Such a man is Earle Liederman. He tells you things straight from the



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EARLE LIEDERMAN

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EARLE LIEDERMAN,
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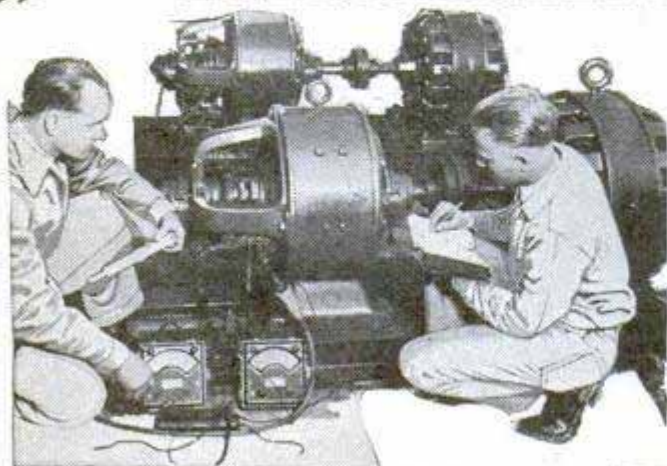
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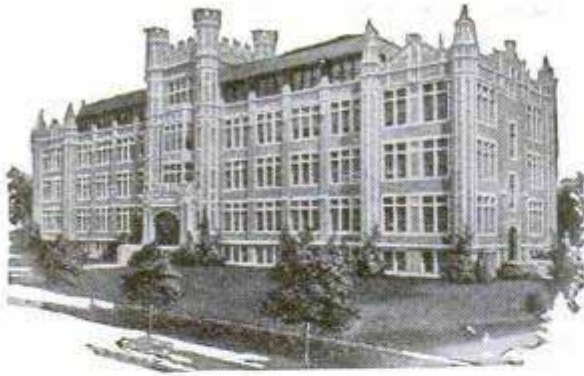


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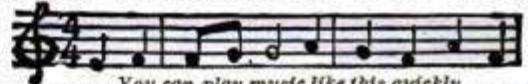
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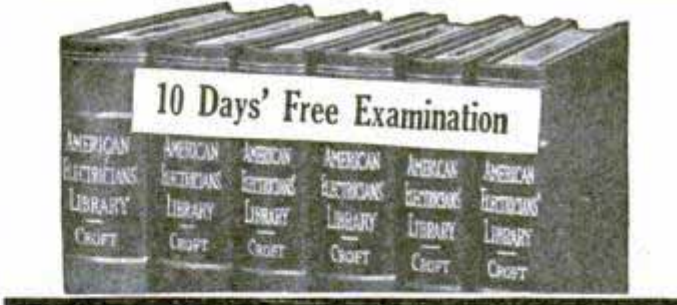
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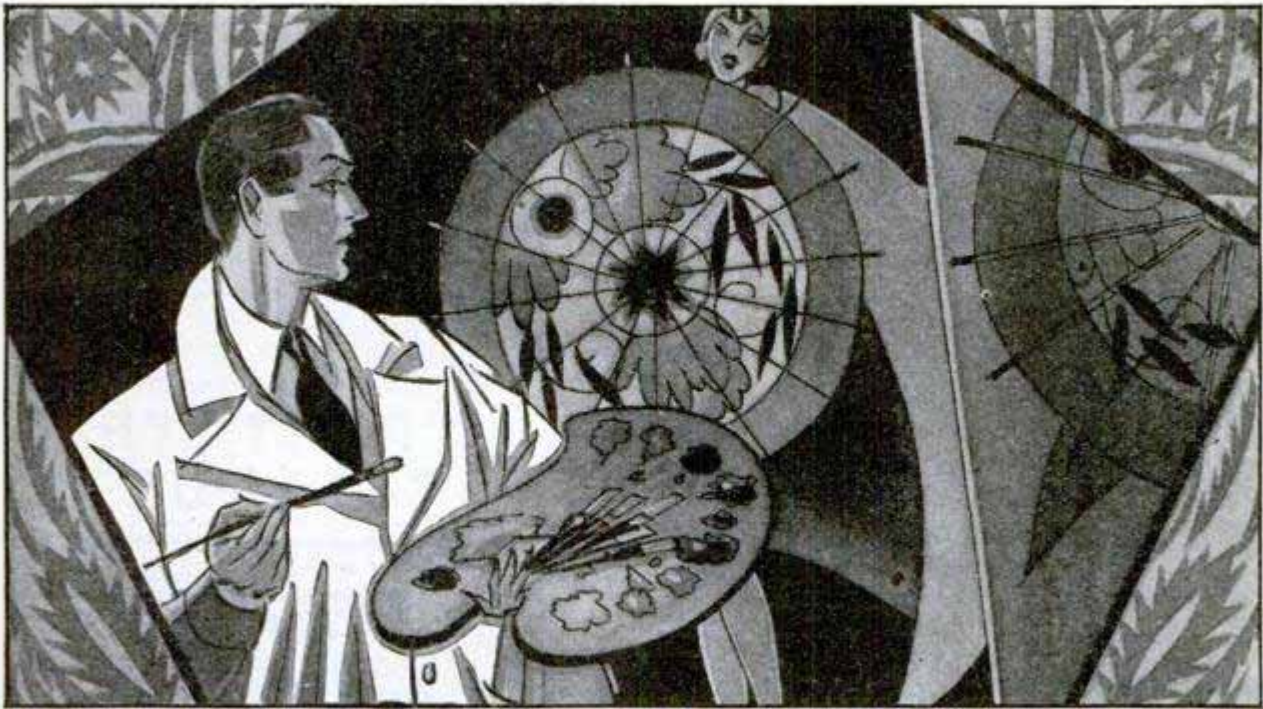
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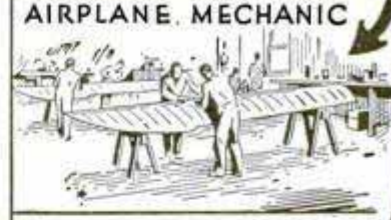
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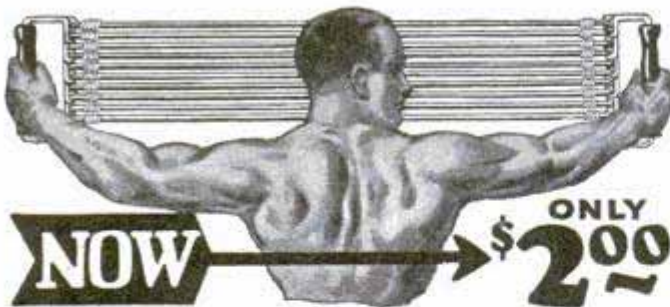
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"Nothing doing—you'll drive the guests home," broke in her brother. "Let's play bridge instead. Too bad, though, I was all steamed up to hear Larry sing a few numbers for us."

"That's a shame," I said pretending to be sorry. "How would it strike you if I played my own accompaniment and then a few dance tunes?"

"Strike us," they roared, "why, Larry, it would knock us right over. You can't bluff us into thinking you can play."

"Well you never can tell," I said. "Stick to singing!" chirped a chorus of voices.

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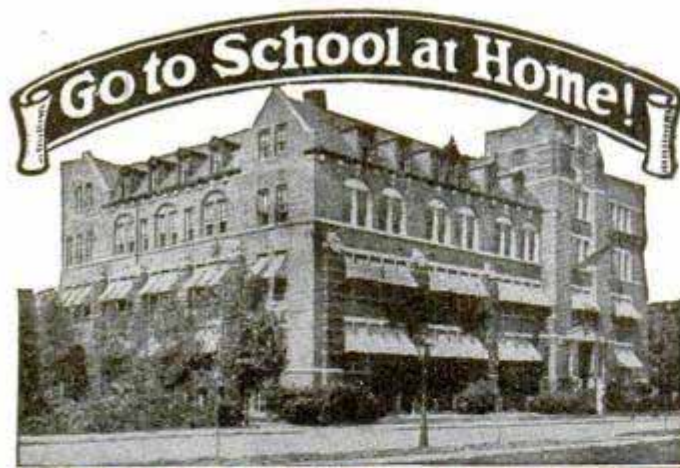
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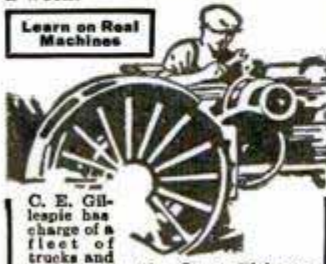
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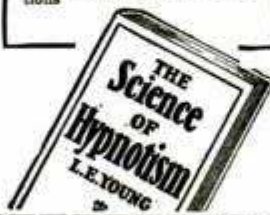
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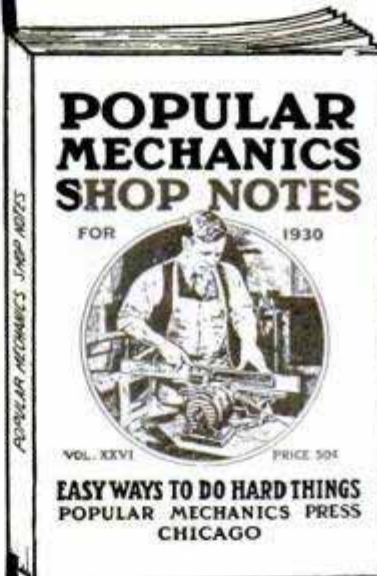
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State of Illinois, County of Cook, ss.
Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, deposes and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Posts, Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. K. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Second. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) L. B. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of bona fide owners; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Publisher. Sworn to and subscribed before me this 28th day of April, 1930. J. GRAHAM, Notary Public. (My commission expires June 16, 1932.)

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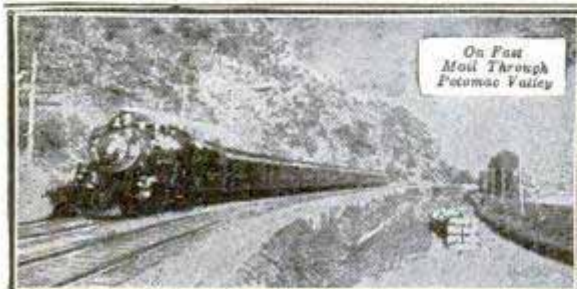
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Just one fact—one SCIENTIFIC fact. That is all. And when you know what it IS, then you can easily learn how to apply it; make it carry you STEADILY, POSITIVELY, AND DIRECTLY to prosperity and independence.

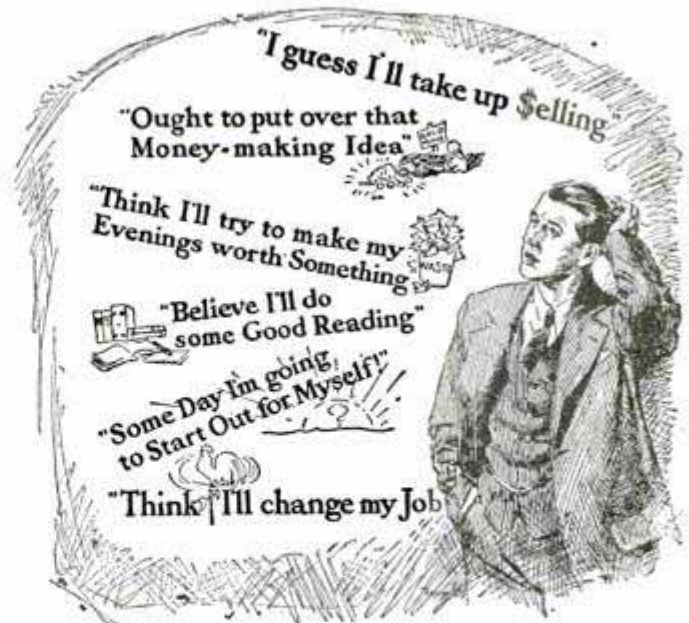
That fact is one which has been PROVEN and stated by the world's foremost scientists and psychologists. You are only ONE-TENTH as successful as you COULD be! Why? BECAUSE, as Science says, you are using only ONE-TENTH of your real BRAIN-POWER!

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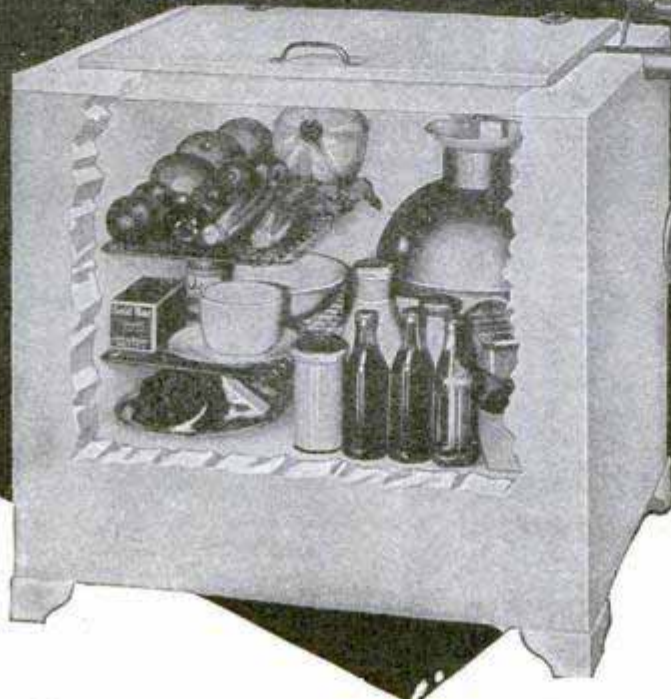
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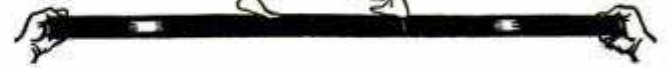
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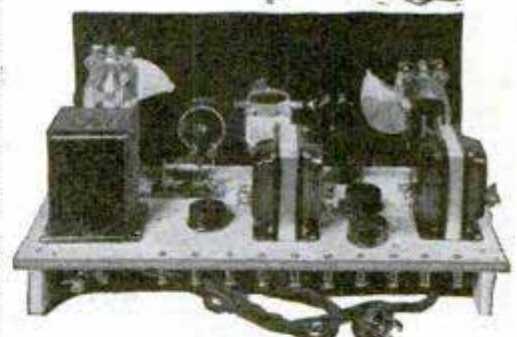
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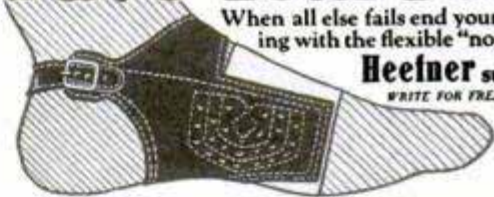
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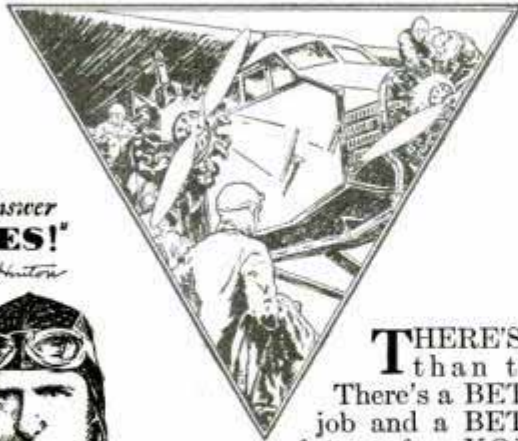
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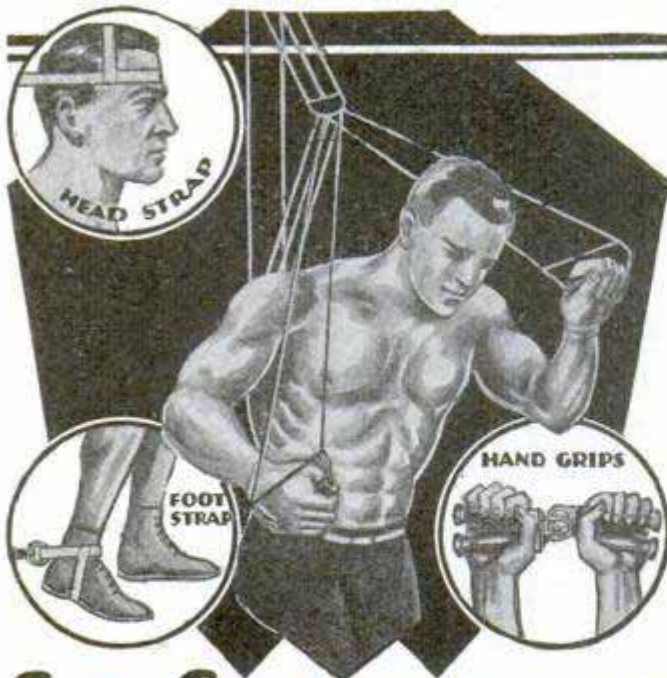
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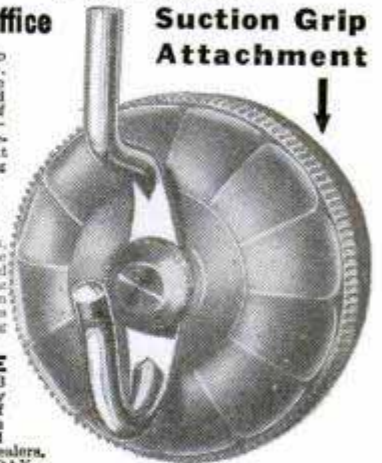
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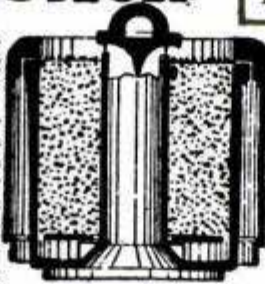
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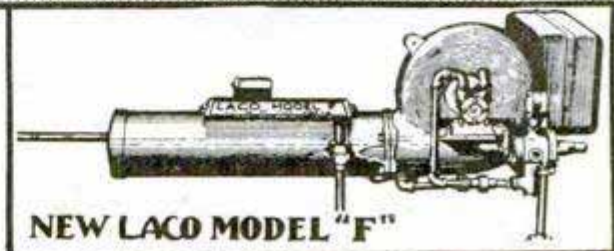
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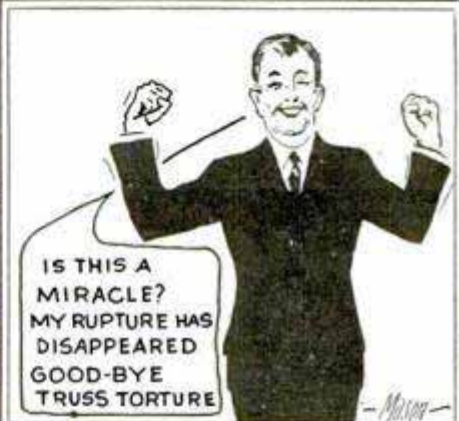
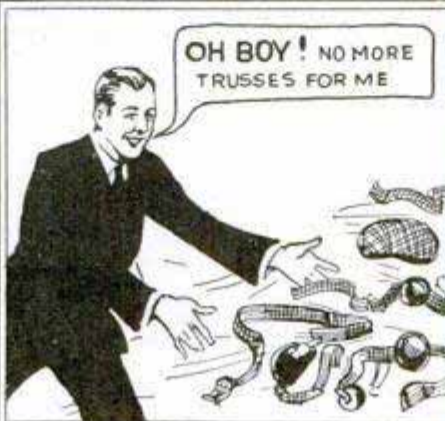
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I MADE \$30 A week home. French breadmaking. 15 years' experience; free booklet tells. Ashbrook 67, Marengo, Ohio.

MAKE Big profits with a fur farm in your backyard. Chinchilla rabbits, muskrat, mink. Write for facts, 252 Conrad's Ranch, Denver, Colo.

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THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

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ARTIFICIAL Marble sanitary flooring, instructions covering wood or cement flooring ½ inch thick, fireproof, all colors, low cost. Ornamental casting, concrete, plaster, papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mahler, Huntington, N. Y.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 228 Gordon Ave., Syracuse, N. Y.

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. Hadwil, 3A-74 Cortlandt St., New York.

LEARN The collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

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A COMPLETE Chemical service, chemical analyses, technical processes and formulas, researches, consultations by mail. Robert Simpson, Public Chemist, 306 Weightman Bldg., Philadelphia, Pa.

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YOUR Chemical problems solved and formula or process furnished for \$5.00. Write me. W. Stedman Richard, Industrial Chemist, Box 2402, Boston, Mass.

ANALYSIS, Chemical consultation, manufacturing ideas developed. Formulas. Write. Associated Chemists, Indianapolis, Ind.

CHEMICAL Analysis, processes, technical information. Robert Henderson, Laboratory, Madison, Me.

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MANUFACTURING Processes that will give your product distinction and build up your business. Either you are in need of a new product to add to your present line or to start a new business on. It will pay you to write us stating your requirements. Complete analytic service. Nielco Laboratories, Inc., 5401 Cicotte, Detroit, Mich.

"INSTANTO"—Effortless, instantaneous automobile refinisher, 50c. Any formula, 50c. Catalog free. Industrial Institute, Dept. 201, 64 West Randolph, Chicago.

INEXPENSIVE Ice-making formula 50c. (Machinery unnecessary.) Neil Tasker, Shamokin, Penna.

SPECIAL Formulas. Sky-Ray Research Laboratory, 1416 So. Ewing, St. Louis, Mo. 3,000 VALUABLE Formulas prepaid \$1.00 National Service, 3644 Tamarack, Cincinnati, Ohio.

10,000 MONEY-MAKING Formulas. Tells you how to make and sell almost everything under the sun; cosmetics, mullage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send no money. Just write a postal for "Henley's 20th Century Book of Formulas." Pay postman postage and \$4. Popular Mechanics Press, 200 E. Ontario St., Room 802, Chicago.

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SUCCEED With you own products. Make them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, soap, extracts. Valuable book free. National Scientific Laboratories, 1935W Broad, Richmond, Va.

3000 Formula encyclopedia prepaid \$1.00. Sterling, 7514 Eastlake Terrace, Chicago, Illinois.

GUARANTEED Formulas, best science can produce for making popular, biggest-selling specialties all lines. Don't buy formulas till you've received valuable eye-opening literature. Miller, Chemist, 706-F Jetton, Tampa, Fla.

500 **FORMULAS** And big illustrated catalog 25c. Ideal Book Shop, Park Ridge, Ill.

FORMULAS All kinds. Catalog free. Clover Laboratories (P), Park Ridge, Ill.

SECRET Formula of world's greatest auto polish sent for \$1.00. Cordes, 4137 24th St. San Francisco.

AGENTS WANTED

WANTED At once: More good men to introduce and retail Rawleigh's Good Health Products. Town and country. Wonderful opportunity. Get into business with backing of largest manufacturer its kind. Capital over 15 million dollars. Quick freight, express, parcels post service from 10 great factories and branches—one near you. Nothing new—no experimenting. No experience required. You simply follow the same old time-tested Rawleigh Methods which secure the most business everywhere and have given consumers best values and satisfaction for 40 years. 170 necessities frequently needed every home. Enormous demand. Annual sales nearly 40 million products. Big free trial inducements. Quick easy sales. Repeat every 30-60 days. Enormous profits—\$100-\$400 month and more profits. Steady year around; no lay-off. No boss—you become sole owner and manager. Practically no capital required. We supply everything—stocks, outfit, sales and service methods. Big pay every day. Profits increase every month. "First come first served." For full particulars write W. T. Rawleigh Co., Dept. F-A-PPM, Freeport, Ill.

SELL Direct to motorists. Tow rope without knots, no slip, no jam. Put on in 32 seconds, taken off in 18 seconds. A fastener rope does not pass through, set on rope any place. Muddy, frozen or knotty rope no interference. Certified and patented. Sample postpaid. 15 feet $\frac{1}{2}$ inch rope, two $\frac{1}{2}$ inch fasteners, \$1.35, or 15 feet $\frac{3}{4}$ inch rope, two $\frac{3}{4}$ inch fasteners, \$1.75. Fasteners per pair $\frac{1}{2}$ inch 40c, $\frac{3}{4}$ inch 55c. Hercules Rope Fastener Co., Box 890, Kansas City, Mo.

AMAZING New invention. Electric water heater. Sells for \$3.75. Heats water almost instantly. Make big money. Write today. Lux-Visel Company, Dept. 23, Elkhart, Ind.

AGENTS Give away \$1.50 article to sell \$3.50 auto specialties; daring, new, big give-away plan; sound proposition. Get details. Automotive Research Co., Dept. P, Saugerties, N. Y.

AMAZING New fly killer offers you wonderful chance to make \$15 profit a day. Instantly kills flies, mosquitoes and other insects. Easily demonstrated. Tremendous demand in homes, stores, restaurants, etc. Particulars free. Albert Mills, 5194 Monmouth, Cincinnati, Ohio.

MANY Thirsty thousands will buy our soft drink powders this summer. Think of it! 10 big glasses 10c, best drinks you ever tasted—prepared instantly. Sell families also stores—500% profit selling by glass. Send 25c enough 30 assorted glasses with particulars postpaid. Morrissey Company, 4417-25 Madison, Chicago.

MUSICAL Cup: Speaks for itself. Easy sell, big money. Guaranteed sample 50c. Fowler & Co., 21517 99th Ave., Queens Village, N. Y.

PROFITS "And How" selling the only genuine perfume starch. Handsome display box to place in stores. Send dime for working outfit. Gilcor Mfg. Co., 30 University Place, New York.

WE Pay more for your evenings and spare moments than any agency firm. You can use balance of day calling on wholesale trade. Demonstrate and sell automobile radiator clean, get two-thirds of all you take in. Send 25c full sized package, try on your own or neighbor's car. If you don't take up agency, quarter refunded. A. Dana Chemical, 31 E. Lee, Baltimore, Md.

\$25.00 REWARD For any corn Great Christopher "Positive" corn cure cannot remove. Also removes warts, moles, callosities. Price 35c. Reliable Specialty Corporation, Buffalo, N. Y.

BRANDNEW Dollar can opener. 100% profit. Good Housekeeping approval. Amazing demonstration. Agents, distributors cleaning up to \$40-\$124 weekly. Sample free. Territory going fast. Write today. Harker Products, Battlecreek, Mich.

SELLING Like blazes! Beautiful toilet goods assortment at \$1.75 with 24 inch pearl necklace free to your customers. 100% profit. Davis Products Co., 238 North Ave., Dept. 630, Chicago.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 10.

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 to cover cost of mailing. New Method Manufacturing Co., Box PM-6, Bradford, Pa.

WORLD Beater proposition for agents. Biggest, surest, steadiest, income from new cleaner that's better. Everybody buys, repeats. Over 100% profit. Get facts. The Stewart Laboratory, 3807 South Parkway, Chicago, Ill.

MAIL Order News, America's pioneer mail-trade magazine, published 27 years. Brimful with money-making suggestions for agents, mail order men, and opportunity seekers. Send 25c for copy. May be worth fortune to you. Mail Order News, 11 West 42nd, New York.

"QUICK Trick"! The Automobile Polishing and Dusting Cloth dry cleans and polishes finest automobile and furniture finishes in one simple operation. Exceptional sales and profits. Sample free. Our line repeats. Walter S. Doe & Co., Kent, Ohio.

SELL Koehler's Flashy Signs. Start now. 100 9x11 \$3.50, 100 12x18 \$9.00. 500% profit. Proven sellers. Koehler's, Fourth Morgan, St. Louis, Mo.

MCDONALD Polishing Cloth, 18 Agawam St., Lowell, Mass., cleans metals. Sample, terms 15c silver.

MEN, Women, boys, girls make \$10 day selling castle soap, 4 cakes \$1.00. Boot Mills towel free. Henry H. Moritz, 2103 West 81st, Cleveland, Ohio.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-T West Van Buren, Chicago.

MAKE And sell your own goods. Formulas by expert chemist, 30 years' experience. Manufacturing processes, trade secrets, all lines. Thousands of clients. Catalog for stamp. B. Mystic Company, Stamford, Conn.

SENSATIONAL Invention—"Reminder Watch," can be set for three appointments. Retail \$12.50, your profit \$4.00. Write promptly for valuable information. D. P. Howard, 354 South Spring, Los Angeles, 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., 84 Elizabeth St., New York.

WE Offer a most profitable opportunity with unlimited possibilities not over worked. Write today. Francis Co., 245 First St., Jersey City, N. J.

AGENTS—Up to \$12 daily. Introducing hosiery guaranteed 6 months or replaced. 126 styles, color for men, women, children. Lowest prices. Auto and hose offered producers. Outfit furnished. Wilkint Hosiery Co., Dept. C-9631, Greenfield, Ohio.

MONEY Plus. Get free movie tickets and have cash income every week from local merchant advertisers. Particulars free. A. Benton, 914 Elsbeth, Dallas, Tex.

MEN Wanted—to demonstrate and take orders direct from motorists. Amazing magnetic trouble light. Sticks on metallic surfaces. Our men earn as high as \$75.00 weekly. Write for demonstrator. Magno, Beacon Bldg., Dept. 166, Boston, Mass.

BOTTLE Your own products! Flavors, perfumes, food specialties. Free labels. Valizon Products Company, Geneva, N. Y.

THIS Advertisement may make you thousands of dollars, if you'll 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.

MAKE Big money selling The Bootlegger's Map. Fast selling comic number. Send 10c for copy and prices. The Griswold Press, 854 Howard St., Detroit, Mich.

EMBOSSED Signs that are guaranteed not to fall apart. Samples and lists, ten cents. Superior, 4646 Telegraph, Oakland, Calif.

BIG Money easy. Simply showing new Polly wrench. 10 wrenches in one. Guaranteed! Fast seller. Sample furnished. Gellman Mfg., Dept. 6-T, Rock Island, Ill.

IMPORT Your own goods. German export magazine published in English offers numerous bargains, latest novelties; opportunity for obtaining profitable agencies. Copy 60c. Square Deal Supply, P-246 Fifth Ave., New York.

ARE You old at forty? See our advertisement on page 65 of this issue. The Electro Thermal Company, 2130 Morris Ave., Steubenville, Ohio.

AGENTS—Ersco milk markers, new household utility. Ideal straight or side line. Sells for \$1, costs you 50c. See April Popular Mechanics, page 635. Protected territory. Act quick. Pope, International Bldg., Washington, D. C.

MEN Or women: Make \$10 daily spare time soliciting orders from sample. Marvelous new auto and furniture polish. Amazon, 1418 Augusta Blvd., Chicago.

SELL New signs, embossed price tickets, and changeable signs. Wonderful selection; used in all businesses; information free, \$1.00 worth samples 25c; be first in territory, send \$5 for 100 best assorted signs, \$3.00 for 50; sell 30c each. P. Franklin Co., 3322 3rd Ave., New York.

SALESMEN—1,000 Car washings for \$3.75. Remarkable new invention washes cars faster, cleaner, cheaper. 100% profit for agents. Write today for free sample offer. Gy-ro Brush, Dept. FC-14, Ampere, N. J.

AGENTS—Owning car, handy with tools. Hundred dollars weekly selling furnace safety signal. Reduces coal bills. Eliminates danger from gas and overheating. Even-Heat, Inc., Manufacturers Blowers, Grates, Automatic Controls, Plants, Syracuse, N. Y.; Ottawa, Can.

SOMETHING New! 100% profit; \$12 daily selling all dealers cloth signs. Send 60c for sample and particulars. New Method, 119 West Vernor, Detroit, Mich.

AGENTS Make high as \$12 day. Selling wonderful new spring and summer styles. Latest shades. Full fashioned only \$1.39. Extra big commissions. Write quick. Silk-nit Hosiery Co., Dept. 2031, Dayton, Ohio.

AGENTS Earn \$8 day. Dri-Kleanit removes dirt, grease, tar, all one operation. Cleans car for about 10c. No soap or water used. Auto looks like new. Wonderful seller. Send three 2c stamps for sample. American Accessories Co., Desk 6431, Cincinnati, Ohio.

AGENTS—Absolutely new! Our hand colored popular priced photo statuettes going big! Everyone wants them! \$10-\$25 daily earnings possible. Samples furnished! Cruver Mfg. Co., FS2456 Jackson, Chicago.

OLIVER Cleared \$700 in 30 days with our line of books and Bibles. Outfit free! Exclusive territory! Nichols Co., Dept. B10, Naperville, Ill.

1930 **DIRECTORY** Lists where to buy thousands of articles wholesale. Agents wanted. Pruitt System, Brookfield, Ill.

AGENTS! \$15 Daily! Amazing new dishwasher washes, rinses, dries dishes! Hands do not touch water. Fits any sink. Women "wild" about it. Sells quickly! Get free sample offer. Household Aids, 352W Ohio, Dept. 246, Chicago.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, soap, extracts. Valuable book free. National Scientific Laboratories, 1935W Broad, Richmond, Va.

MAKE Big money, sell oil gauge to every Model A owner. Carton of 6 postpaid \$6.00 or will send C. O. D. Limaco Sales Co., Connersville, Ind.

AGENTS! You can buy 200 necessities direct from manufacturer for less than you can make them yourself in quantities you buy! Four big lines big-selling repeaters sold all over United States, Canada, and Australia; Good Health Products, Stock and Poultry Raisers' supplies, soaps and toilet articles, food products, insecticides, cleansers; needed daily every home. All guaranteed exactly as represented by largest company of its kind in the world with four great factories—22 acres floor space. 10 branches—one near you. Cash or credit. Quick, easy sales. Good pay every day. Steady repeat business. First come, first served. Write for particulars. W. T. Rawleigh Co., Dept. F-G-PPM, Freeport, Ill.

\$200 MONTHLY Selling amazing new automobile trouble light. Electro magnetic. Sticks anywhere on car. It's an Everlasting Flashlight. Sells on sight. Send for demonstrator and prices. National Electric Corporation, 222 High St., Newark, N. J.

MAKE \$10.00 A day selling changeable signs to stores. Blue front, red border, size 14x24, six lines, 260 letters and figures. Easy to sell for \$1.50. Two sample signs postpaid \$1.00. 26 signs and sample case \$10.80. 100 signs \$35.00. National Sign System, 215 So. Broadway, St. Louis, Mo.

MEN! Women! Earn splendid income. Establish permanent business as exclusive distributor our products your county. Write quick. Indianapolis Soap Co., Dept. 53, Indianapolis, Ind.

BIG Money daily, selling shirts of all kinds, neckwear, underwear, Sox, pajamas, sweaters, raincoats, coveralls, pants, children's playsuits. Outfit free! Experience unnecessary. Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

AGENTS: Make \$25.00-\$100.00 weekly selling Comet sprayers and autowashers to farmers and autoists. All brass; throws continuous stream. Established 40 years. Particulars free. Rusler Co., Box C-11, Johnstown, Ohio.

PROFITABLE. Quick easy sales, men and women make good with new household necessity. Sample 50 cents, refunded with first order. Detroit Wire Products Works, 607 Shelby St., Room 802, Detroit, Mich.

AGENTS Make \$75 weekly with extensive line of household specialties—sponge rubber mats, fairy damask tablecovers and 50 other fast sellers. Write B. & G. Rubber Co., Dept. 445, Pittsburgh, Pa.

MAKE \$28 Daily demonstrating automatic gaslighters. Cost you \$8 gross, doz. \$1. Rapid Mfg., 2772 Pitkin Ave., Brooklyn, N. Y.

AMAZING Nulustre polishing cloth, cleans, shines all metals—eliminates liquid, paste, powder polishes. Big profits, quick 25c seller—whole or part time. Samples free. Shef Mfg. Co., 20 Shef Bldg., Weehawken, N. J.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, soap, extracts. Valuable book free. National Scientific Laboratories, 1935W Broad, Richmond, Va.

PORTRAIT Men you can make money anywhere selling our guaranteed portraits. Send for free frame catalog. Portrait Agents' Supply Co., Dept. F, LaPorte, Ind.

AGENTS Wanted everywhere. Write for further particulars. Snow & Parker, Inc., 41 Fish Pier, Boston, Mass.

AGENTS Demonstrate Minute Kleen. Fast-selling cleaner for automobiles, furniture, metal and glass. Your name on labels. Quick repeater. Large profits. Free sample. Minute Kleen Laboratories, Dept. E, Evansville, Ind.

STRANGE New ironing cord! Prevents scorching. Saves electricity. Cannot kink or snarl. For telephones also. Up to \$25 daily. Samples furnished. Neverknot, Dept. 6-A, 4503 Ravenswood, Chicago.

AGENTS—Sell pure silk guaranteed hosiery direct to wearers. Unusual quality-values assure unlimited earnings. Lynx Knitting Co., 16 Hudson St., Dept. E2, New York.

NEW Glareshield. Immense profits as a sideline. Sells on sight. Retail price \$1.50. Send 75c for sample and details. Dept. "N," Box 511, Sheboygan, Wis.

SUCCEED with your own products. Make them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

DISTRIBUTORS. Model "A" Fords need automatic spark controls. Write Kinley Electric Co., 79 Edward, Buffalo, N. Y.

EASIEST Window letters on the market. Big profits. 50 styles and colors. Free sample. Write quick. "Ralco," 1045 Washington, Boston, Mass.

EASY To sell groceries, paints, auto oils to consumers. Steady, profitable work. Experience unnecessary. Credit given. Valuable outfit free. Loverin & Browne, 1602Y So. State, Chicago.

REAL Money made with this seller. 22K gold finish monograms for autos, wallets, etc. Easily attached. Enormous profit. Write today for particulars. Royal Monograms, 137 Fifth Ave., Dept. F-14, New York.

100% PROFIT in Read-O-Lites Ideal Multiple Duty lamps. Every home prospect. Sells \$2.50, cost \$1.25. Send for sample. Money back guarantee. Foremost Electric, 87 Walker, New York.

SMOKE And sell a real pipe. Charcoal liner. No breaking in. Aluminum base and stem. Evaporates moisture. Never gets strong. Always a cool, sweet smoke. Agents wanted to sell direct. Retail \$2, 100% profit. Write for particulars. Bronco Buster Pipe Company, Room 107, 233 East Colfax, Denver, Colo.

EARN \$5 Daily sparetime. Sell high grade printed stationery. Keep \$1.00 profit every sale. Outfit free. Rapid Press, A1421 Solon, Chicago.

JUST Put our chewing gum outfit in your pocket. Make daily expenses. Sell to stores. Popular flavors. Outfit furnished. Helmet Corp., Dept. 64, Cincinnati, Ohio.

LINIMENT Powder. Bottle yourself. Labels free. Great profits! Bucknam, Box 383, Madison Square Station, New York.

MAKE \$20 To \$35 a day selling Imprint Book Matches, spare or full time; big repeat business; every merchant a prospect. Start taking orders immediately. Send \$1.00 deposit for elaborate selling portfolio containing actual book match samples of 24 individual copyrighted designs. Write Imprint Book Match, 877 Meigs St., Dept. A-11, Rochester, N. Y.

HEAVY Profits introducing new type mending fluid. Amazing scientific development. Agents, part-time workers cleaning up. Details free. Karam-Smith, 6606 Bozan, Ft. Wayne, Ind.

SELL Business cards. Good profits. Free samples. New England Card Co., Box 129, Boston (Chelsea), Mass.

FIFTY Full sized name cards 50c. Agents wanted. Thomas Card Shop, Camp Hill, Pa.

AGENTS—Big chance to make \$9 daily, introducing new "No-Bang" door check for screen doors and other house doors. Very low priced. Automatic. Banishes disease bearing flies, mosquitoes, bugs. Noiseless, safe. Every house needs 2 or more. Quick seller. Big profits. Best season now on. Write quick for terms of demonstrating sample. Elmwood Check Company, File 1206, Cincinnati, Ohio.

\$61.50 WEEKLY introducing and selling a new gas light burner for kerosene lamps. No chimney. No mantle. Samples free. Luther Mfg. Co., Dept. 680, Cincinnati, Ohio.

MEN, Women, sell non-alcoholic tube flavors. Thos. J. Ferguson, 7426 Richmond, Maplewood, Mo.

SHOES Completely resoled for 3c a pair! Amazing new preparation makes new shoes out of old in few minutes. Take orders \$20 to \$40 daily easy. Write for territory and free sample offer. Perfect Mfg. Co., Dept. A-506, 220 E. 3rd St., Cincinnati, Ohio.

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.

MEN Making \$78 to \$119 weekly showing home owners beautiful 4-color illustrations of our dependable guaranteed trees, shrubbery, etc.; pay weekly, everything furnished free; experience unnecessary; full-part time; permanent. Perry Nurseries, R-6, Rochester, N. Y.

AGENTS—Make a dollar an hour. Sell new kind of sharpeners. Sharpens all knives and tools quickly. Demonstrating sample 10c. Premier Mfg. Co., Dept. 104, Detroit, Mich.

OH Hello! Why didn't I see this before? Christy's Iron Rust and Stain Remover sells like blazes. Write for free sample. Christy, Inc., 5067 Broadway, Newark, N. Y.

FREE "Unheard of Booklet" describes daily problems. Increases income 300%. Art-Craft Co., Kossuth Ave., New York.

ANXIOUS To hear from lady interested in opening little home dress shoppe. Mme. Isabelle, Gowns, P65, Times Square, N. Y.

IT'S A KNOCKOUT. G. U. C. Auto Hand Mop. Guaranteed to outwear a dozen sponges. Patented, no competition. Sells on sight to auto laundries, wash-racks, garages, car owners, painters, janitors, housewives, etc. Sale guaranteed. Repeat orders roll in. Exclusive county selling rights. Write today, be first. G. U. A. Co., 189 Dolores, San Francisco.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, soap, extracts. Valuable book free. National Scientific Laboratories, 1935W Broad, Richmond, Va.

HUNDREDS Of Firms need representatives in every community in U. S. Send for free sample copy of Opportunity Magazine, F-750 No. Michigan Ave., Chicago.

GENUINE Gold leaf letters for store and office windows, enormous profits, free samples. Write now. Paramount Sign Letter Service, 7 East 42nd St., N. Y. C.

DOES 300% profit interest you? World's best polishing cloth. Everybody buys, sample free. MagiCloth, 3317 Summit, Kansas City, Mo.

REMNANT Store, 1514 Vine St., Cincinnati, Ohio. Greatest dry goods bargains on earth. Agents and dealers.

SHOES Completely resoled for 3c a pair! Amazing new preparation makes new shoes out of old in few minutes. Take orders. \$20 to \$40 daily easy. Write for territory and free sample offer. Perfect Mfg. Co., Dept. Z-506, 220 E. 3rd, Cincinnati, Ohio.

AGENTS: 60c To 67½c profit on \$1.00 sales. Quick sales, repeat orders, selling famous Ho-Ro-Co Iron Tonic. Also full line remedies, toilet articles, food products, daily necessities. M. G. Roth, Pres., 2852 Dodier, St. Louis, Mo.

MANUFACTURE Auto specialties: Battery charging electrolyte, radiator seal, hand soap, puncture plugger, glass cleaner. Get my free list. John Mickman, Chemist, St. Paul, Minn.

NEW! Rubber soles—Cement on instantly. Never loosen. Outwears leather. Waterproof. Sells fast. Big repeater. Test at my expense. Besterer Co., 195 Irving Park Sta., Chicago.

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.

NEW Invention, easiest thing ever sold. Inexpensive washer for autos. Car owners eager to buy on demonstration. No competition. Big profits. Plomo Specialty Mfg. Co., Dept. C, Cleveland, Ohio.

\$150 MORE Monthly; spare moments; whirlwind seller; immense profits. Davila, Box 1495, San Juan, Porto Rico.

TIME Counts in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

AGENTS Buy direct at lowest mill prices. Men's latest fancy hose, doz. \$1.45-\$2.00. Ladies' Pointex silk hose, doz. \$4.25-\$7.00. Catalog free. Superior Knitting Company, Dept. 34, New Haven, Conn.

CHICAGO Expert valued \$3 stone at \$900. The diamond's only guaranteed rival. Greatest spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. Mexican Gem Company, Dept. PM, Monterey, Calif.

SELL By mail! Start your own small business anywhere. Free folder tells how. No personal selling. Everything furnished. A. Horton, Metropolitan Bldg., St. Paul, Minn.

NEW! Different! Milady's Novelty Clothes Brush. Rainbow colors create instant sales. Hadleigh made \$24 first day. Free sample. L. Jensen Co., 304 S. Dearborn, Chicago.

UNUSUAL Income. Every community. Sell homes, shops, theatres, stores, banks, schools, etc., the new Fugo, world's simplest fire protection. No sales experience necessary; we teach you. Part or full time. Act quick! The National Formetal Co., 6547 Metta Ave., Cleveland.

NEW Solray ultra-violet infra-red health lamp at unheard-of low price of \$12.50 sells like wildfire. Spare or full time. Big profits. Everyone a prospect. Write for special offer to Solray Co., Inc., 213 E. Illinois St., Chicago, Ill.

"SELLING Opportunities," magazine, Brookfield, Ill., is a live-wire magazine for those who sell to live. Twelve issues and copy of "Selling Yourself," 25c.

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.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, soap, extracts. Valuable book free. National Scientific Laboratories, 1935W Broad, Richmond, Va.

AGENTS—Mosco Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 504 Searle Bldg., Rochester, N. Y.

400% PROFIT Selling perfumes. Melrose Works, Box 731, Chicago, Ill.

ENGRAVED Name plates, signs, numbers, desk plates, store window signs, etc.; profits large. Brett Bros., Winthrop, Mass.

SELL Stores 5c carded breathlets, etc. Lorrac Products, Albany, N. Y.

WANTED: District manager to appoint agents. Unlimited opportunity. No canvassing. Mother Hubbard Products, 554U Congress, Chicago.

BIG Profits, quick repeats, placing Aspirin, Notarar, Plints, Silkstone, other self-selling counter cards with dealers. Over 100% profit. Sterling Co., H7, Baltimore, Md.

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.

FLAVORING Extracts—Bottle yourself! Concentrated. Labels furnished. 600% profits! Whirlwind moneymakers! Free offer! Thomas Manufacturing Company, Indianapolis, Ind.

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\$50,000 PICTURE Man Friedman made canvassing. Beginners can make \$100.00 weekly with my sales talk. Experienced men make more. Free book "Profits in Portraits" explains. Sample free. Picture Man Friedman, Dept. 8, 109 West Austin, Chicago.

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AGENTS Wanted—On a fast selling 25c item for the kitchen, costs you 8 1-3c. Sample sent parcel post prepaid for 10 cents. P. Seed Filter Mfg. Co., Inc., 353 Broadway, New York.

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.

A BUSINESS of your own—Making sparkling glass name and number plates, check-boards signs. Big book and sample free. E. Palmer, 512, Wooster, Ohio.

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A SIDE Line that beats your main line. High class salesmen to call on manufacturers, wholesalers, retailers or professional men with very unusual and profitable sideline. Established business. Our men take 3 to 5 new and renewal contracts daily \$10 to \$75 each. No samples to carry. We bill and ship direct. Your commission half amount billed. You get full credit on repeat orders without callbacks. Most exceptional opportunity for right man. Commonwealth Company, 508 S. Dearborn, Chicago.

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OPPORTUNITY To earn \$20 daily selling for only \$1.00 a year Superior \$1,500.00 Accident Policy. Superior Policy Department, 11 South LaSalle, Chicago.

ARE You old at forty? See our advertisement on page 65 of this issue. The Electro Thermal Company, 2130 Morris Ave., Steubenville, 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-19, East Jaffrey, N. H.

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SALESMEN To take orders for real home cooked chicken, exclusive territory, sure repeat business. Delicatessens, sandwich shops, groceries, drug stores. Sure sales; excellent sideline. Scharrer & Co., 2102 S. Compton, St. Louis, Mo.

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WANTED Distributors for new chemist discovery. Restores original finish of autos, etc. 2646 Yemans, Detroit.

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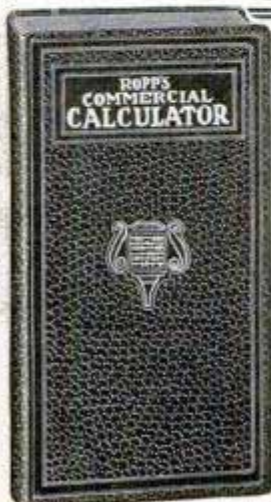
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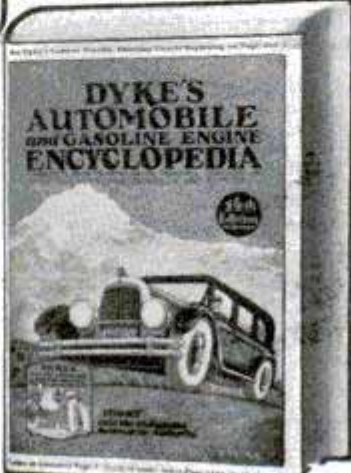
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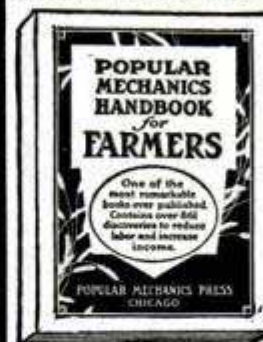
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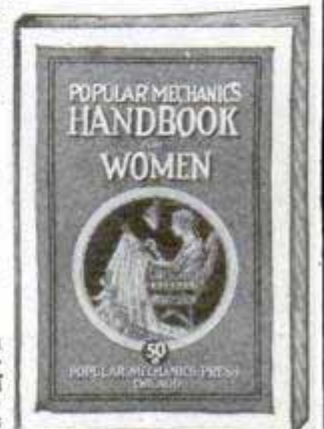


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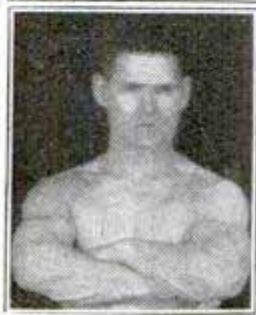
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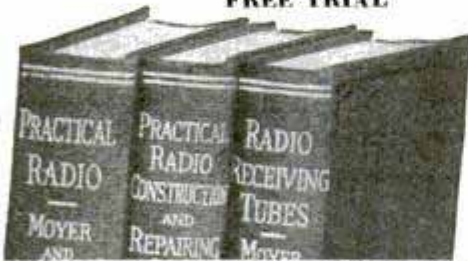
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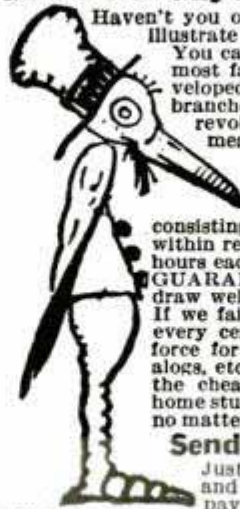
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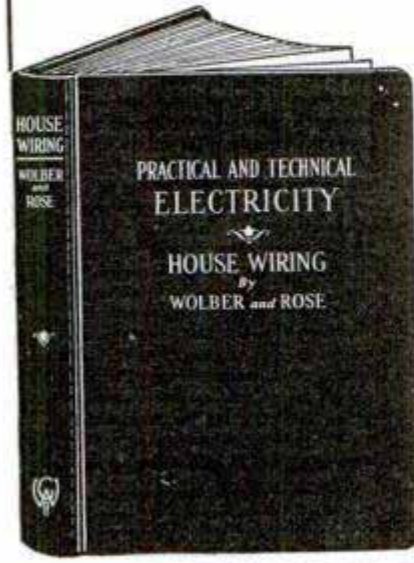
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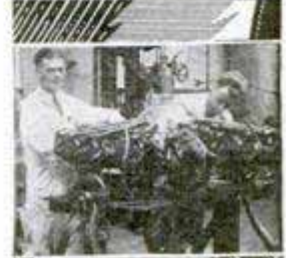
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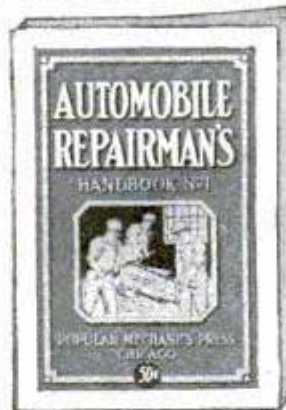
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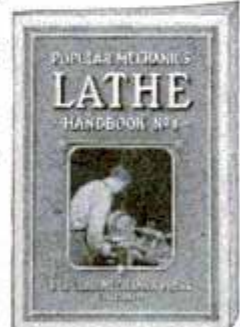


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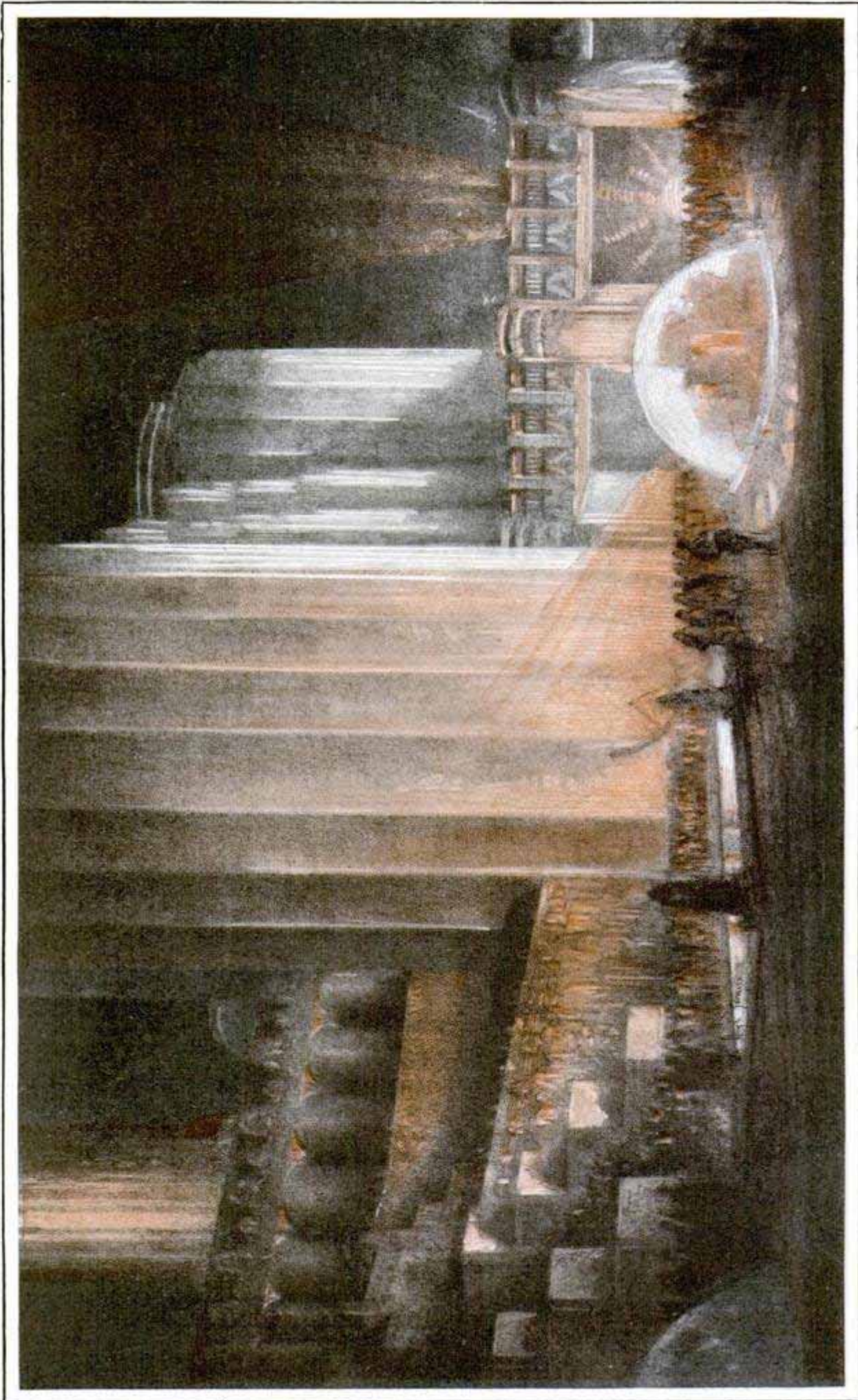
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Unusual Lighting Effects Are Planned for the Chicago World's Fair Centennial Celebration in 1933: This Sketch by Hugh Ferriss, from a Design Prepared by Raymond Hood, a Member of the Fair's Architectural Commission, Shows a Night Scene in One of the Gardens—See Page 915

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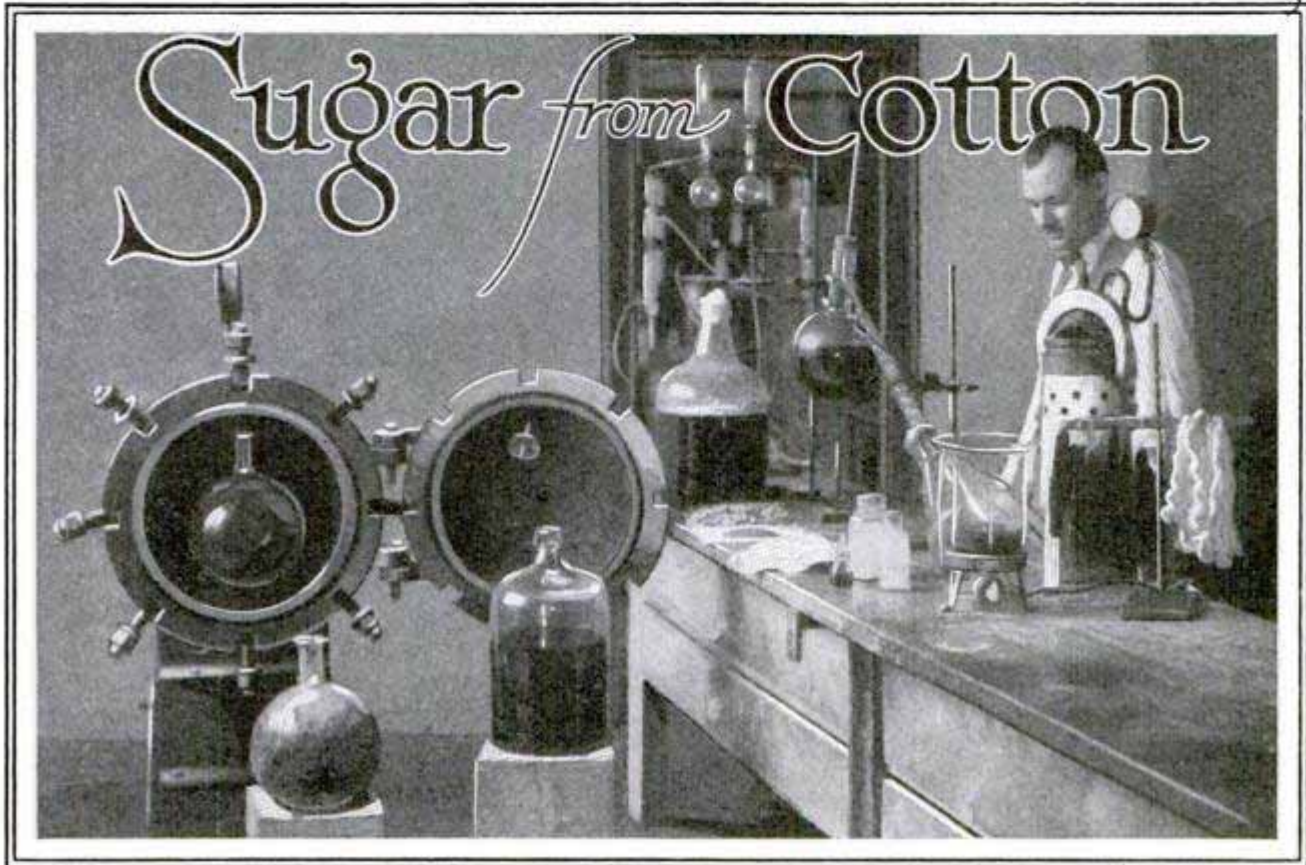
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 53

JUNE, 1930

No. 6

570



The Large Bottle in the Center Contains Molasses Extracted from Peanut Shells, a Source of a Kind of Sugar like That Derived from Cottonseed Hulls

By GEORGE W. GRAY, *Sparkill, N.Y.*

THE WIZARDS of the laboratory—those wonder-workers who by doing “this” and by adding “that” to some worthless stuff, convert it into a valuable—have been at it again. This time they have gone into the cotton fields of the south, taken one of the waste products of cottonseed and extracted a rare sugar.

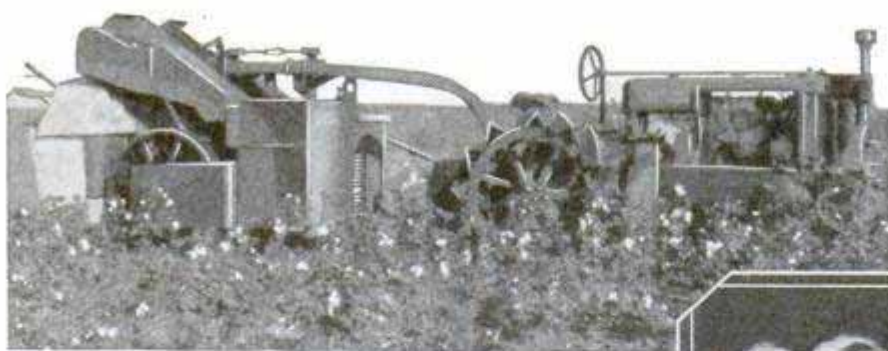
Indeed, this sugar, which is known to science as xylose, has heretofore been so rare that it sold at \$100 a pound. But now chemists of the bureau of standards, under whose direction these notable experiments were made, find that from every ton of waste they can produce a quarter ton of the sugar. Since more than a million tons of waste are available each year, and since the cost of extraction is low, we have the possibility of 250,000 tons of the sugar at a few cents a pound.

And therein lies a question: For what purpose may the sugar be used? The announcement of its discovery in such quantities and at so low a cost has served as a “Work Wanted” advertisement to industry, and today experimenters all over the world are trying to find a profitable job for the peculiar sugar.

“Candy manufacturers and bakers have asked for samples,” said W. E. Emley, who is in charge of this research at the bureau, “and they are experimenting with the sugar in their laboratories to determine its possibilities as a food. Xylose is not as sweet as cane sugar, but it may have other qualities to make up for this deficiency.”

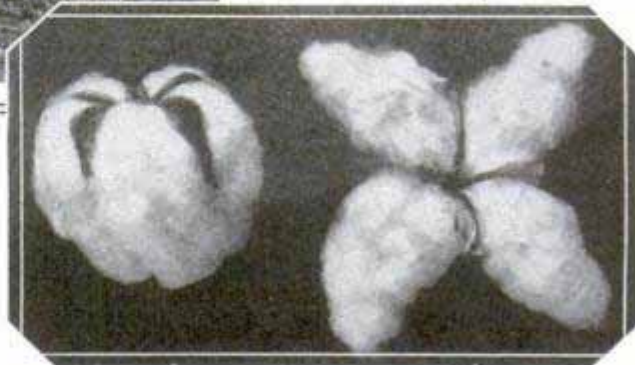
Experimenters in one laboratory fed it to rats and watched results. They report that the sugar passed through the rats un-

not on market



of the cottonseed which remain after the cotton fiber has been stripped off, and after the rich kernel has been removed from the inside of the seed to be crushed for its

Mechanical Cotton Pickers Are Appearing in Parts of the South; at Right, Typical Bolls



changed and without ill effects. In other words, it apparently provided sweetening without entailing any fattening. You can easily imagine what this may mean if the sugar proves to operate the same way in the human system. No need then for physicians to warn stout persons to avoid candy. However, Mr. Emley, who is a conservative and conscientious chemical engineer and unwilling to accept any possibility as a fact until it is proved, thinks that these conclusions are still too uncertain to be adopted. Much more experimenting is needed, in his opinion, before we can label xylose as a non-fattening sugar. These experiments are now under way, but it may require three years before the full facts are known.

There are possible jobs for sugar other than in the realm of foodstuffs, however. Explosive manufacturers are trying to nitrate the xylose; that is, to convert it into an explosive, just as wood fiber and glycerin are converted into guncotton and dynamite by treating them with nitric acid. If these experiments succeed, a more powerful or cheaper form of explosive may result. Others are trying to convert the new sugar into acids or alcohols, and in either form it might be valuable for lacquers or enamels. Chemists at the bureau laboratory have already produced acids from xylose, some of which, it is thought, may be useful in the tanning and dyeing industries. One tastes like citric acid and might be suitable for use in soft drinks.

During the past few months samples of xylose have been supplied to thirty-five research laboratories, and of these ten are in foreign lands, which indicates the great interest this new product of waste has aroused.

The new sugar is made from the shells

oils and ground into meal for cattle feed. Experiments also show that the same sugar may be extracted from peanut shells. When the xylose industry gets established, it may also provide a market for the farmer's peanut shells, of which 50,000 tons are produced annually in the United States.

Following this same program of conserving and making profitable every possible form of farm waste, the bureau of standards is experimenting with artichoke tops. The artichokes themselves are used to make levulose, another sugar, while the large leaves cut off as tops are thrown away. In Iowa they are trying at present to make insulating boards out of these tops, and the prospects seem promising.

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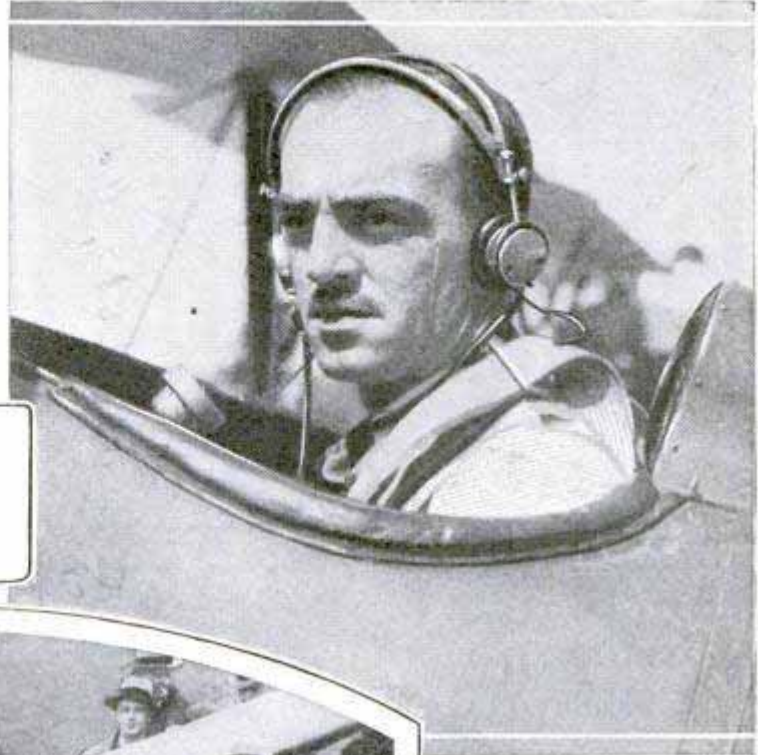
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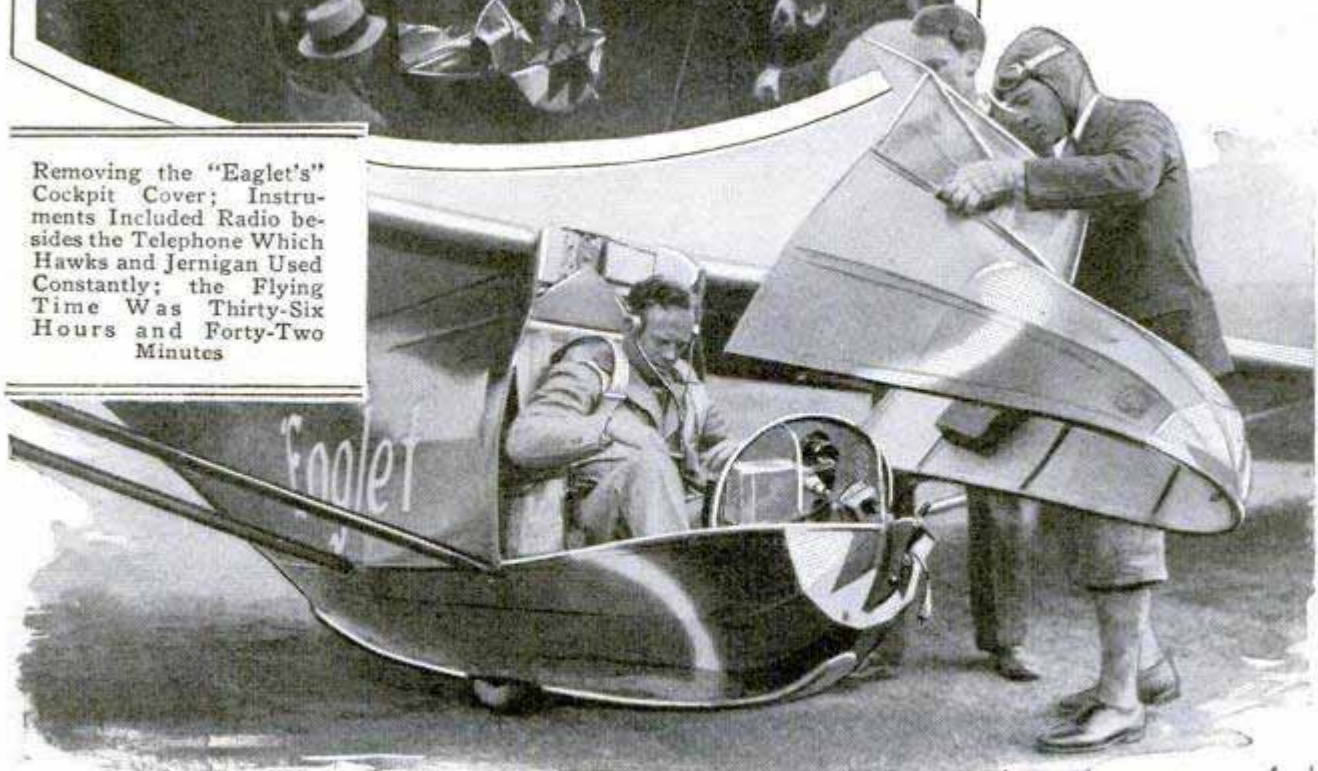


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Spectacles with High Hinges and Bows Which Give the Wearer an Increased Visual Field

Imitation-shell spectacle frames with hinges set considerably higher than the ordinary kind have appeared on the market. The hinges, placed above the level of the eyes, give the wearer a considerably increased visual field.

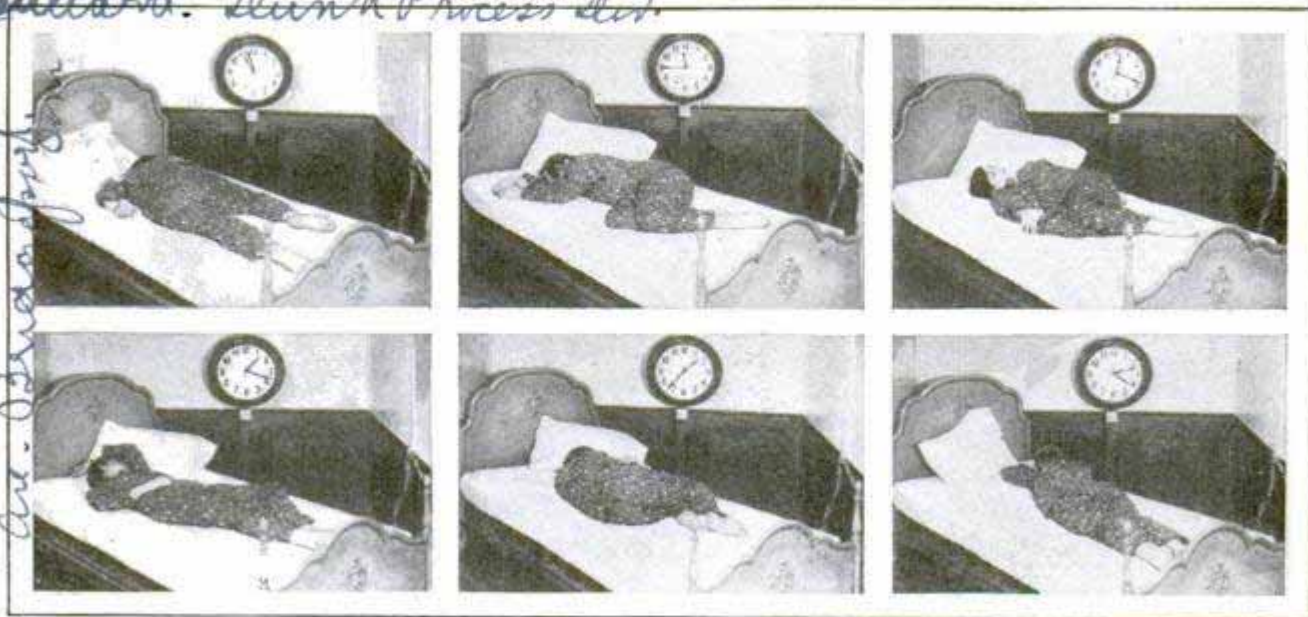
NEW WAY TO FINISH METALS
PROLONGS THEIR LIFE

Reduction in cost and increased speed in production are among the advantages claimed for an improved process for preparing metallic parts for grinding, polishing and other operations. An electrochemical bath is employed, which is said to achieve the same results as have been attained only by sandblasting and pickling.

The process is said not to pit the surface of the metal, thus eliminating the necessity for refinishing, and it is also said to render the product partly resistant to rust and other destructive agencies. The metal is given a surface especially well suited to the needs of electroplating with nickel, copper or chromium. A motor generator and tanks constitute the principal equipment. In finishing stainless steel by this method, only two grinding operations are necessary to secure a polish, whereas eight had previously been required. The process has been used with good results in finishing the inner surfaces of long pipes.

HOW YOU SLEEP REVEALED
BY AUTOMATIC CAMERA

Cameras which snapped a picture every time a sleeper made an appreciable move were used recently in experiments to find the most restful positions for the average slumberer. The cameras were operated by electromagnets connected to the bed springs. The photographs appeared to disprove theories that greatest comfort is attained with the spinal column straight because the average sleeper on an average night was found to change his position about every seven minutes, and some of the postures appeared both unnatural and uncomfortable, yet did not affect slumber. Some of the more common positions assumed by sleepers have been named the "swimming sprawl," the "kitten coil," the "kitten coil, reverse," and the "cuddle."



Cameras Connected to the Bed Springs Took These Pictures, One Photograph Being Snapped Each Time the Slumberer Moved, in a Study to Discover the Most Comfortable Sleeping Posture

experiment by Mr. H. M. Johnson, Laboratories

Acting class of legal establishment
optometrist
280

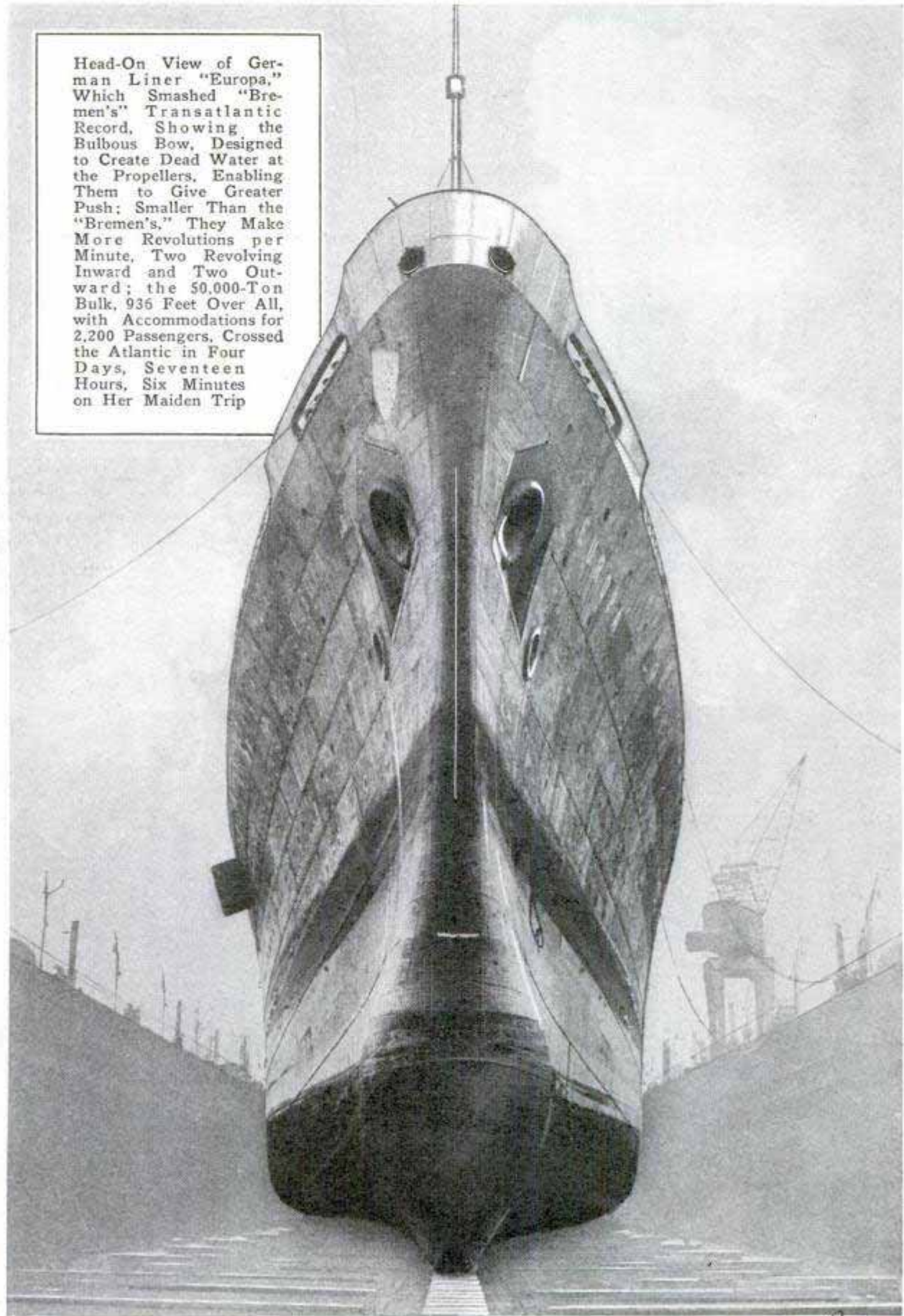
602
Bullard Co.,
Brewster St. Springfield
Mass.

Pat. 1,615,192

431

HOW THE "EUROPA" GETS RECORD-BREAKING SPEED

Head-On View of German Liner "Europa," Which Smashed "Bremen's" Transatlantic Record, Showing the Bulbous Bow, Designed to Create Dead Water at the Propellers, Enabling Them to Give Greater Push; Smaller Than the "Bremen's," They Make More Revolutions per Minute, Two Revolving Inward and Two Outward; the 50,000-Ton Bulk, 936 Feet Over All, with Accommodations for 2,200 Passengers, Crossed the Atlantic in Four Days, Seventeen Hours, Six Minutes on Her Maiden Trip



see Aug 1929. 258

Wide World

Cont. Mrs. A. D. Durkin,
886 Savoy Theatre
POPULAR

553

Dilentr. Much



This Fox Terrier Lost a Leg in a Steel Trap and Now Runs About on an Artificial One

DOG WEARS ARTIFICIAL LEG MADE BY WOMAN OWNER

When a fox terrier owned by a Flint, Mich., woman was caught in a steel trap and so badly injured that a front leg had to be amputated, the animal's owner set to work fashioning an artificial limb. It consists of a leather boot strapped to the body. The boot is supported by stays of featherbone which give and bend, and is fitted with a rubber sole and padded with felt and a top layer of sheepskin. The dog manages to run and romp almost as nimbly as his able-bodied companions.

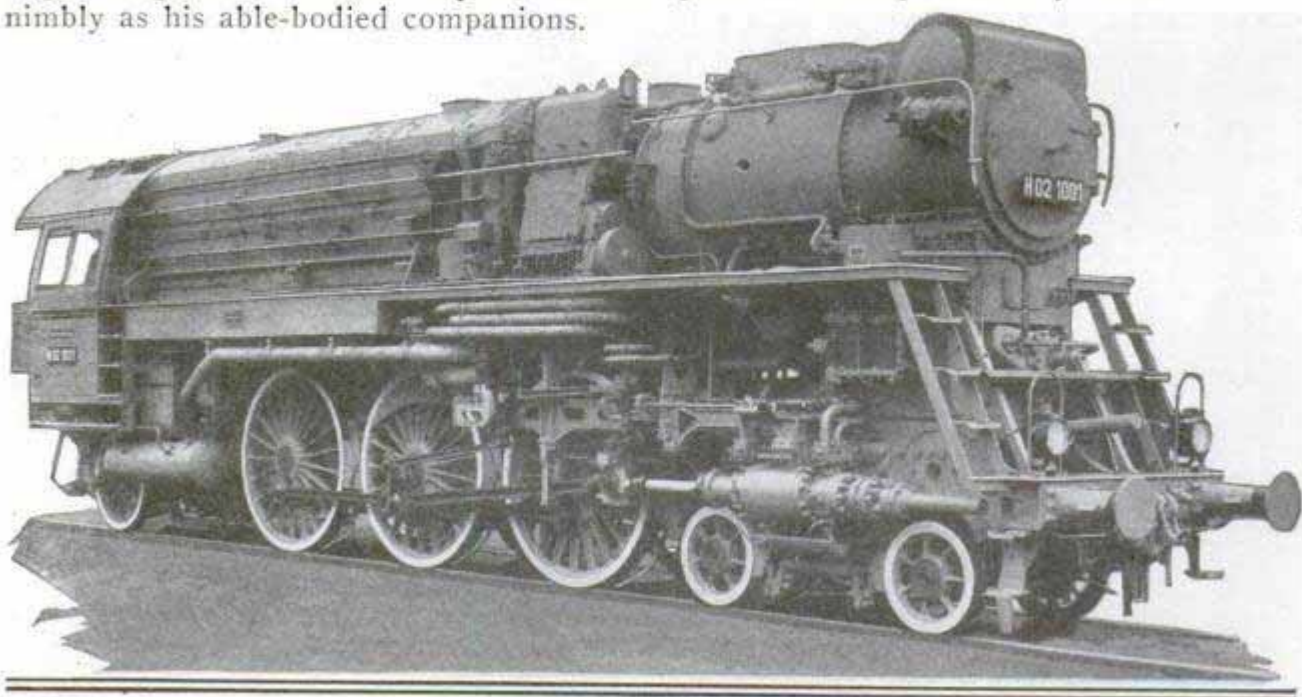
Cont. William M. Meyer,
7010 Continental Ave
MECHANICS
Forest Hills, L. I. New York
MAN-MADE LAKE COVERS SITES
OF SIX ENTIRE VILLAGES

625 Six villages and fourteen cemeteries were removed from the Sacandaga river valley in the foothills of the Adirondacks to make room for a man-made lake, twenty-seven miles long and costing \$12,000,000. The reservoir has a storage capacity of millions of gallons of water and before it could be made, highways and bridges were relocated and hundreds of private homes were torn down or moved.

HIGH-PRESSURE STEAM ENGINE TO SAVE MUCH FUEL

472

Expected to effect a saving of forty per cent or more in fuel as compared with a standard express-train locomotive, an engine, operating under 1,450 pounds of steam, is being tested by the German State railroads. Besides the fuel saving, the high-pressure engine is able to cover greater distances with a given quantity of coal and water than the ordinary locomotive. The firebox is composed of narrow tubes connected to collector tubes. To the tube coils of the firebox are joined another set of coils in front of it, through which steam under high pressure is forced. From the high-pressure cylinders the steam goes to a low-pressure boiler, is superheated at low pressure and eventually passes to low-pressure cylinders.



High-Pressure German Locomotive Which Operates under 1,450 Pounds of Steam; It Saves Forty per Cent in Fuel and Travels Farther on a Given Supply Than the Ordinary Engine

Berliner Maschinenbau-Aktiengesellschaft
late L. Schwartzkopff, Berlin 24 Germany.



© Fairchild Aerial Survey, Inc.

Looking Down upon the Burning "Muenchen" from the Air Shortly Before the Vessel Sank at the Pier in New York; Explosions Spread the Fire throughout the Boat

Wide World

FORTH from her slip came the "Muenchen." A tug pulled the stern hawser taut, while others nosed against her bow, heading her toward a drydock. It was her first trip since she sank at her pier last February, following an explosion and fire.

The salvaging of the ship called for talent, ingenuity and inventiveness. After the disaster, a company of highly specialized men moved on the pier. Here was the magnitude of their job:

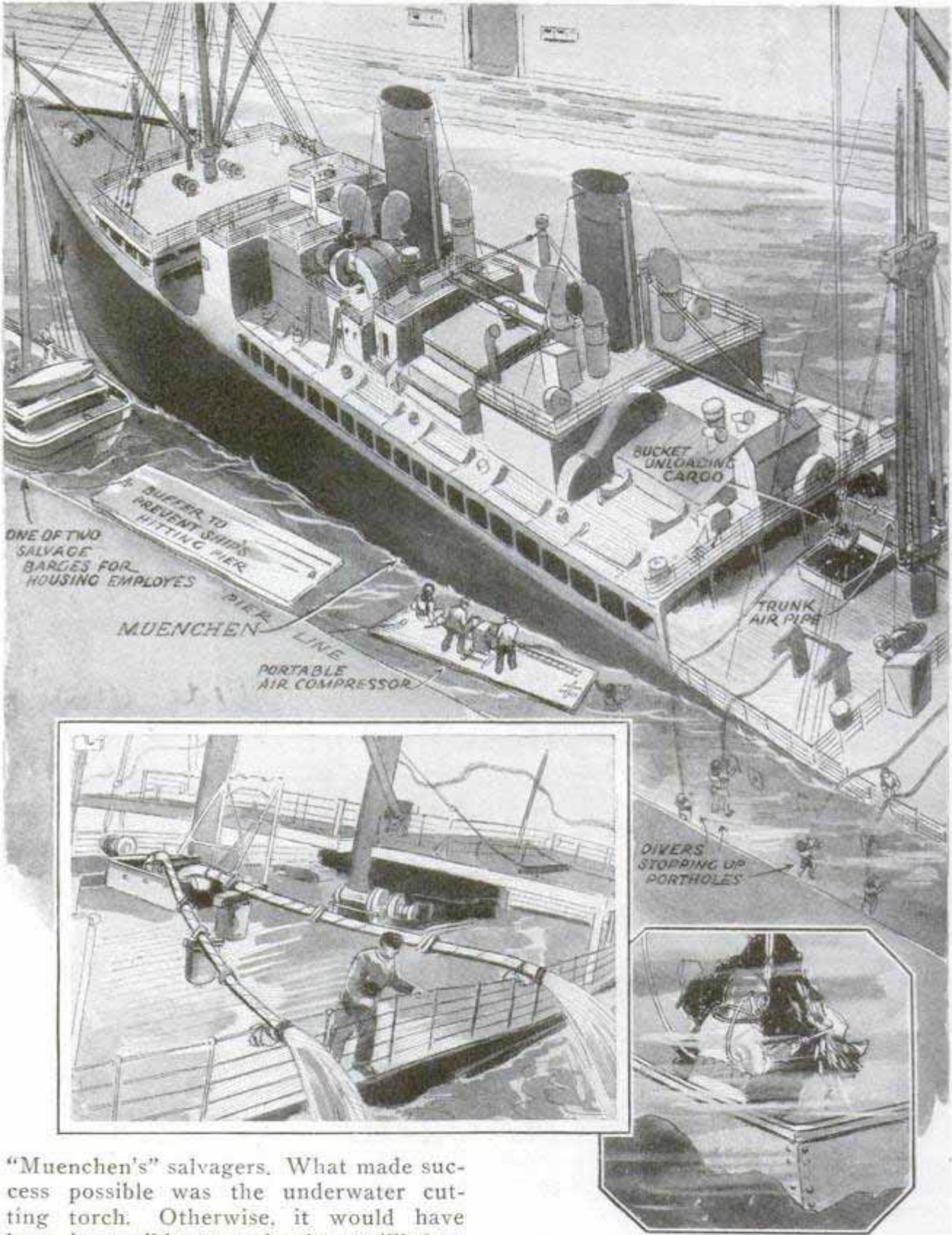
To patch with cement, wood and canvas all submerged openings; to ascertain the center of gravity and state of equilibrium of a 13,483-ton vessel; to remove hundreds of tons of cargo; to plug up irregular gashes made in her stern; to construct and lower a cofferdam; to pump millions of gallons of water from holds and compartments; to bring the ship safely to drydock.

Consider the size of the pumping job alone. Exclusive of the "Muenchen's" own steam-driven pumps, the equipment used was capable of exhausting about 1,500,000

gallons per hour. The electric and compressed-air pumps that operate under water, are among the salvager's most important tools. In the case of the "Muenchen," they were used in the maze of machinery in the engine room. Suspended from the catwalks around the sides, these pumps were surrounded by box screens to strain from the water heavy greases and floating debris.

When water is thrown out of a ship hull at a very rapid rate, the highest engineering talent must be called out. For if the ship's stability is wrecked in such a way that she loses equipoise and rolls over on her beam ends, most of the work preliminary to pumping must be done over. Before the order can be given to pumpmen, an engineer must figuratively place the scuttled vessel on a very sensitive balance and know almost to an inch how and where the center of gravity will shift when the cargo is taken out of No. 3 hold and the water exhausted from No. 6. This refined system of juggling vessels was but one difficult problem before the

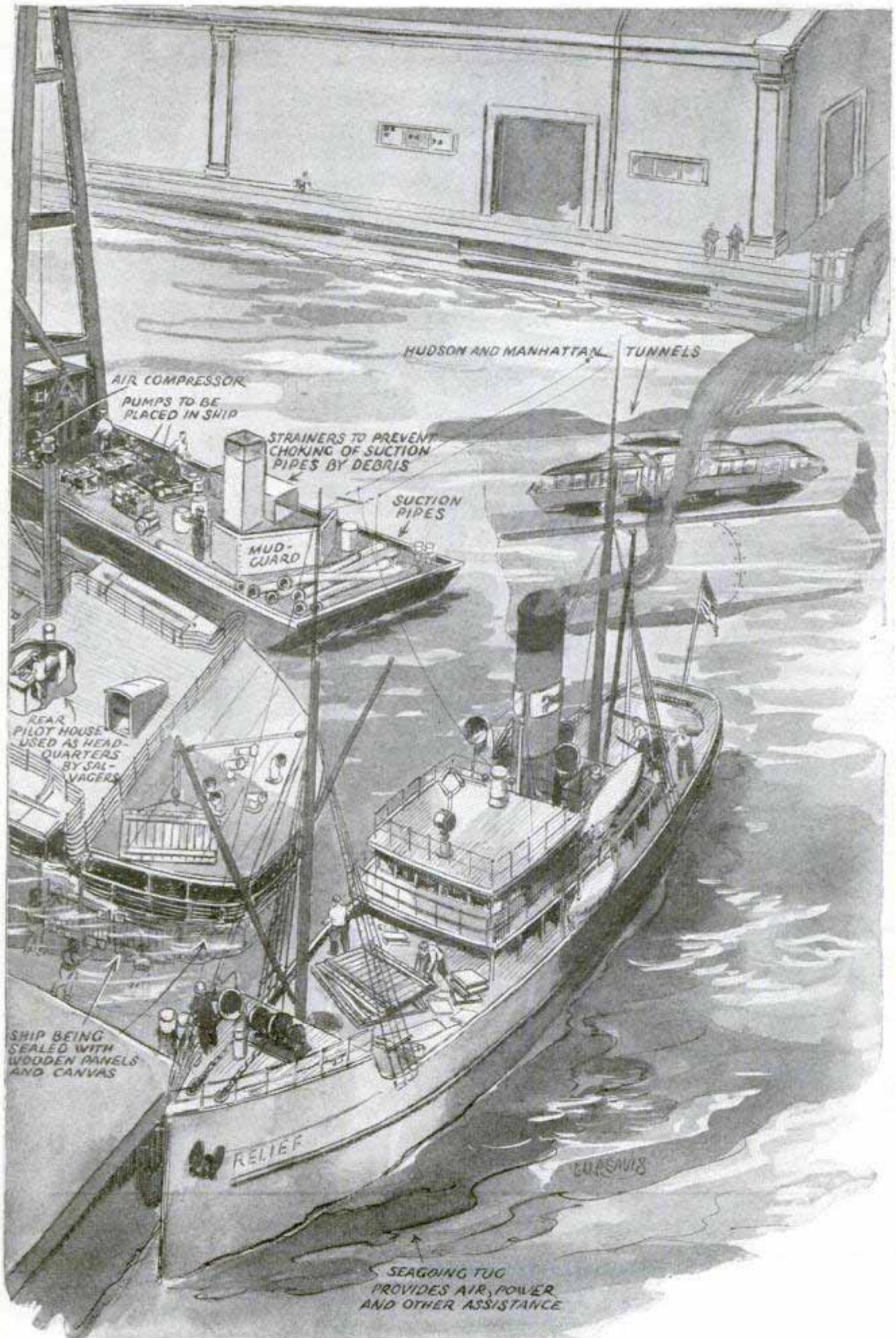
652



"Muenchen's" salvagers. What made success possible was the underwater cutting torch. Otherwise, it would have been impossible to maintain equilibrium and distribute the crushing weight of water. Divers used the oxy-electric torch to cut drain holes in the 'tween decks, to allow water to flow down and thus forestall a top-heavy condition which might induce capsizing.

The oxy-electric torch employs a com-

bination of the electric torch and compressed oxygen from cylinders. This unusual combination is the chief difference from the oxyacetylene torch commonly seen on land. But the difference is vital, since it eliminates possible danger caused by the high conductivity of water as a



AIR COMPRESSOR
PUMPS TO BE
PLACED IN SHIP

STRAINERS TO PREVENT
CHOKING OF SUCTION
PIPES BY DEBRIS

SUCTION
PIPES

MUD-
GUARD

HUDSON AND MANHATTAN TUNNELS

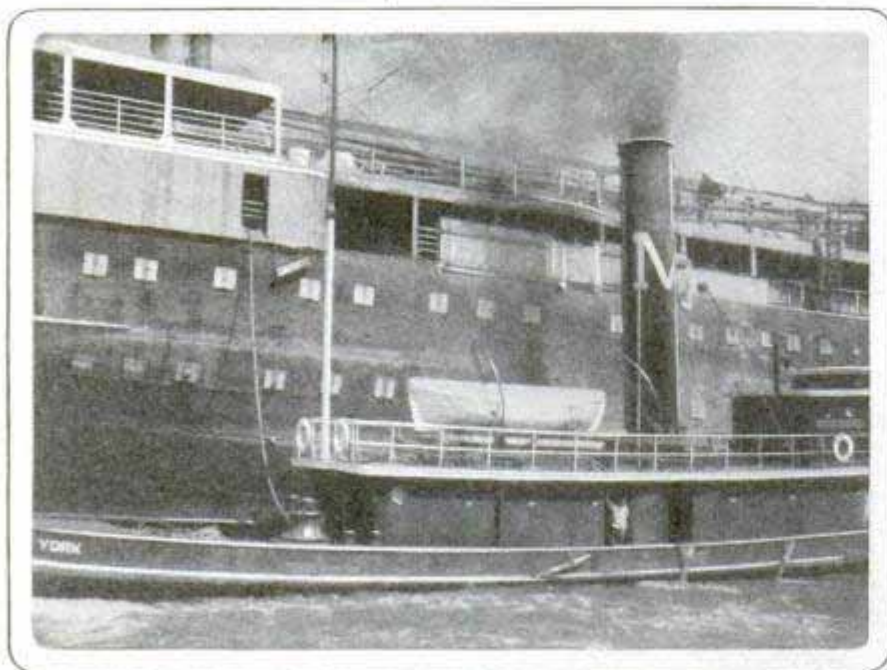
REAR
PILOT HOUSE
USED AS HEAD-
QUARTERS
BY SAL-
VAGERS

SHIP BEING
SEALED WITH
WOODEN PANELS
AND CANVAS

RELIEF

EUSAVIS

SEAGOING TUG
PROVIDES AIR, POWER
AND OTHER ASSISTANCE



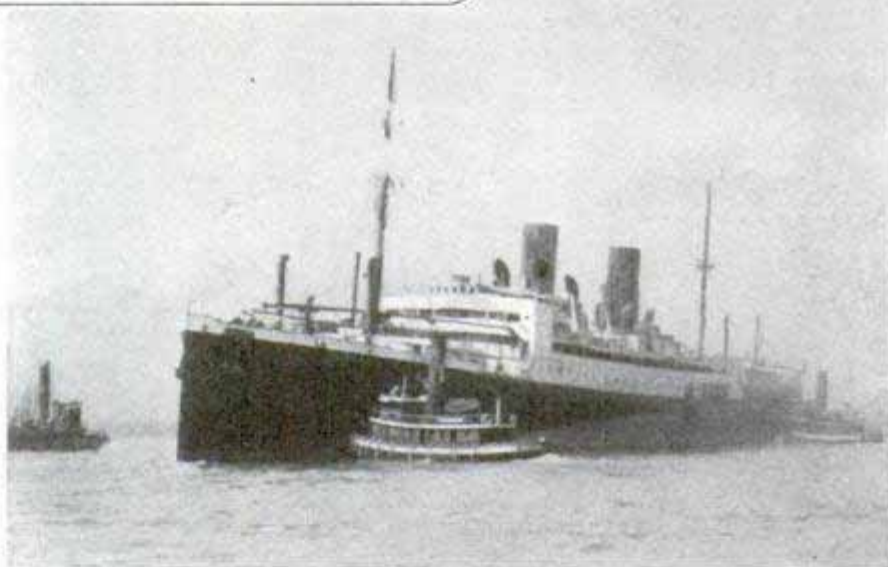
beam back to the very rudder. Every sanitary opening, vent, duct, chute, porthole and cargo opening had to be sealed. Over portholes, divers applied a two-way patch which could be bolted together either from the ship's interior or from the open water.

It took about fifty days to prepare the "Muenchen" for the pumping operation. The capacity of the apparatus on hand

carrier of electric currents, as well as hazards from excessive gas compression. The electric arc's heat is so intense, it vaporizes a small pocket of water all around the cutting edge. Thus, the operation is protected by a bubble or blanket of steam, while the high-pressure oxygen oxidizes and blows molten metal out of the cut.

The peculiar problem with the "Muenchen" was that her forward compartments were tight and buoyant, while the stern was buried in mud. It was necessary to resort to the use of a cofferdam, or "mud dam," around a great hole torn in the hull by the explosion. The cofferdam was U-shaped. When submerged, it provided protection against the normal mud bottom, so that the area around the opening could be pumped clean of silt, and also permit sluicing of the hole so that divers could apply a snug patch. The largest gash in the hull was no less than twelve feet long and four feet wide, and it was plugged by an ingenious patch, the form made up of tongue-and-groove boards, filled with concrete and calked watertight by heavy canvas.

Hundreds of other patches had to be fitted, from the area just forward of the



Pushing the "Muenchen" into the River and Hauling Her Back to Dry-dock; Upper Photo Shows Damaged Hull with Portholes Sealed

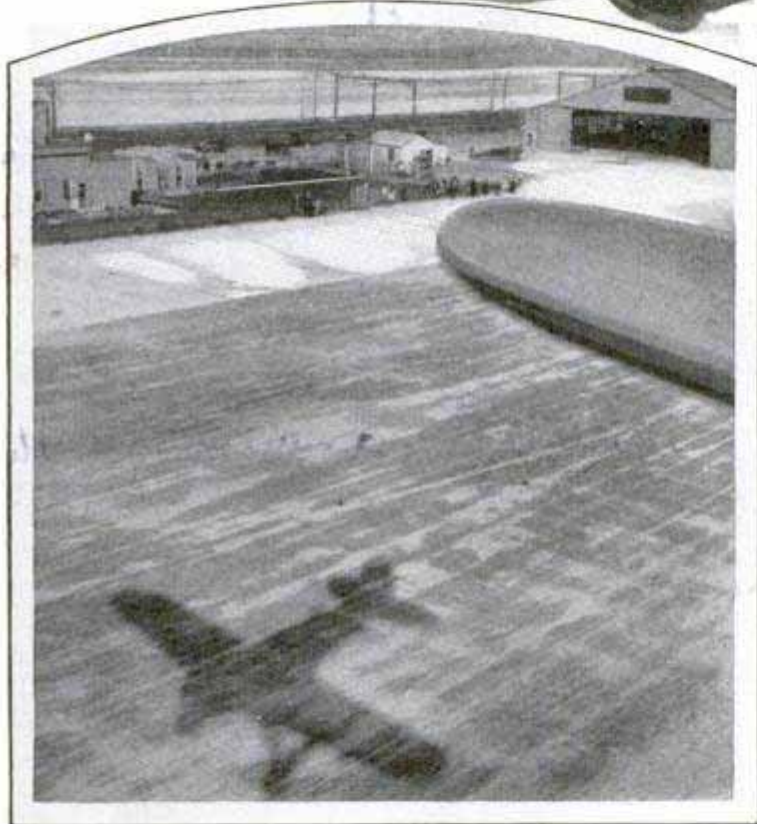
was so great that the vessel was easily pumped dry in three days. To see her rise out of submergence and bring her port side almost to a level with the starboard was a sight fraught with drama. Here was a ship submerged by a mysterious fire and explosion. And here was man, commanding this vessel to raise herself out of the mud by her own winches, so to speak.

The "Muenchen" righted herself, and save for her stripped decks and smokeless funnels, she was a ship brought back to life even before her salvagers brought her safely into drydock.

☐ Milkweed floss is being used in life-saving, insulating and playground equipment.

HOW THE EARTH LOOKS AT THREE MILES A MINUTE

Some idea of how the earth below appears to an airplane pilot traveling 206 miles an hour is afforded by an aerial photograph taken recently by a newspaper photographer as his plane, piloted by Maj. John A. MacReady, former chief of the test division of the army air corps, flew over the Oakland,



Low-Wing Monoplane That Traveled over Three Miles a Minute, and Picture Taken from Ship at That Speed

Calif., airport at nearly three and one-half miles a minute. The picture was taken during speed tests of a low-wing monoplane, similar to the ship recently purchased by Col. Charles A. Lindbergh. The average for six dashes over a mile course, with and against the wind, was 198 miles per hour, with a speed of 206 miles an hour attained when the photograph, taken with an ordinary camera without special equipment, was made. A dime and a penny were employed to keep the camera in focus during the flight and a lens speed of one-thousandth of a second was used, the picture clearly indicating

Turned by Aero Club of Northern California

the tremendous rate of motion. The tests were conducted at an altitude of barely fifty feet.

NEW PHOTO-ELECTRIC CELL MAY RUN MOTORS 606

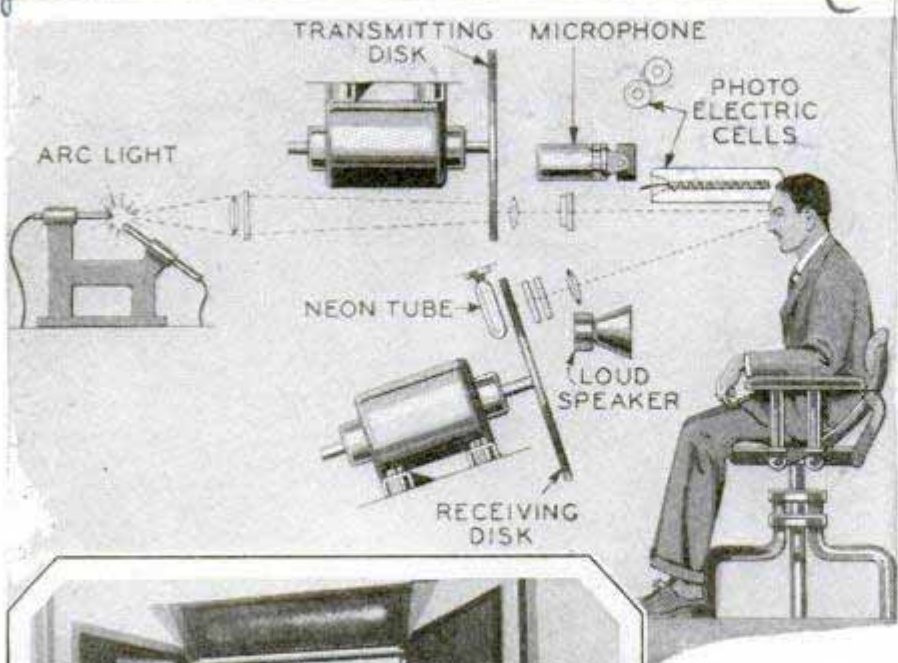
Running motors with electricity made from sunlight is seen as a possibility for the future as the result of the invention by a German scientist of a cell that converts light directly into useful quantities of electric current. The essential part of the cell is a sandwich of copper oxide between two layers of metallic copper and may prove useful in both talking pictures and radio television. Ordinary photo-electric cells can only be operated with an auxiliary source of electric current, but in the latest cell, electrons are driven off when light falls on one of the thin copper layers. The electrons pass through the exceedingly thin copper-oxide layer, and when they reach the other layer of copper, an electric current results. The current is so powerful that when a rapidly flickering light shines on the cell, the power can be fed into a loud speaker, and a note vibrating at the same rate as the flickering light can be heard. The cell can be operated indefinitely without loss of efficiency and is extremely sensitive to invisible infra-red rays. It is expected to be useful in measuring light intensity.

News Bulletin 470-E. 9/29/30
Dance Service

Dr. W. Lange, Kaiser Wilhelm Institute

immerse 2-10 hours in a solution of calomel (protochloride of mercury)

688



while the scanning beam which picked up the features of the talker was a blue ray, not bothersome to the eyes. The two speakers, who had never met, said they would have no difficulty in recognizing each other on the street as a result of the conversation.

W.P. Economic and Commercial League, Lafayette, Laipoyeg

REVIVE OLD WOOD PRESERVATION IN GERMANY

Treating wood with mercury solutions to prevent decay, a method that is said to have been originated by a monk in the eighteenth century, is being used again with good results in Germany. The treatment has no harmful effects on man or beast, its effects are permanent and it permits the use of wood for greenhouse and other purposes where iron is not suitable because of its rusting.



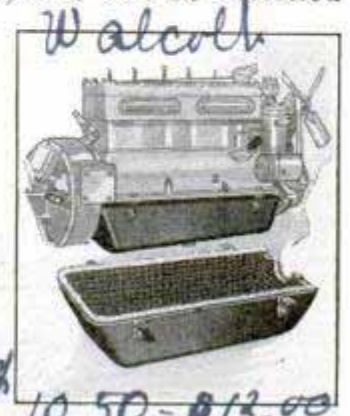
Above, Diagram Showing How Phone Users See Each Other as They Talk; Below, Image of a Speaker

TELEPHONE USERS SEE EACH OTHER AS THEY TALK

Two-way television, by which two persons, two and one-half miles apart, looked each other in the eye as they conversed over the telephone, recently was demonstrated successfully by the American Telephone and Telegraph company. The conversation was made possible by the use of the "iconophone" and was carried on as though the person at the other end of the wire were in the same room, a microphone and loud speaker replacing the ordinary telephone instrument. The telephone users sat in front of a screen behind which the loud speaker was concealed. The screen showed the image of the speaker at the other end of the five special wire circuits necessary to accomplish the feat. The pictures were strong and clear, the large room which served as the telephone booth being bathed in orange light,

by postal and railway authorities
AUTOMOBILE CRANKCASE COVER MAKES STARTING EASY

Starting the automobile in winter is made easy with a crankcase cover which applies the thermos principle to this part of the engine. It is an insulated metal cover which fits tightly about the crankcase so that a dead-air space entirely incloses the exposed surface, thus keeping the oil warm for prolonged periods while the car is standing idle. The cover contains a removable cap in the bottom to permit oil drainage, and can be installed in a few minutes. For winter driving it does not cause the oil to heat above normal summer-driving temperature and helps prevent dilution of the oil by gasoline from excessive use of the choke and condensation of water inside the crankcase caused by rapid cooling of the oil.



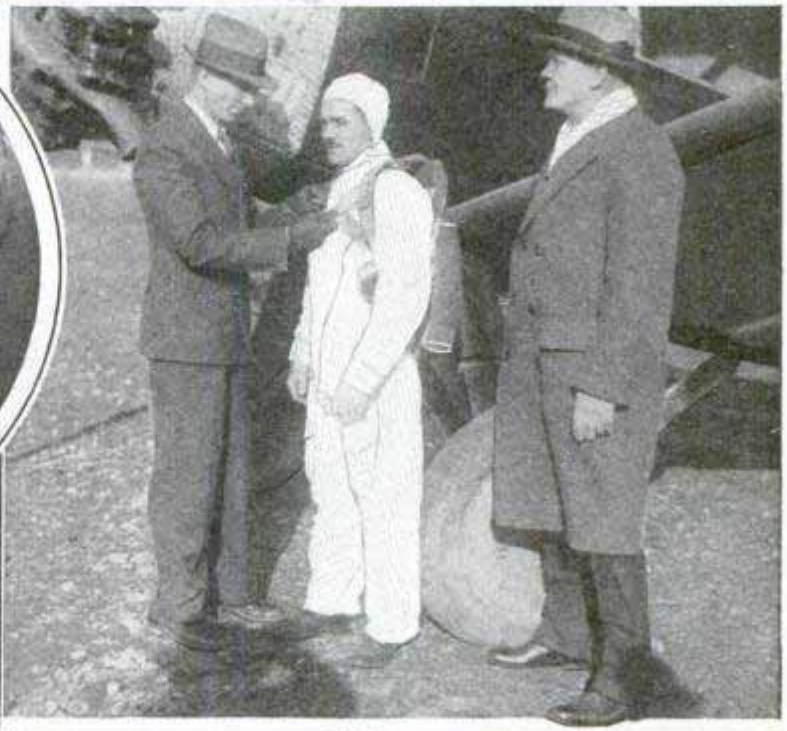
10.50 - \$12.00

Walcolb
Joseph Weidenhoff, Inc
4344 W. Roosevelt Road

WITH THE LATEST RECORD MAKERS OF THE AIR AGE



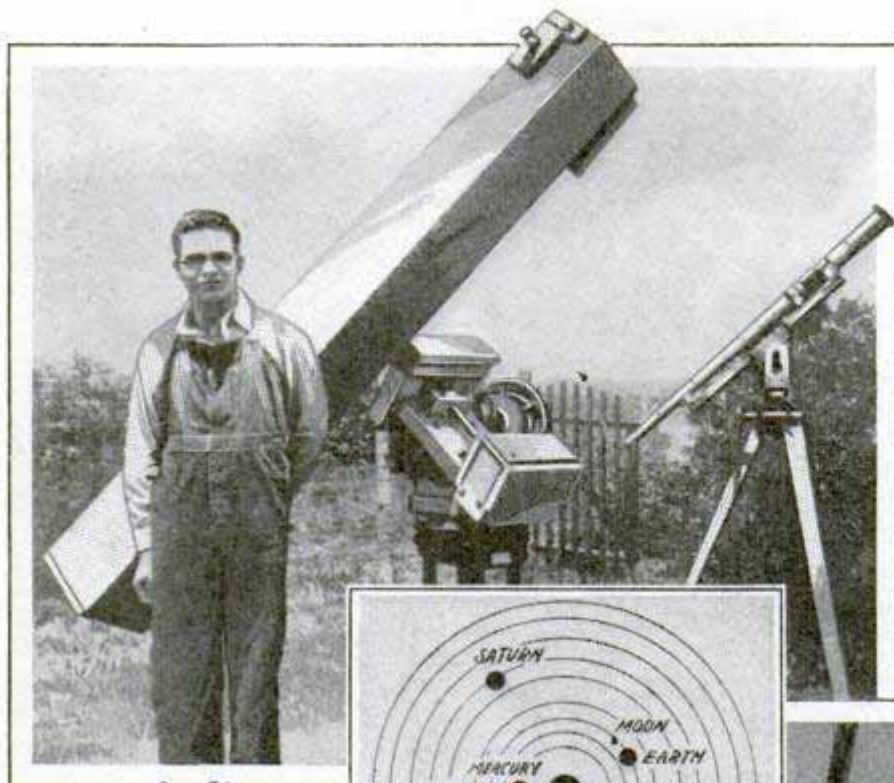
In Circle, Capt. Boris Sergivsky, Who Broke Altitude Record for Loaded Seaplanes, and, at Right, Clarence Chamberlin and Fred Cole, Parachute Jumper, Who Staged Test to See Which Would Land First, Plane or Man with Chute; the Man Won



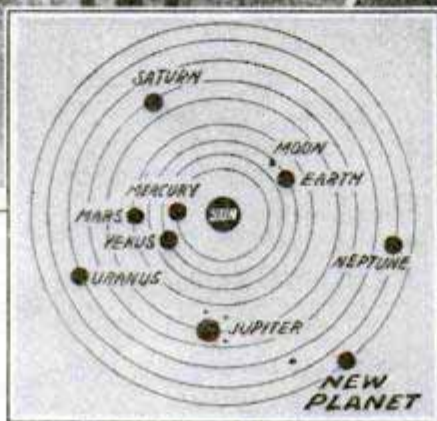
At Left, Elinor Smith Being Carried from Her Plane After She Had Scored a Record High Flight for Women in Her Bellanca Monoplane, and, Above, Marshall Headle, Lockheed Test Pilot, Who Stroved for a Record for Commercial Planes with a 1,100-Pound Pay Load; All Official Record Attempts Are Conducted under the Most Rigid Conditions and Are Checked with Accurate Instruments, Sealed before the Flights and Then Calibrated by Experts

Wreck works

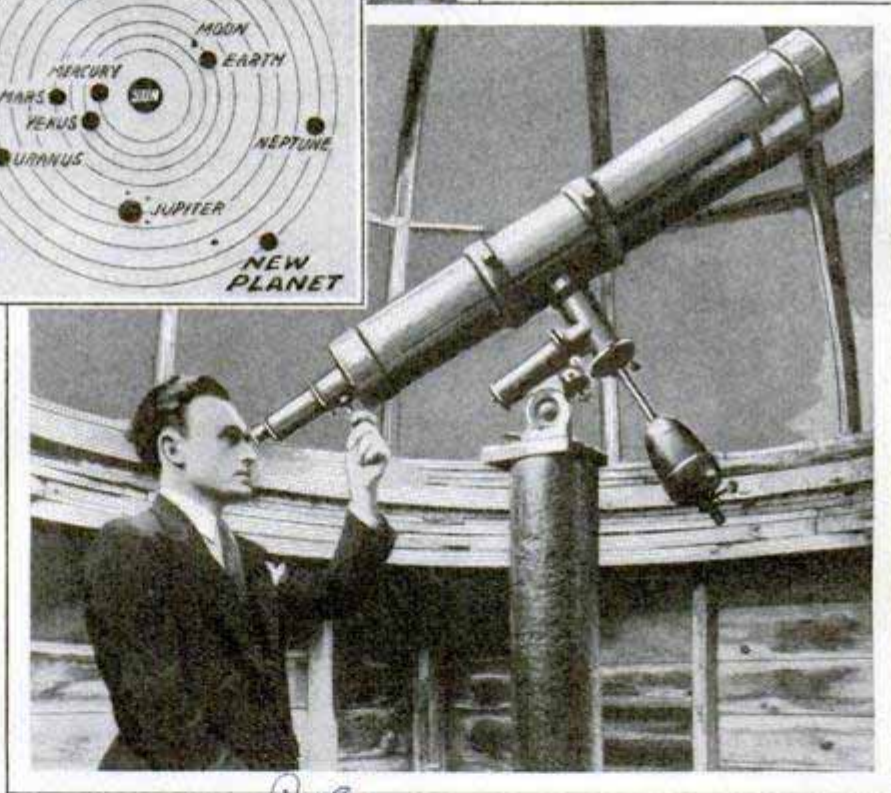
43 YOUNG STAR-GAZERS LEAD HUNT FOR NEW WORLDS



the large photographic telescope in the firm belief that the planet predicted by Professor Lowell actually existed. He found many asteroids and variable stars in this painstaking work, and finally, when the task was about half finished, an object appeared on one of his plates that resembled what he believed the new world should look like. Astronomers found that the youth's effort had added a new planet to the solar system.



Important astronomical discoveries recently have been made by amateur star-gazers following astronomy more as a hobby than a vocation. How is it possible for them to find what expert astronomers seek in vain? Chance, of course, plays its part, but, aside from luck, persistence in their hobby is partly responsible for their success. The trans-Neptunian planet, recently discovered, had been predicted fifteen years ago by the late Prof. Percival Lowell, but it remained for a youth of twenty-four to find it. Clyde W. Tombaugh, the discoverer, had worked on his father's farm in summer and built reflecting telescopes in winter until a year ago when his enthusiasm for astronomy resulted in his obtaining a position at the Lowell observatory. There he began a systematic program of examining the ecliptic thoroughly all the way around the sky with



Above, Clyde W. Tombaugh, Young Astronomer Who Located Trans-Neptunian Planet; Drawing Shows Location of New World; Below, L. C. Peltier, Who Has Found Two Comets

Another farm boy whose work has startled experienced astronomers is L. C. Peltier, who built his own observatory in a cottage on his father's farm. He found a comet five years ago which later was named for him. In recognition of his feat and his interest in astronomy, Harvard university loaned him a six-inch telescope, and recently he located another.

THRILLS OF FLYING AND MOTORBOATING COMBINED



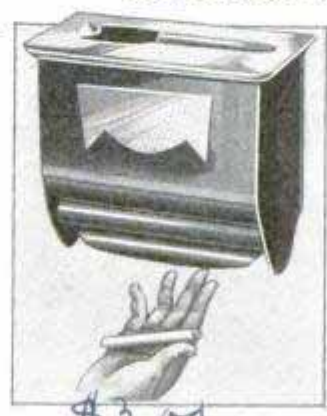
Motorboating and Flying Are Combined in This Waterplane, a Boat That Flies and an Airplane That Swims, All in One; an Outboard Motor Furnishes the Power to Fly or Float

A desire to keep a west-coast shipyard busy during the seven idle months of the year has resulted in the invention of an unusual boating novelty. It isn't a boat. It isn't an airplane. But it combines the thrill of both. This latest water thriller, the invention of Russell and Milton Robertson of Alameda, Calif., is a "waterplane." Observation of outboard racing craft with their prows rearing out of the water as the powerful little motor at the stern pushes them up along the surface at high speeds gave them the idea. Why not put wings to the craft and lift it completely out of the water? After six months of experiment, the brothers built a craft that actually flew—that raised itself by its own wind resistance ten feet into the air—attached, however, to the outboard motor on pontoons at the water level. This unusual boat novelty was built from two pontoons, one supporting the fuselage, the other carrying the outboard motor. Water and aircraft features were combined. Both pontoons are connected in tandem with parallel stringers working in swivels. This allows the forward pontoon to take to the air. A thirty-two-foot wing is carried on the forward pontoon as well as the complete fuselage, and motor and steering controls. The

waterplane is controlled similarly to an airplane. A "joystick" operates the ailerons and elevators. A rudder for steering is under each pontoon and is operated by foot controls. When the motor is started, the plane travels about twenty-five feet before attaining planing speed, and in a hundred feet more the forward pontoon lifts out of the water. The thrill of zooming from the water at a sustained speed of forty to fifty miles an hour marks a new era in boating.

see April 1930-607

CIGARET DISPENSER FOR AUTO CONTAINS ASH TRAY 486



delivers one smoke at a time in the hand, while the cover holds a removable ash tray and cigaret rest.

Isardson Mfg Co
1108 23rd New York

5182



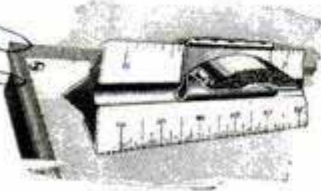
Torpedo Being Launched from British Craft during Fleet Target Practice; the Missile Was Fired with Compressed Air

TORPEDO IS CAUGHT BY CAMERA AS IT LEAVES TUBE

Torpedo practice featured maneuvers of the British Atlantic fleet recently, some of the projectiles being fired by blasts of compressed air. The accompanying photograph shows a torpedo leaving the tube. What appears to be smoke is merely vapor formed by the release of the air. Modern torpedoes used in warfare can attain speed of more than thirty-five miles an hour in water, travel a distance of 7,000 to 8,000 yards and carry as much as 500 pounds of high explosive. The first self-propelling torpedoes, devised by Whitehead and his son, traveled but about six miles an hour and had an extremely limited range.

TRIANGULAR SCALE MAGNIFIER IS EASY ON EYES

To prevent eyestrain and aid in accuracy of work, a magnifying glass for attachment to triangular scales now is being used by engineers and draftsmen in plotting and scaling work. Formerly a hand magnifying glass had been used when great accuracy was required, but this cumbersome and unsatisfactory method has been replaced



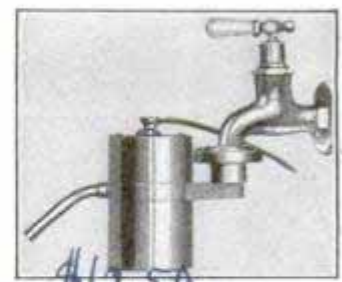
by a scale magnifier mounted in a chromium frame which slips over the scales and provides for even the finest graduations.

STEEL-HARD COPPER ALLOY MADE INTO RAZOR BLADES

Soft copper is one ingredient of an alloy, as hard as steel, that can be used successfully for razor blades or shears. Two modern hard coppers, "everdur" and "tempaloy," both were found while searching for something else, and both can be machined and worked like steel, but will not corrode and rust. Everdur was found while searching for a metal that would withstand the attack of acids in chemical plants during the war, and is composed essentially of copper, silicon and manganese. Tempaloy, made of copper, silicon and nickel, undergoes peculiar changes when heated in different ways. When brought to 750 or 800 degrees centigrade and then chilled quickly, it is soft and ductile and can be worked cold. When held at 450 degrees for a few hours, however, it becomes lastingly hard, and hence is a copper that can be tempered like steel.

ELECTRIC HEATER ON FAUCET WARMS WATER INSTANTLY

Hot or cold water may be obtained instantly from a faucet equipped with an electric heater which, when turned on, warms the cold water as it comes from the faucet, delivering it hot enough for any purpose. When the heater is not operating, cold water issues from it. It fits on any faucet, does not consume current when hot water is not drawn, and replaces a central hot-water heating plant. It is plugged into a light socket, requiring no wiring to install. Included in the heater is a filter screen which may be removed for cleaning. It is easily mounted or detached.



made by American Brass & Waterbury
by Charles W. Jacobs, Conn.

W. E. Richmond
466
St. Louis, Mo.

3084 and
Lab

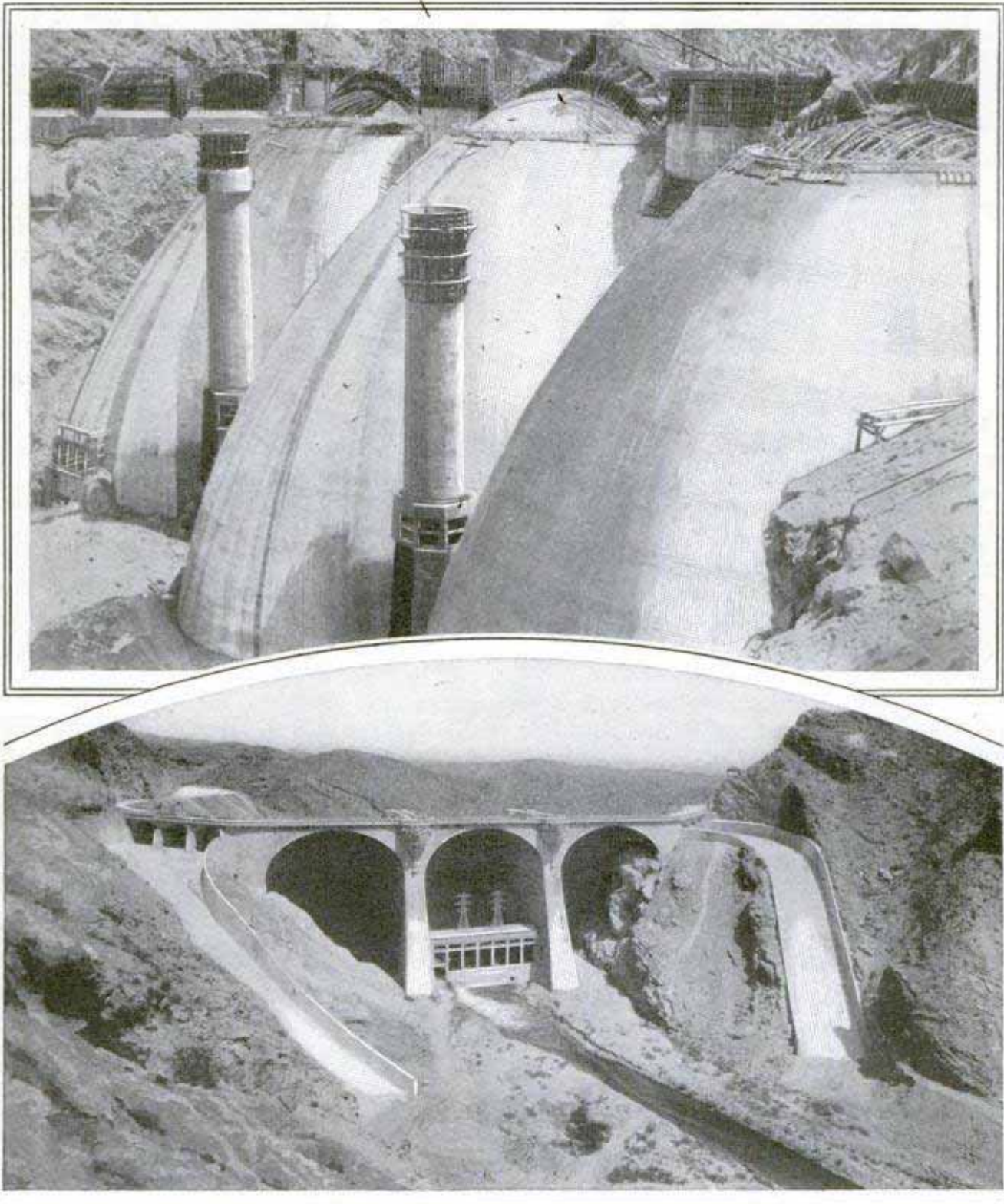
658
Richmond

George M. Kaler, 543 Tall Bldg.
Pat. ap. pr. San Antonio, Texas

Mr. George M. Kaler
543 Tall Bldg.

Hot Shot Electric
Water Heater

QUEER DOMES FORM BULWARK FOR COOLIDGE DAM



Above, an Upstream View of the Egg-Shaped Multiple Domes That Form the Bulwark for the Recently Completed Coolidge Dam; Below, View Looking Downstream Showing the Electric Power Plant

Three huge concrete domes, shaped like eggs halved the long way, and then quartered, form the bulwark for the Coolidge dam across the Gila river canyon in Arizona, recently dedicated by the former president. The eggshells, made of reinforced concrete, vary in thickness from

twenty-five feet at the bottom to four feet at the top, the diameter at the bottom being 180 feet. The multiple dome structure was designed especially for the narrow, deep channel of the river. The dam, costing \$3,500,000, provides electric power as well as irrigation facilities.

Mrs. Esaly Co.

898 *Screenboard* POPULAR MECHANICS
522 *ne*



A Coin-in-the-Slot Game Which Combines Some of the Features of Golf and Billiards

BILLIARDS AND GOLF COMBINED IN COIN-IN-SLOT GAME

Some of the features of both billiards and golf are combined in a game played on a table about half the size of an ordinary billiard table. Cues are used to shoot the balls, but instead of pockets about the corners of the table, the balls are banked so that they fall into numbered slots under a hood near the center of the table. Scoring is somewhat similar to golf, and the table is equipped with a coin-in-the-slot arrangement so that no attendant is required, the players simply depositing a coin to obtain the equipment necessary to play a game.

FASTENER FOR AUTO TOWROPE REQUIRES NO KNOTTING

Tying knots in an auto towline is unnecessary if detachable fasteners which form no part of the rope, except when in use, are employed. The fastener consists of a metal plate with curved projections at the ends to fit over the rope. To adjust the towline,



*Patd 6/25/29 1,718,641
5/8" - 38 cent pair - 3/4" 45 cent per pair*

*Hercules Rope Fastener Co
Box 890 Kansas City*

*Colombini 29 Bevin Road
Newly Heath*

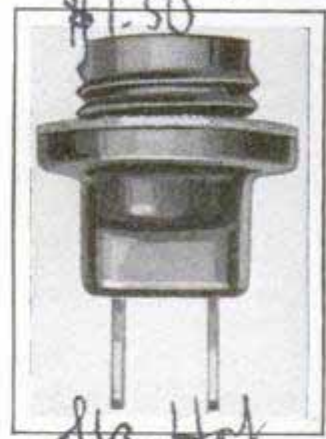
it is only necessary to place the hooked ends over the rope and push the end of the line between the metal plate and the section of rope beside it. The attachment can be used with rope, chain or cable, and also may be employed in hanging swings and hammocks.

FISH LEARN TO READ ALPHABET

Fish have been taught to distinguish letters of the alphabet after painstaking effort by professors of a German university. First, the fish were taught to distinguish colors by placing food in the water in bags of different hues. The fish soon learned to go to the bag of a certain color containing their food, and to open it by pulling a string. Next, letters were attached to the bags and, finally, the letters were used with bags of the same color. The fish learned to choose the bag containing their food from the letter on it, regardless of its position with reference to the other bags, and at last even acquired the ability of distinguishing between the letters "B" and "R."

POCKET-SIZE ELECTRIC HEATER COOKS EGGS AT TABLE

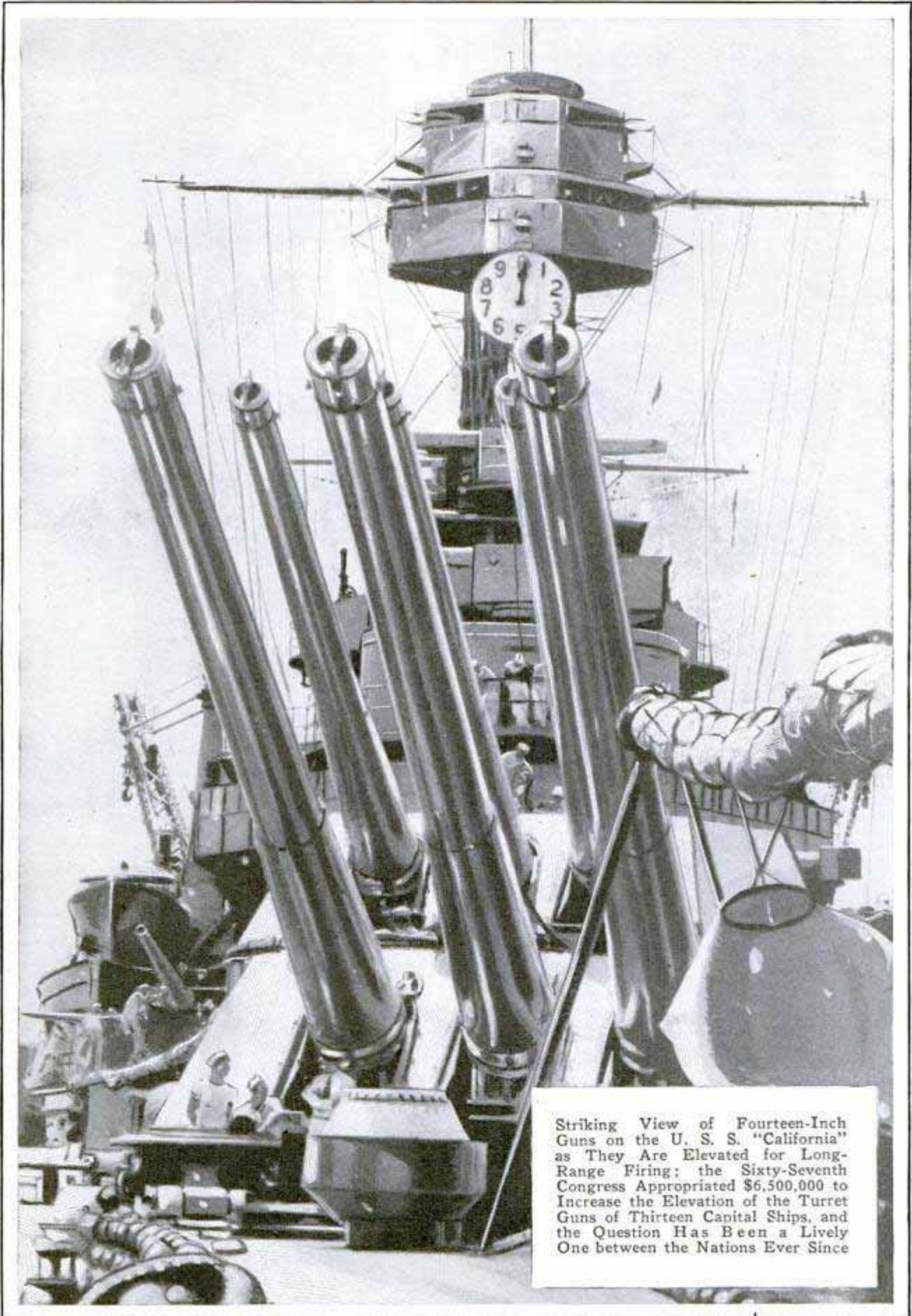
Suitable for many purposes such as warming a hot-water bottle, heating milk, warming water for shaving or for sterilizing, an electric heater is not much larger than a light plug and can be carried in the pocket or hand bag. It screws into a hot-water bottle top, or may be used with a small vaporizer to cook eggs at the breakfast table and to produce vapors helpful in treating colds and other maladies. The unit is so constructed that there is nothing to break or get out of order.



CA special telephone using the Braille system has been installed in the residences of blind subscribers in Paris, in hospitals and in the homes of blinded soldiers.

*Chicago The Fairbanks
Sta. Hot Products Co
1924*

THE "BIG ONES" RAISED FOR LONG-RANGE FIRING



Striking View of Fourteen-Inch Guns on the U. S. S. "California" as They Are Elevated for Long-Range Firing; the Sixty-Seventh Congress Appropriated \$6,500,000 to Increase the Elevation of the Turret Guns of Thirteen Capital Ships, and the Question Has Been a Lively One between the Nations Ever Since

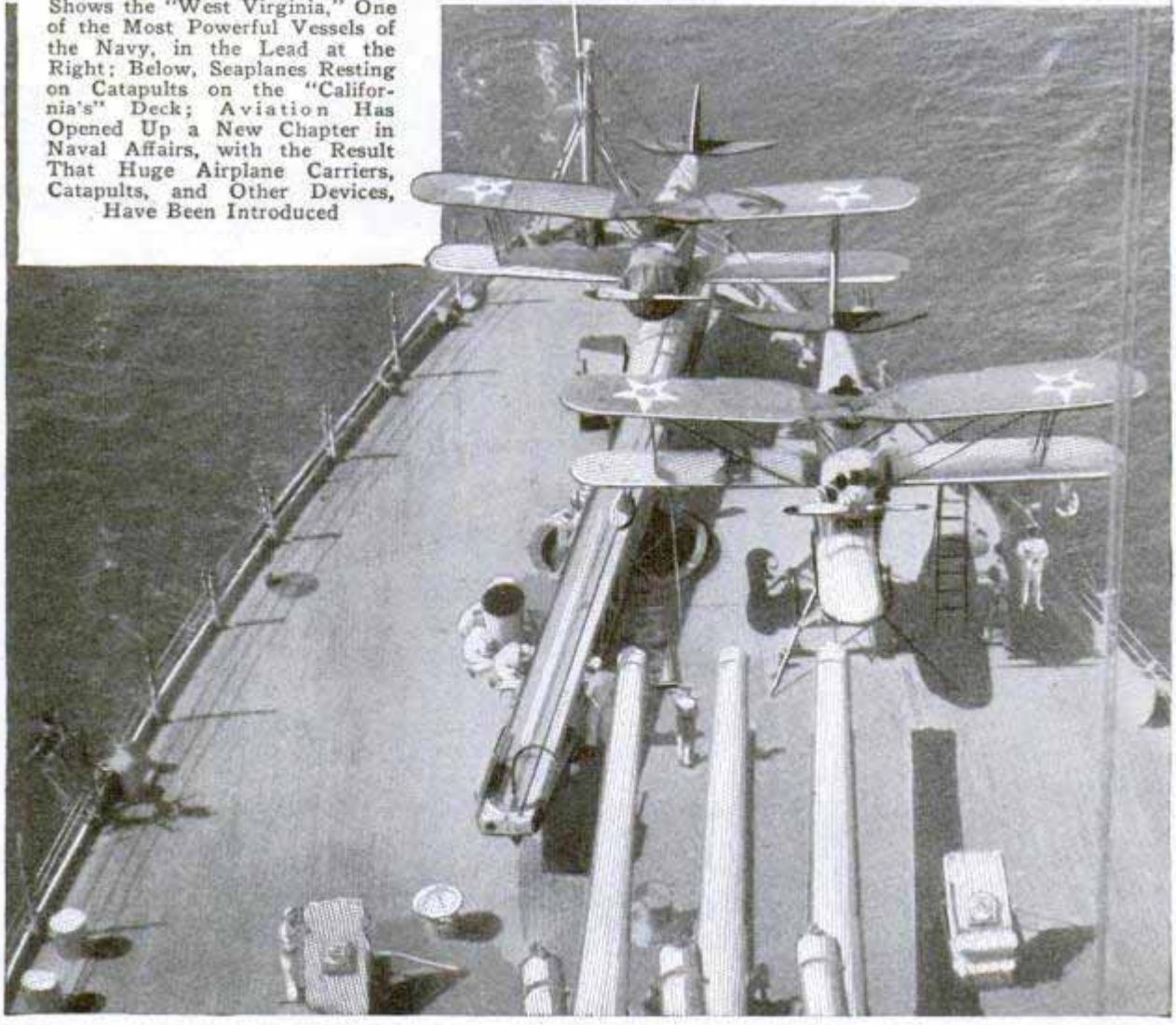
Mid World - Keystone View Co

640

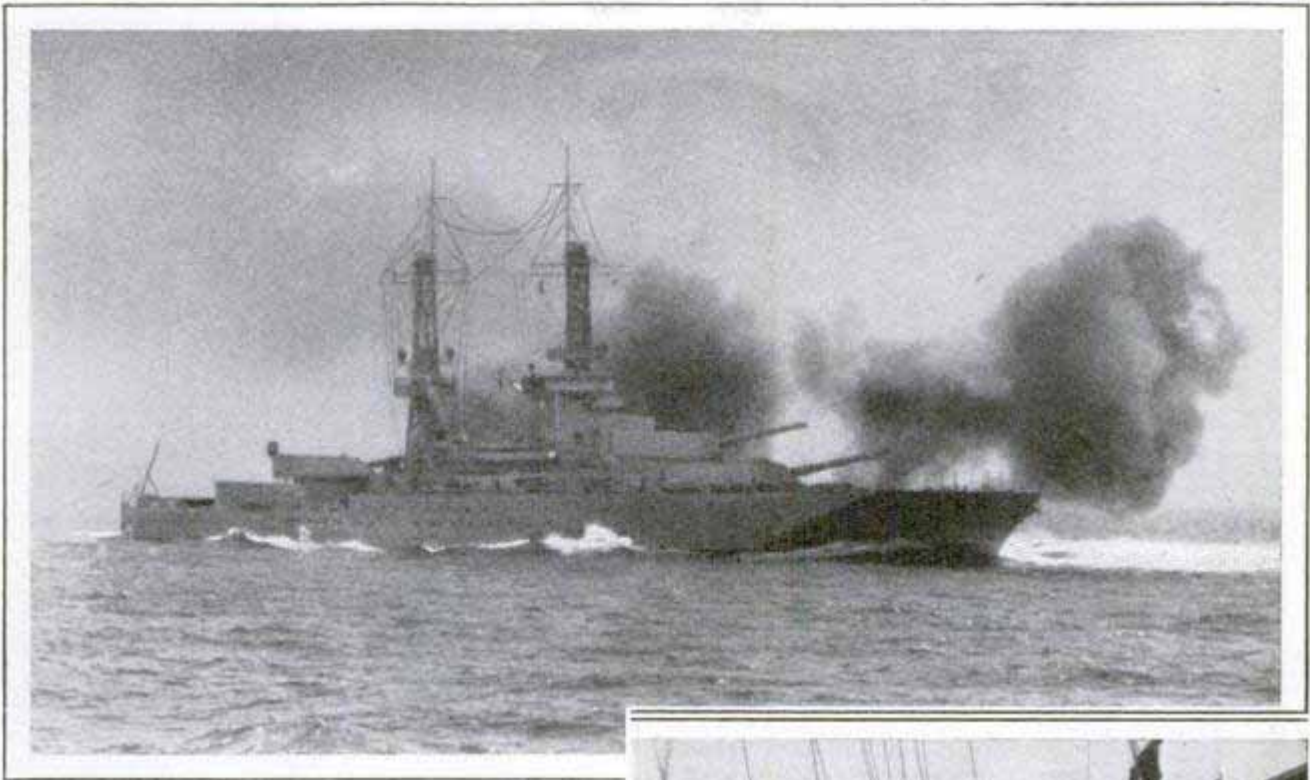
BATTLE FLEETS STEAMING SOUTH FOR MANEUVERS



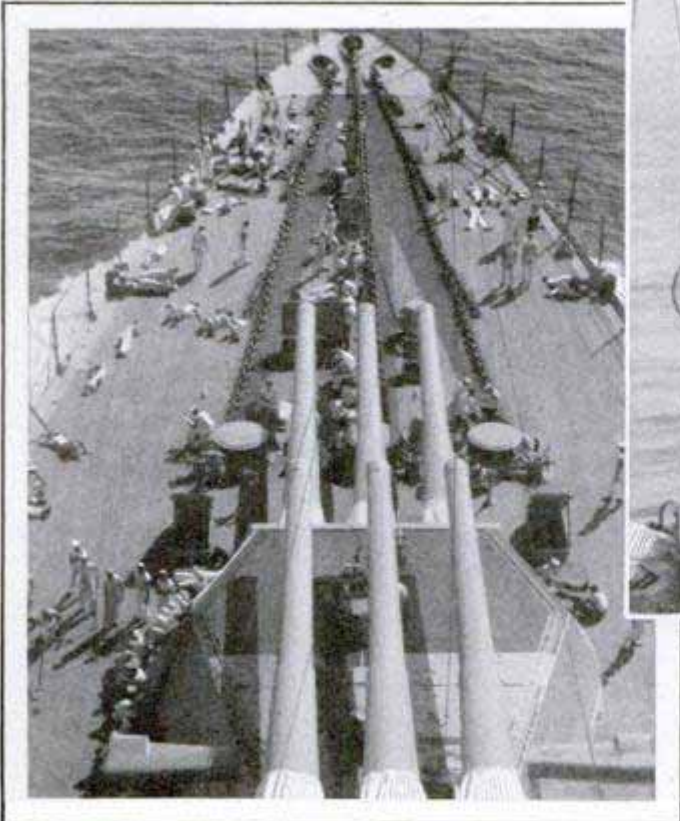
Battle Fleets in Double Line, en Route from San Pedro to Panama; This View Was Made from the Flagship "California" and Shows the "West Virginia," One of the Most Powerful Vessels of the Navy, in the Lead at the Right; Below, Seaplanes Resting on Catapults on the "California's" Deck; Aviation Has Opened Up a New Chapter in Naval Affairs, with the Result That Huge Airplane Carriers, Catapults, and Other Devices, Have Been Introduced



LONG-RANGE GUNS ROAR DURING BATTLE PRACTICE



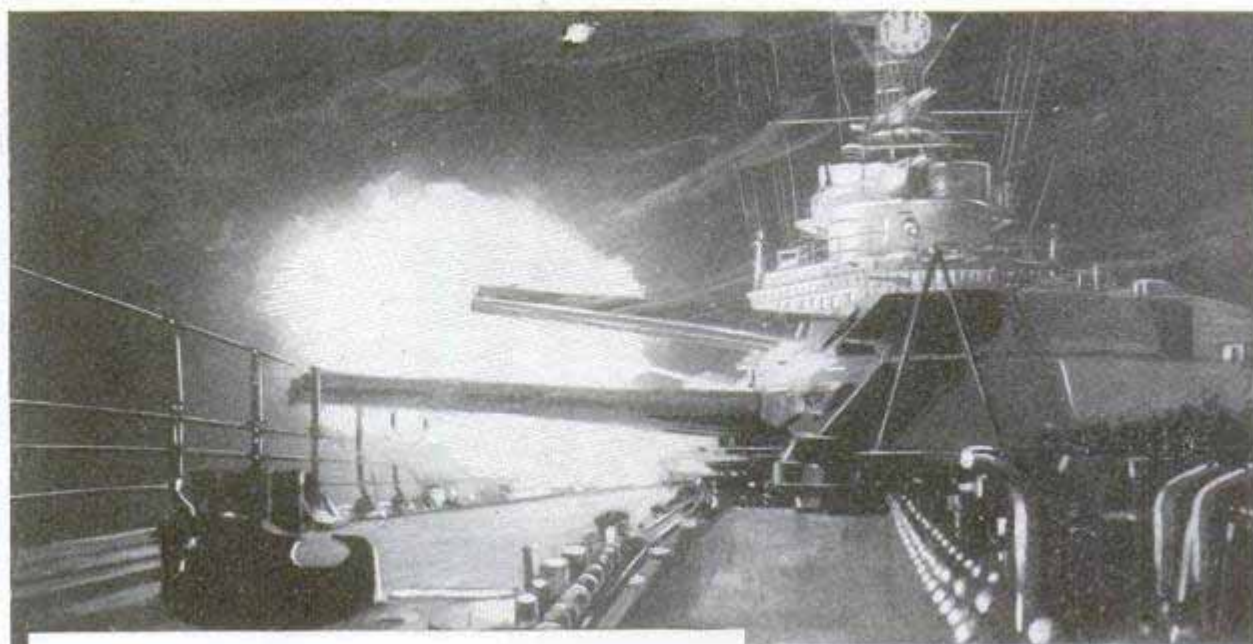
The U. S. S. "Idaho" Firing Her Long-Range Guns during Special Battle Practice off the Coast of California; the "Idaho" Is a Ship of the First Line and Displaces 32,000 Tons; It Has a Speed of Twenty-One Knots and Has Twelve Fourteen-Inch Fifty-Caliber Guns, with a Maximum Range of 24,000 Yards; This Powerful Vessel Was Finished in 1919 and Is Due to Be Scrapped in 1939



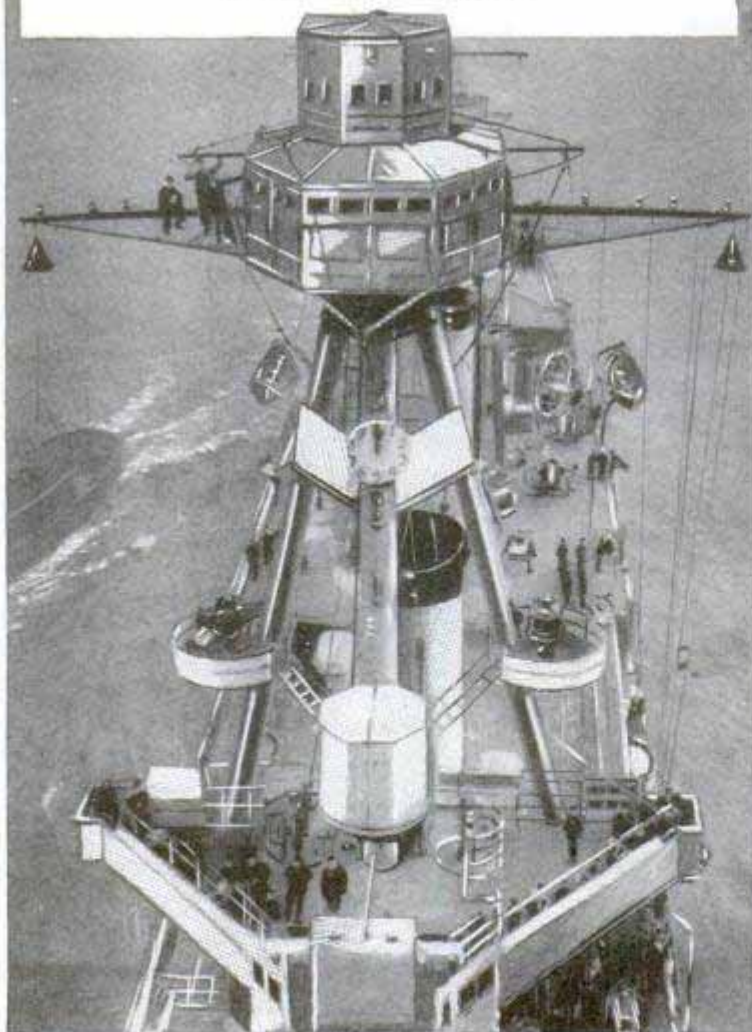
Above, Sailors of the Flagship "California" Sending Signals during Maneuvers, and at the Left, an Hour for Deck Games and Other Sports on the "California" While the Ship Was en Route from San Pedro to Panama

540

"DOGS OF WAR" BARK UNDER COVER OF DARKNESS



View aboard the "California" during Night Firing in Maneuvers on the Pacific; Below, the U. S. S. "Pensacola," a Cruiser Constructed under the 1924 Building Program, Going for a Test Run; Right, Pennants on the Destroyer "Bainbridge"

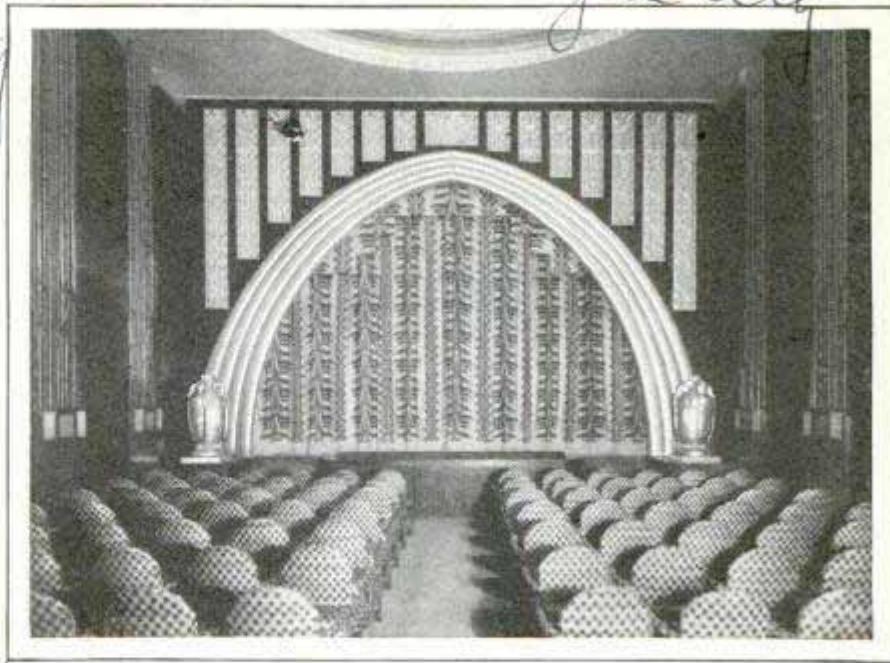


Dr. Joseph News Press
3/18/30

Chas. Theodore St. Brown
922 Bronx Park, South
New York City

**MOLASSES LURES
FRUIT MOTHS** 589

Traps baited with molasses or sugar mixed with water have been found useful in luring Oriental fruit moths which are causing serious damage to peach orchards and other fruit trees, including apple, quince and pear. The addition of a small quantity of aromatic chemicals, such as citral, increases the effectiveness of the traps about three times. Government agricultural experts used glass containers of one-quart capacity as traps. Since there is no effective insecticide for this pest, the tests with baited traps may result in a method of controlling the insects.

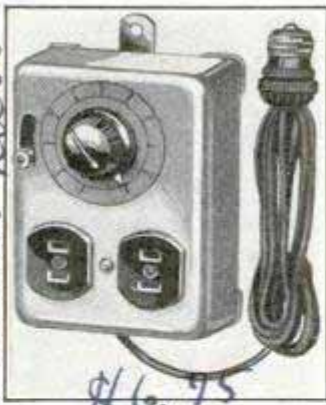


Interior of the Theater on the Fiftieth Floor of the Chanin Building, New York City; It Seats 200 Persons

1224 Belmont Ave. Chicago

**TIME SWITCH HOOKED TO RADIO
TURNS OFF POWER** 518

Persons who fall asleep with the radio going, now may obtain an electric time switch for the receiver which turns off the power automatically at any time for which it is set. For those who enjoy reading and hearing the radio after retiring, an additional socket for attachment to the reading lamp is provided, the time switch turning off both radio and light. It also may be attached to hall lights, window-display lights and signs that are to be switched off at a certain time.



\$6.75

X-L Radio Laboratories

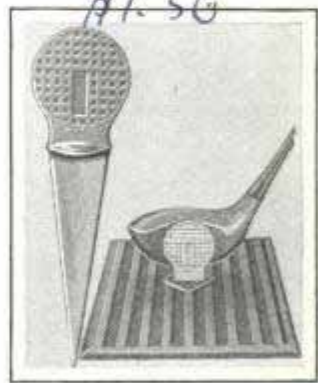
**BIG SKYSCRAPER HAS THEATER
ON FIFTIETH FLOOR** 511

One of the latest wonders in New York is a 200-seat theater on the fiftieth floor of the Chanin building. The playhouse is 500 feet above the street level and

is equipped for the display of motion pictures, stage productions, for musical recitals and other events or may be used as a room for sales and business conferences. Patrons are carried to the theater in six high-speed elevators capable of handling a capacity audience in two trips. The latest developments in lighting, stage equipment and sound insulation have been incorporated in this theater in the sky.

**NON-DISAPPEARING GOLF "BALL"
FOR PRACTICE INDOORS** 491

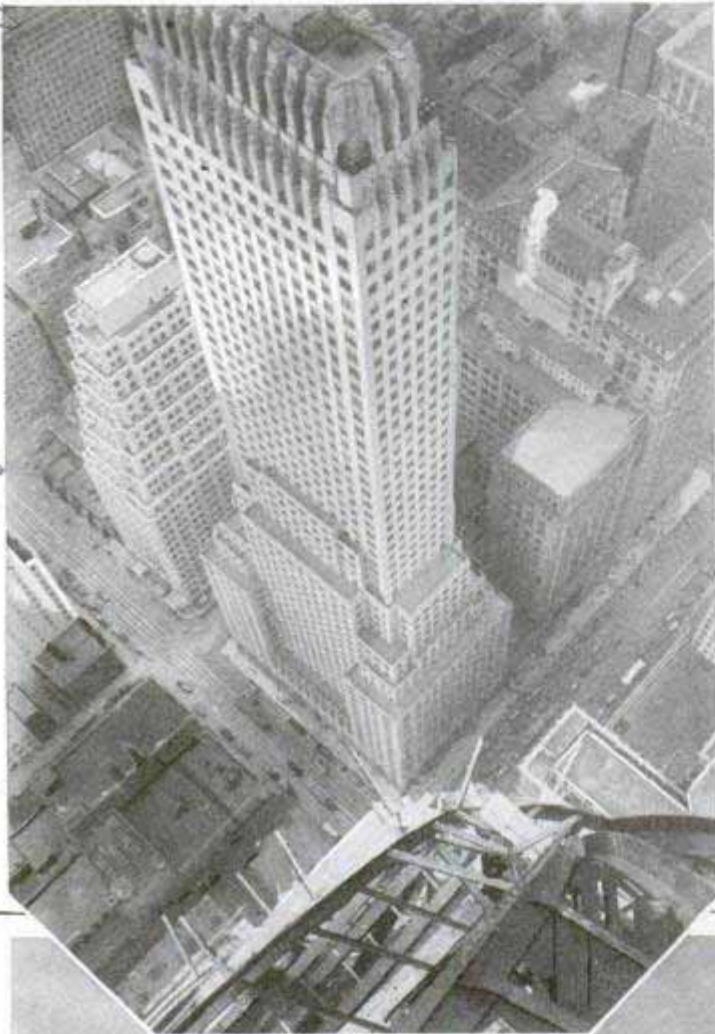
Indoor golf practice without danger to windows or furnishings is possible with a non-disappearing target consisting of a piece of soft white rubber, circular in shape and with the markings of a golf ball. It is mounted on a rubber pad which is laid on the carpet. Each time the club strikes the target square on the nose, there is a resounding slap which is not heard when the "ball" is sliced or cut. For those who prefer outdoor practice, the same idea is offered, mounted on a rod which is thrust into the ground. The outdoor target is so small it may be carried in the pocket.



Pat # 1,493,976

Yaggi, 1889 Oldwood Ave.
East Cleveland, Ohio

*Com. George A. Strader, 35. 21-
 99 St. Jackson Heights, N.Y.*



Steel erectors and hoist workers suffered no fatality in the erection of the 1,030-foot Chrysler building in New York, a record made possible largely by the use of an ingenious bell-signal system in operating the hoist. Contrary to popular belief, the material hoist usually accounts for more accidents than falls from girders. This is because no effective means had been found previously to discount the human element in operating the hoists, which rise from the ground to the uppermost completed floor. Ordinarily the hoist is provided with a bell at each floor to signal it, and while certain men were delegated with authority to push these bells, first ascertaining if workmen were wheeling material from the hoist to some other floor of the building, this frequently was not done and accidents resulted. Instead of push



© Wm. Frange
 Above, View from Top of Chrysler Building in New York, Looking Down on the Fifty-Six-Story Chanin Building; Below, Part of the Manhattan Skyline with Chrysler Building at the Right

March 23, 1930

344

Used by Aero Corporation of 905

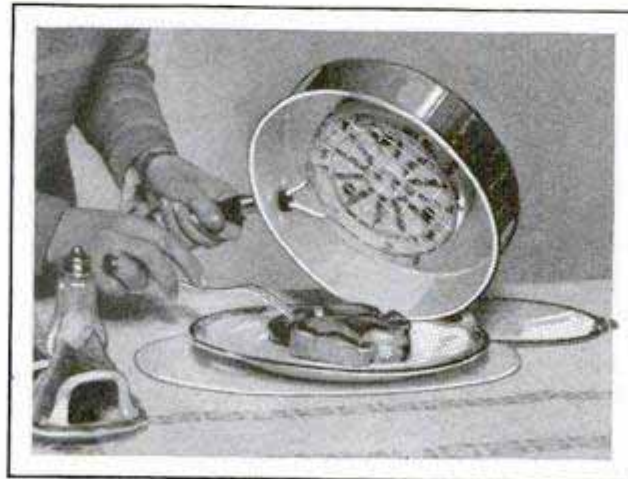
buttons on each of the floors, the Chrysler-building hoist was equipped with wall outlets. A circuit could not be made at these outlets without a special combination of plug and push button, and these plug buttons were given to only ten men who were carrying the signal equipment fastened about their necks by a cable to avoid its unauthorized use. As a double precaution, the signals from these authorized workmen were not transmitted directly to the hoist motors, but were relayed through another operative who first ascertained that all was clear before passing the signal to the engineer.

GROWTH OF AVIATION SHOWN BY YEARLY FIGURES 583

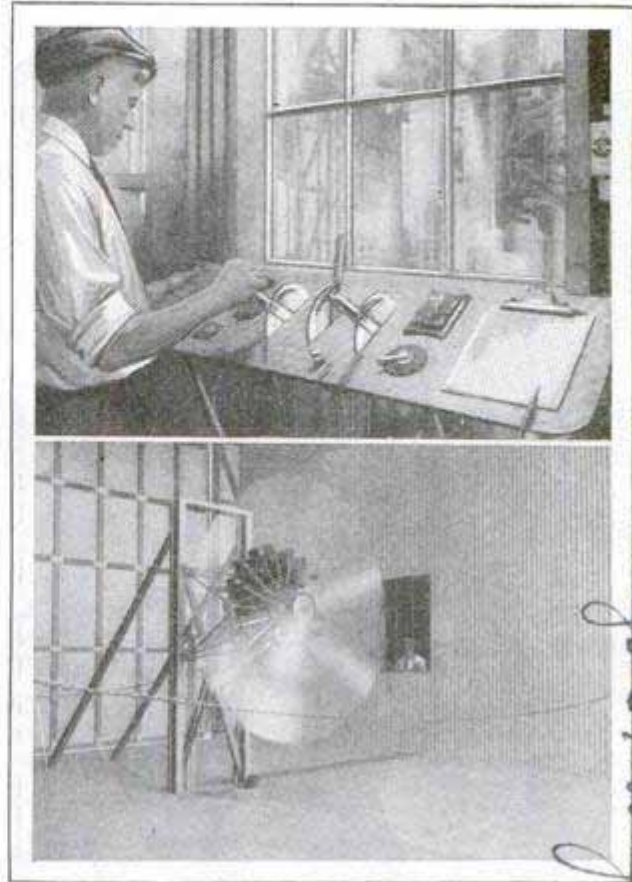
The growth of aviation is shown by figures for the past year. In 1928, the mileage of commercial airways in operation was 16,667. In 1929, this had grown to 36,000 miles, an increase of 19,333. Less than 50,000 passengers were carried on transport lines in 1928, but, in 1929, approximately 150,000 rode the air. The growth of the air mail is well illustrated by the fact that in 1928, the total mileage flown was 7,673,786, while last year it was 12,052,507, an increase of 4,378,721 miles. The value of commercial airplanes produced in 1929 was \$33,624,756, an increase of more than \$16,000,000 over 1928.

ELECTRIC COVER COOKS FOOD ON PLATE AT TABLE 506

Broiling meat and cooking other food at the table on the plate from which it is to be served can be done on an electric cooker employing radiant heat. It consists of a cover for the plate with the cooking element in the top when it is inverted over the food. The cooker somewhat resembles a metal pan with a radiant heater in its bottom. It cooks meat in ten minutes.



Electric Cooker with Heating Element in the Cover, Intended for Use on the Dining Table



Below, Airplane Engine on Test Stand, and, Above, Control Room Where Operator Governs Tests

AIRPLANE ENGINE-TEST STAND FITS ANY MOTOR

For testing airplane engines after they have been overhauled, a stand now is being used that will take any kind of motor, whether radial, rotary or in line. The engine is fastened to the stand as it is in the motor bed of the plane, and the controls are hooked to attachments in the control room where the operator has an instrument board with a full complement of instruments as they are in the plane, enabling him to watch the performance of the engine. The exhausts of the engine lead outside the test room to eliminate noise, and the gas tank also is outside the building to reduce danger from fire. From the control room, the operator watches the engine through a window above the instrument board.

California, 3819 & Western Ave Los Angeles, Calif

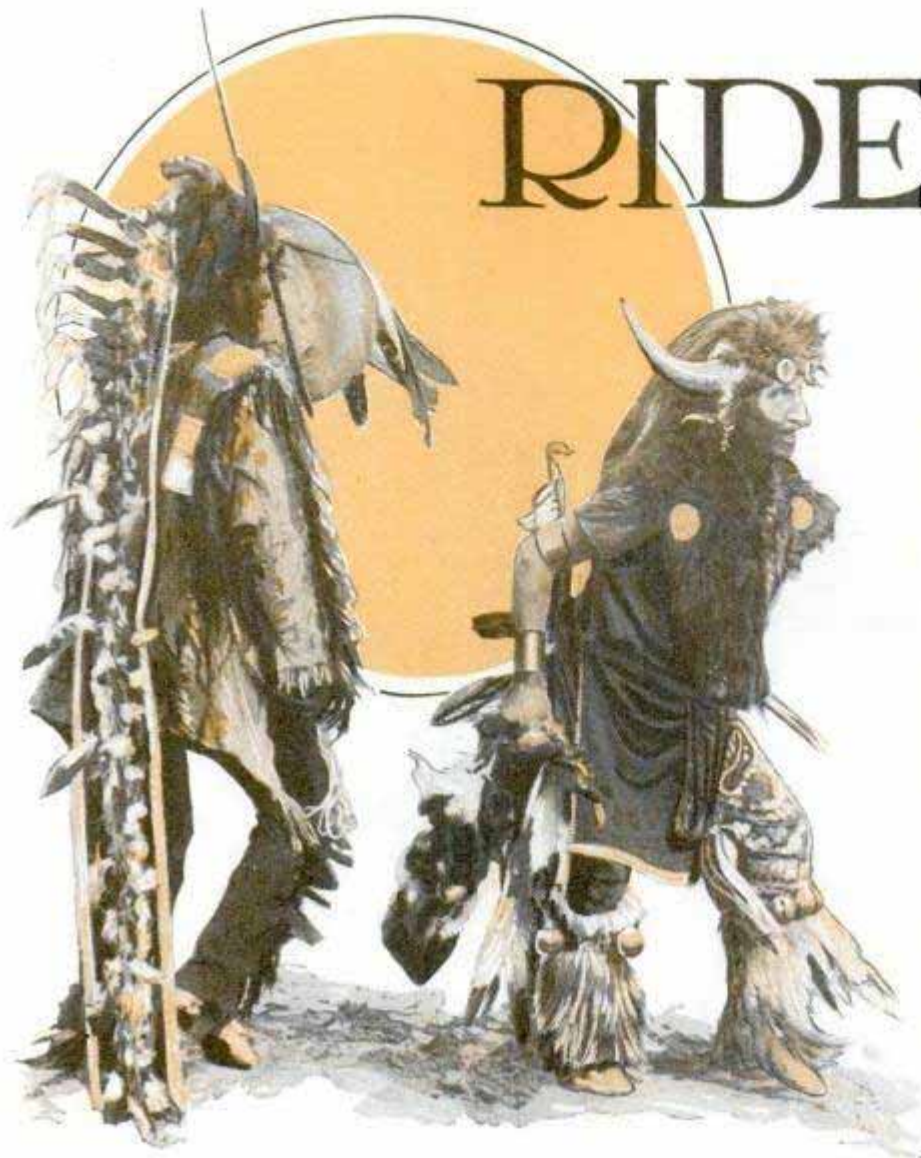
channel nursing Co substituting Horticultural Hall London Eng

cannot locate maker

370.

Com. Earle W. Isage, Ashville, N.Y

RIDE 'IM,



champions are made so fast that the eye is unable to catch the events.

"Norman's on deck," cries a fan. Then—a sudden hush—Cowan is out in front of the grandstand, his broncho pawing the dust. Now he's in mid-air, the horse stampeding and snorting and tossing his head. "Let 'er buck, Cowboy!" re-echoes the cry. Whether it be in Cheyenne, Calgary, Pendleton, or any one of the score of lesser round-ups, the whole country is there to boost their cowman to success—or the hospital.

The next event is now on. Out of the corral comes an angry steer. Two fleet-footed

By G. W. EARLE

"RIDE 'im, Cowboy!" shouts the crowd, as a man swings the corral gate back. Norman Cowan, world-famous broncho buster, is on the hurricane deck of a streak of chain lightning. In the fractional part of the next second, he is either going to "bite leather" or "eat dust," as they say in the west, or he may be able to stick to the back of that cavorting horse.

This is the one event of frontier days, round-ups and rodeos, which catches the attention of every spectator, thrilling even the old-timers of the range. Broken necks and world



Sioux Indian Medicinemen Dressed to Take Part in War Dance in Cheyenne Frontier Days, and Paddy Ryan Bulldogging a Steer

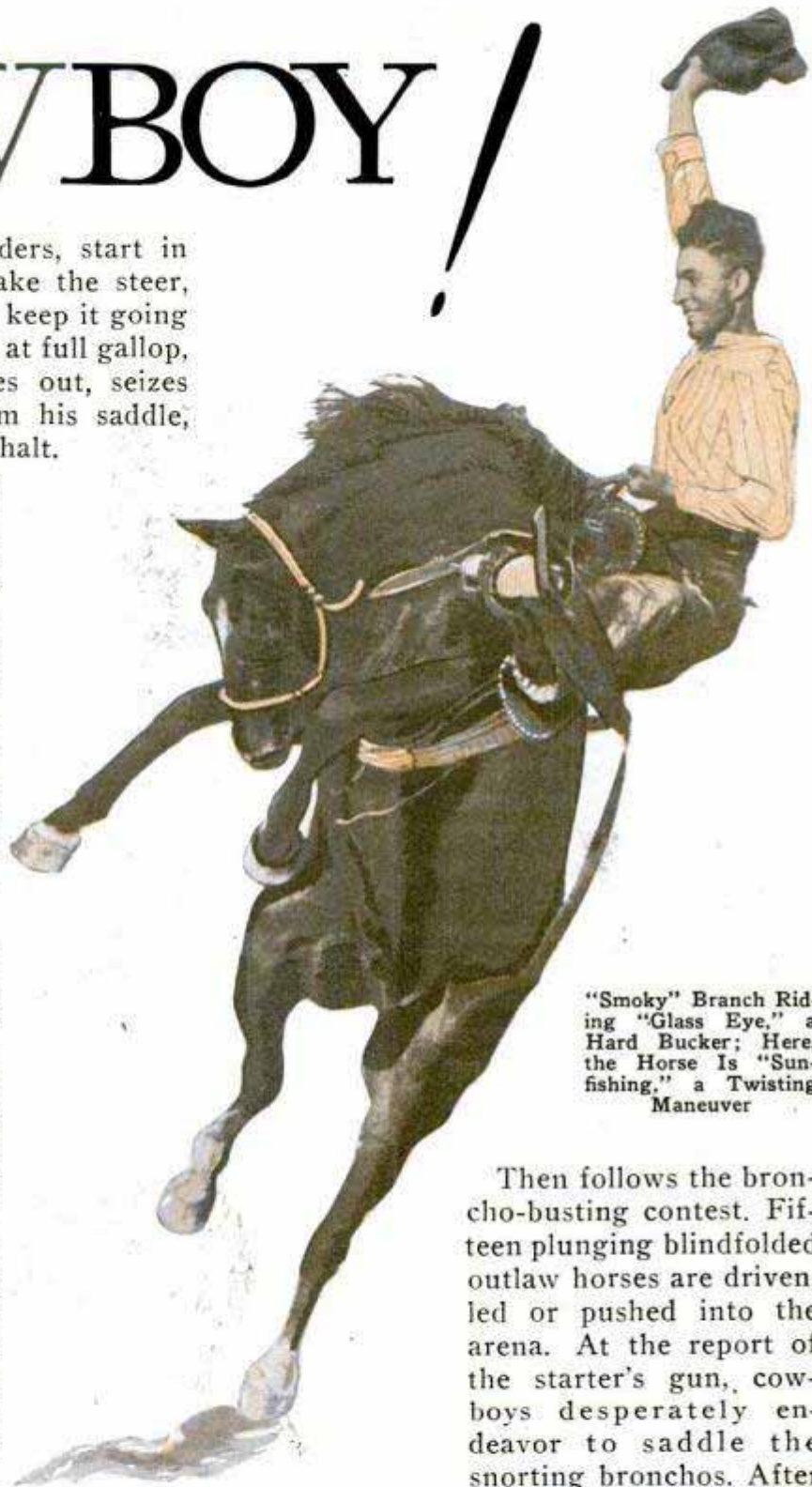
COWBOY!

cow ponies, with daring riders, start in pursuit. They easily overtake the steer, and the riders on either side keep it going in a straight line. Suddenly, at full gallop, one of the cowboys reaches out, seizes the steer's horns, slips from his saddle, and brings the animal to a halt.

In the next few seconds there follows the most interesting contest between man and beast anywhere offered, usually resulting in the steer toppling over on its side. The red flag of the starter is lowered, the timekeeper announces that a new record has been made. There, covered with sweat and dust, stands your world's champion "bull-dogger."

But, it is not quite so easy as it may sound. First, the steer is no parlor pet, but a long-horned fighter, weighing 800 to 900 pounds, and selected especially for his ferocity. The longhorn has a thirty-foot start. The cowboy slips up on the "off" side, and rushes up close to the steer's head. At just the right moment, he lunges off his broncho and grasps the steer's horns. In another split second, a half ton of beef and a cowboy have landed amid a cloud of dust. Trained bull-doggers tip the horns at just the right angle to throw all four feet from under the animal, and, holding the nostrils in one hand, keep the steer down until the timekeeper records the time.

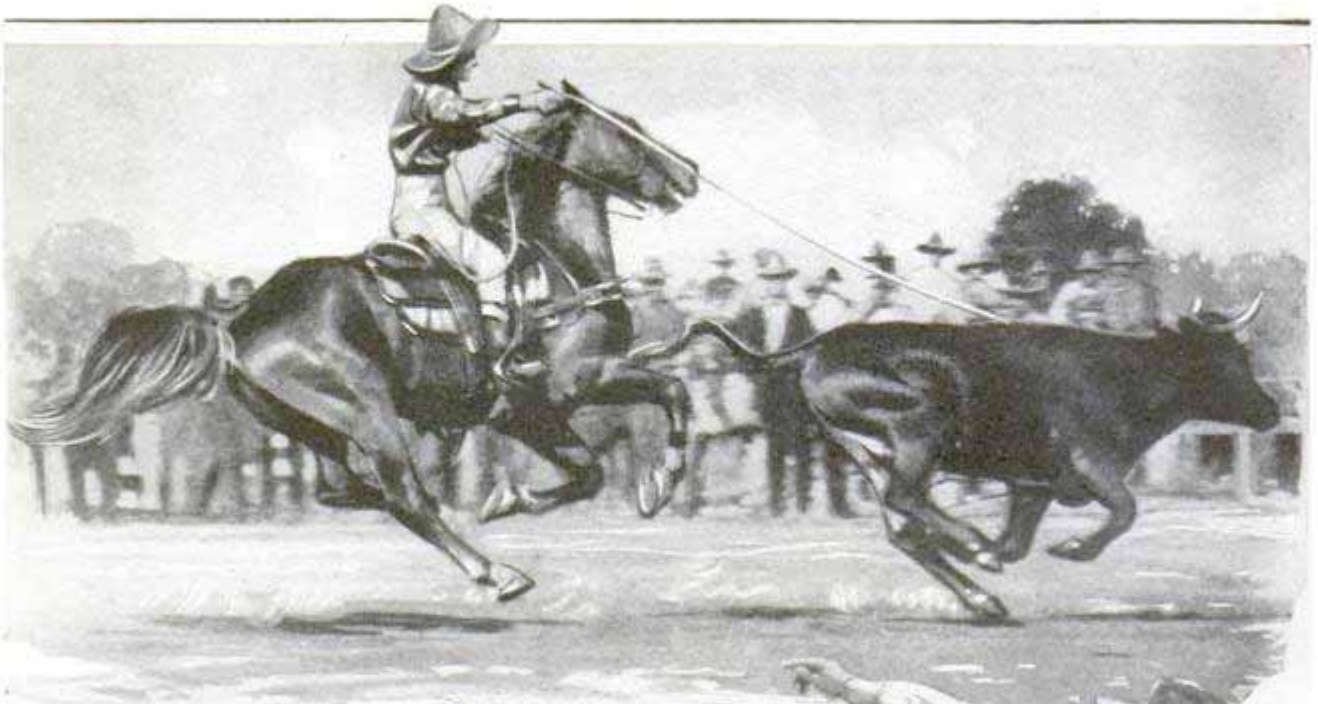
Any cowboy who is unable to perform this feat within two minutes of the start, is out of the race. But he who can perform the trick not only receives a money prize and the applause of the spectators, but a reputation money cannot buy.



"Smoky" Branch Riding "Glass Eye," a Hard Bucker; Here, the Horse Is "Sun-fishing," a Twisting Maneuver

Then follows the broncho-busting contest. Fifteen plunging blindfolded outlaw horses are driven, led or pushed into the arena. At the report of the starter's gun, cowboys desperately endeavor to saddle the snorting bronchos. After a desperate struggle, one

of the cowboys manages to buckle his cinch and mounts. But the bucking horse starts on a stampede in the wrong direction. Then another man mounts, and off they go, pitching, rearing and whirling until they come to the first turn in the oval track. Here the horse refuses to follow the course, crashes into the four-foot wooden fence, and stampedes over the prairie, carrying the cowboy on a mad ride. Finally, one cowboy, luckier than



the rest, by petting, coaxing and spurring, manages to bring a frenzied horse around the half-mile track and under the finish tape. When the ambitious cowboy, striving for money and honor, mounts the saddle of a wild broncho, experienced plainsmen hush. That lad is going for a real ride. When the time gun crashes at the end, the horse stops bucking as surely as though the gun had driven a bullet into its vitals, and the crowds in the grandstands are sure to yell, "Why, that horse is trained!"

And they are right, too, for those bucking bronchos are trained—trained with even greater care than is bestowed on the world's best racing steeds.

A really good bucking horse, of the caliber of "Steamboat," is worth as much cash in the realm of cowboy sports as the fastest horse on the track.

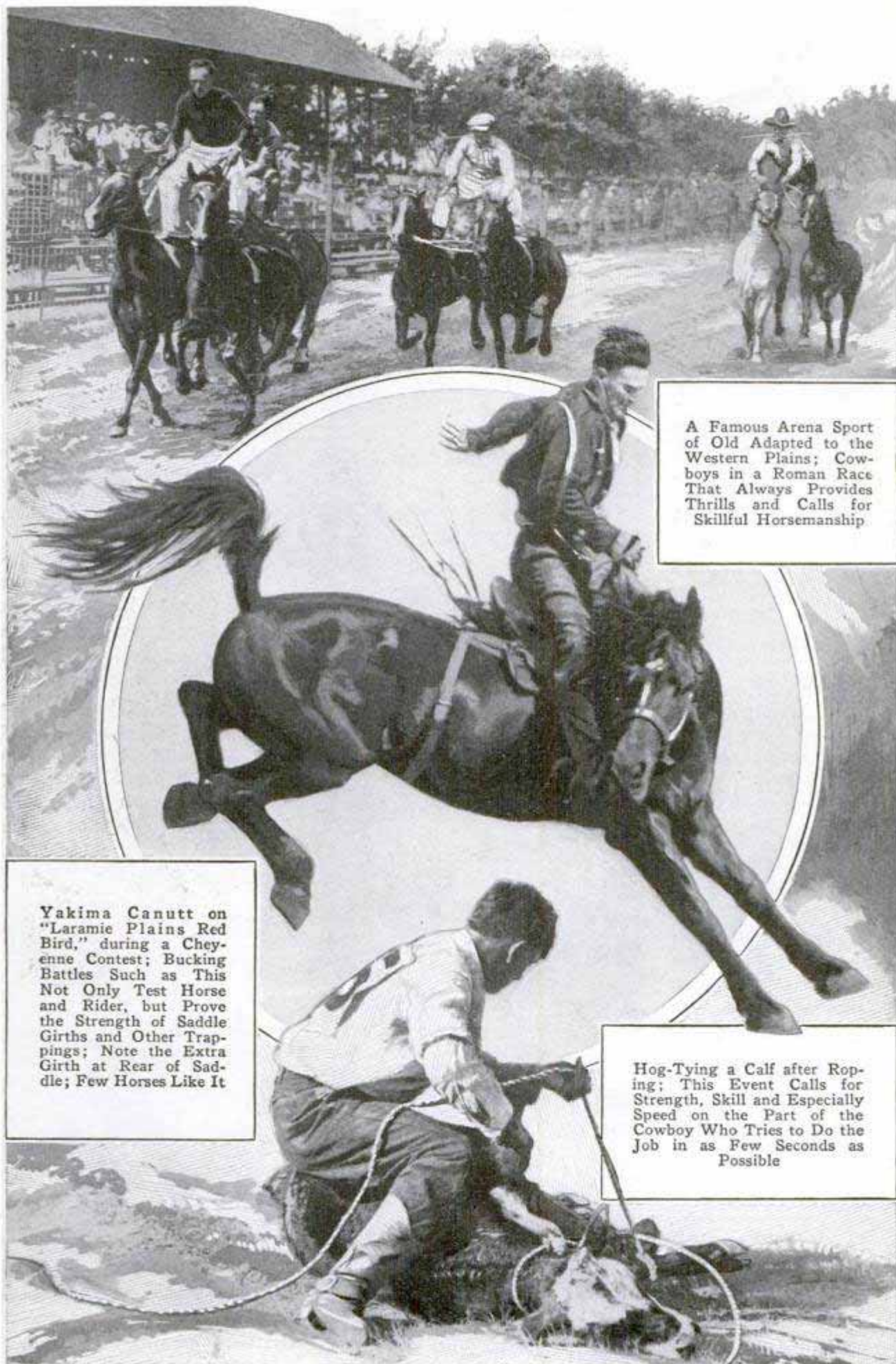
In the olden days, it was the zenith of sport to ride a wild horse, fresh from the plains. Then most any good cowboy could keep on any horse; evolution had not produced the champion broncho



Mabel Strickland, Champion Cowgirl, Roping a Steer, and Hugh Strickland on "Headlight," a Famous Outlaw Horse

buster, the expert who makes his living riding the worst of them. Then, the super-rider wanted something he could not ride, and the business of training jumpers to throw the experienced cowboy became a real enterprise.

Any horse, cowboys tell us, will buck the first time he is ridden, and if he is a good horse, and bucks hard and throws

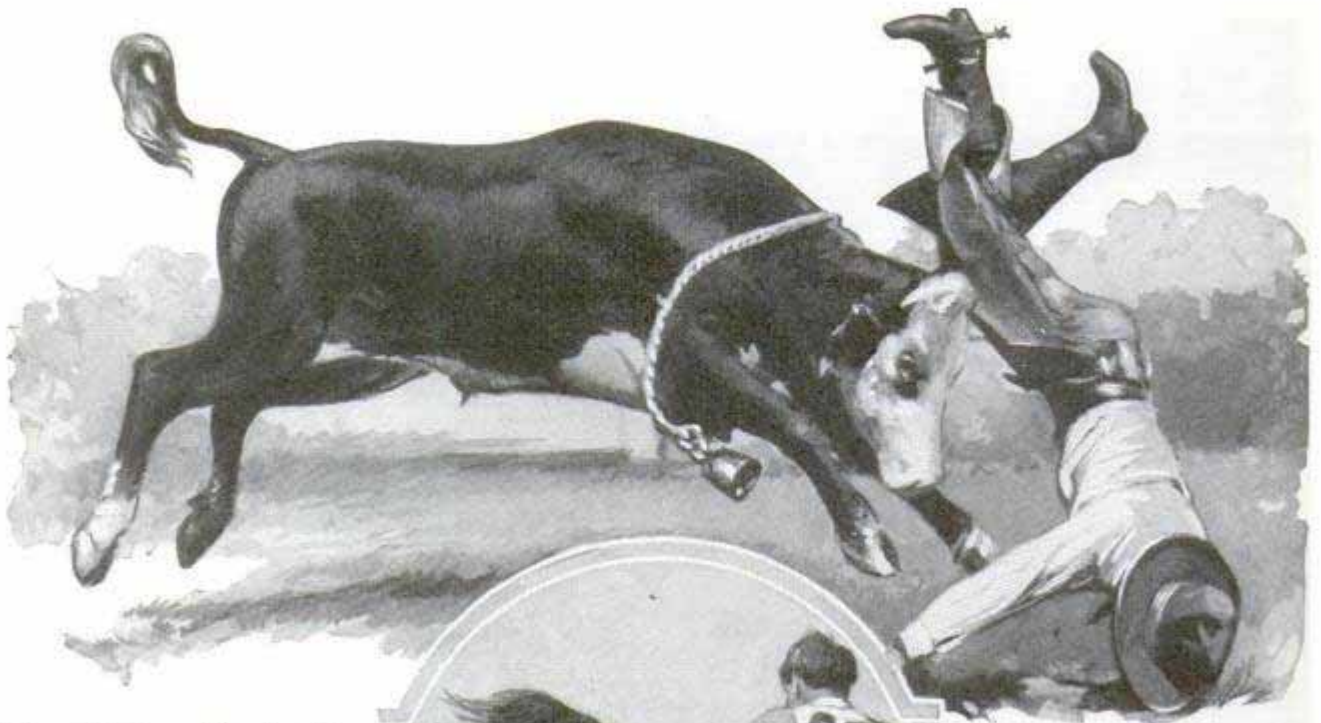


A Famous Arena Sport of Old Adapted to the Western Plains; Cowboys in a Roman Race That Always Provides Thrills and Calls for Skillful Horsemanship

Yakima Canutt on "Laramie Plains Red Bird," during a Cheyenne Contest; Bucking Battles Such as This Not Only Test Horse and Rider, but Prove the Strength of Saddle Girths and Other Trappings; Note the Extra Girth at Rear of Saddle; Few Horses Like It

Hog-Tying a Calf after Roping; This Event Calls for Strength, Skill and Especially Speed on the Part of the Cowboy Who Tries to Do the Job in as Few Seconds as Possible

370



© Doubleday

his rider, will buck again and again. Thus, to provide good buckers, large horses are selected, and cowboys get aboard with the deliberate intention of eating dust. This serves to give the animal the general idea that he can throw anything off his back. The same intelligence that causes the good buckler to start throwing things also causes him to stop when he hears the finish gun. Weeks of patient effort are involved in

teaching these animals to perform feats which surpass anything possible when ordinary wild horses are used.

Riding wild Brahma steers is possibly the most dangerous and most thrilling event on the card. These beasts are

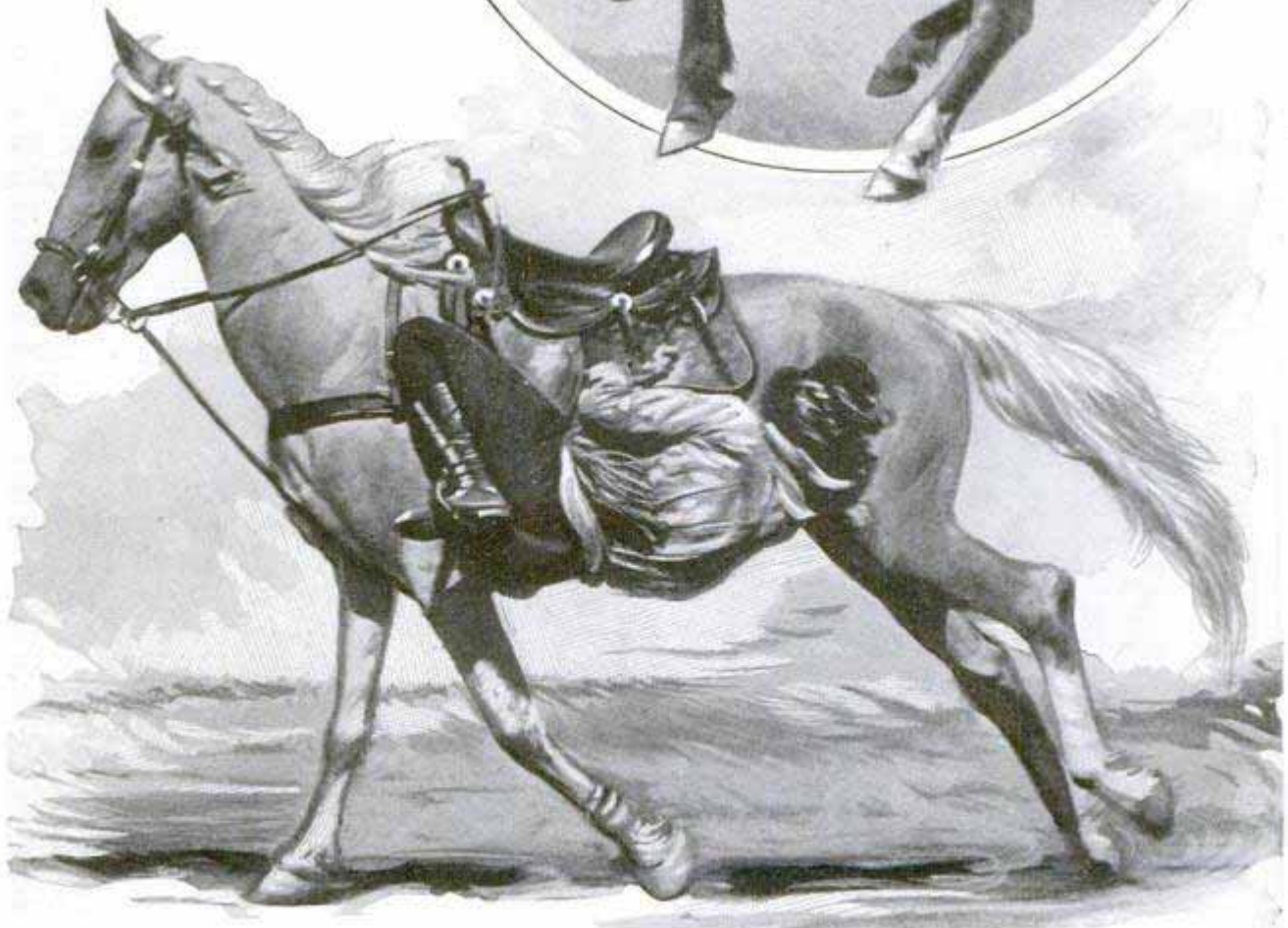


Over the Top after an Unsuccessful Attempt to Ride the Bull; Center, Harry Haythorne on a Bucker, and, Bottom, Billy Kingham Signaling for Time, after Roping, Throwing and Tying a Steer

a cross between the Mexican longhorns and the sacred cattle of India. All efforts to tame them have ended in failure. Although the cattle may be herded without much difficulty, the moment one is "cut out" from the main herd, he is ready to fight at the drop of the hat. To keep on the deck of such an animal calls for a high degree of daring and skill. If a rider can stay on during the first five jumps, there's a chance for him, but most riders eat dust the first half of the first bust. The cowboy who fails to land on both feet and start running fast, may be out of all luck, for the steer is almost certain to whirl with the speed of a wild cat and chase the cowboy all over the grounds.

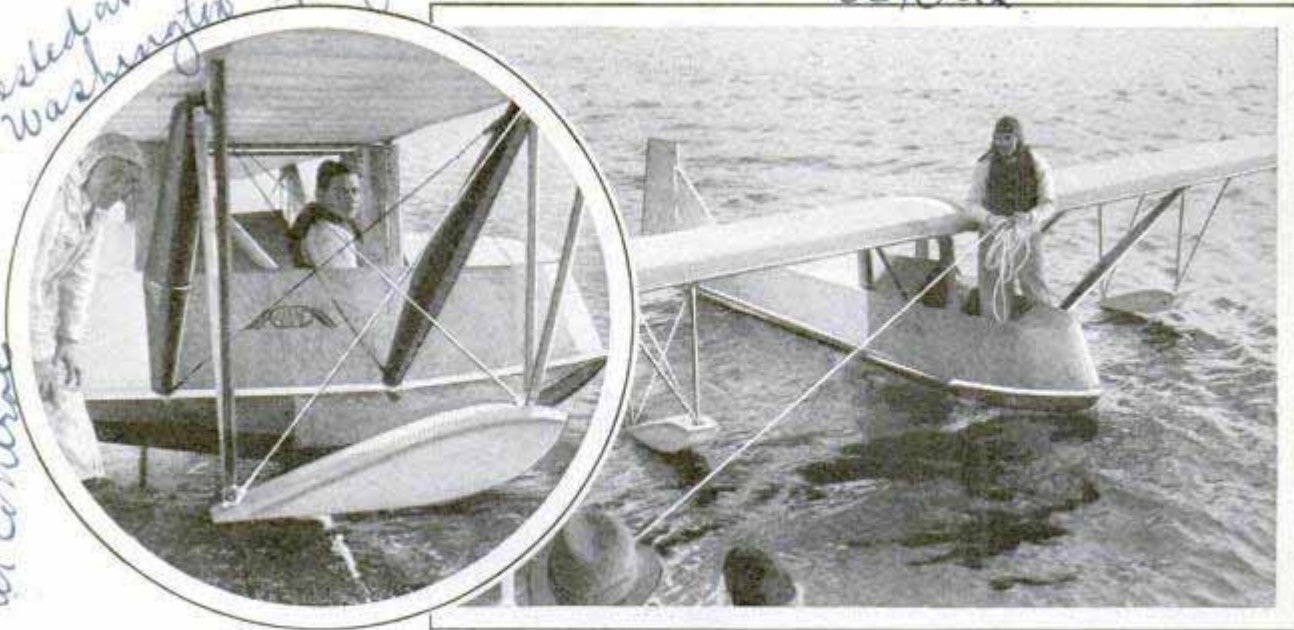
The cowgirl's cham-

pionship contests are always great drawing cards. The horses used in these are "hot stuff," and only top-notch cowgirls enter. The fair riders draw for mounts, and are permitted to hobble the stirrups.



Mabel Strickland on a Spirited Bucker and Bonnie Gray, Noted Girl Trick Rider, Climbing under Her Horse as It Runs; She Will Take the Saddle on the Other Side

Oklahoma City Okla



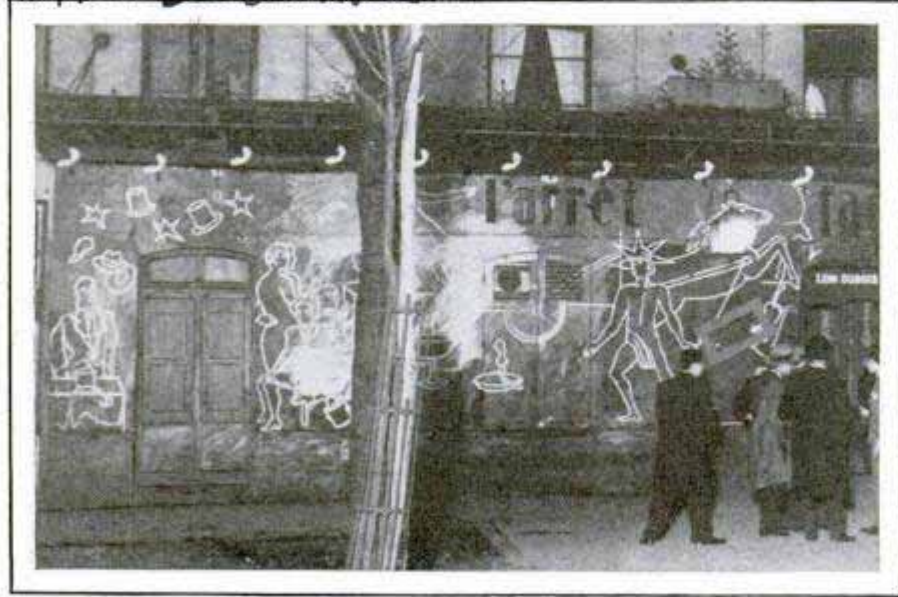
Two Views of the Glider Which Takes Off from Behind a Motorboat and Alights on the Water; It Is Designed, like an Amphibian or Flying Boat, with Pontoons

GLIDER TAKES OFF FROM WATER BEHIND MOTORBOAT

Built on the lines of a flying boat, a glider that is intended to be launched from and to alight on the water has been tested successfully. A seaplane or a motorboat affords sufficient momentum to send the craft into the air.

CHALK CARICATURES ON WALLS OF PARIS NIGHT CLUB

Fantastic caricatures in chalk, some the work of prominent artists, decorate the walls outside the "Do Drop Inn," one of



Fantastic Chalk Caricatures Adorning the Outer Walls of One of the Paris Night Clubs Frequenting by Many American Tourists

the noted Paris night clubs. Here American tourists, students from all over the world and a few real Parisians gather for all-night rounds of gaiety.

LIGHTS SWITCHED ON BY RADIO TEN THOUSAND MILES AWAY

From a distance of 10,000 miles, Senator Guglielmo Marconi, inventor of wireless telegraphy, recently sent out radio signals which illuminated all the lights in the electric building in Sydney, Australia. The signals were transmitted from the inventor's yacht off Genoa, Italy, by tapping the key of the transmitter five times at three-second intervals, thus projecting a short-wave radio current which was picked up by an amplifier at the receiving end and sent to a relay. This relay, in turn, closed a circuit supplying current for the lights. The practical value of the demonstration lies in the ability to establish communication to so distant a point through a small station. Before switching on the lights, Marconi established telephone communication with Sydney from his boat, using only a fifty-foot antenna.

72 Tested at Port Washington S. C. New York
Stick at water, S. C. or Idaho, N.Y. at control

Chicago Tribune 3/27/30

52 Vandewater Ave
New York City

POPULAR MECHANICS

367 W. Wmsage Products Co
215 Madison Ave
New York City

**BUILDING FILLED WITH DRY ICE
COLDER THAN NORTH POLE**

At Elizabeth, N. J., is a building, the interior of which is colder than either the north or south pole. It is filled with 5,000,000 pounds of dry ice, the refrigerant made from the same gas that puts the fizz in soda water, and which has a temperature of 109 degrees below zero. The dry ice has been stored to meet the summer's demand from ice-cream makers for a substance cold enough to keep the cream in good condition on even the hottest summer day.

**LIFTING STRENGTH OF PLANTS
MEASURED WITH WEIGHTS**

Determining the tremendous lifting power of growing plants is the object of a series of tests being conducted at the University of Pennsylvania. Nearly everyone has noticed how a growing mushroom will lift a piece of bark many times its own weight, or how a sprout will raise a piece of glass under which it is growing, but no effort has been made to determine the extent of this strength. The experiments consist in attaching weights of various sizes to coleus and geranium plants placed on a greenhouse bench,

all under the same conditions except for the variation in weights. The stems are bent downward by the weights, but owing to the tendency of the plants to turn their leaves toward the sun, they try to straighten whenever constrained in any way. Thus, in three or four days, some of the plants succeed in straightening their stems. Then, from the value of the weights and the distances from the point bent, or the leverage, the force can be calculated and recorded, along with the size of the stems, the age of the plants and other conditions. From calculating the power for plants of different species, valuable data regarding the life and culture of such plants are anticipated.



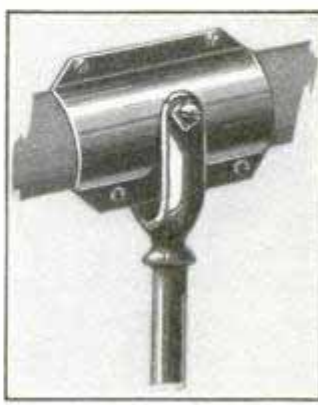
Buoyant Sweater Equipped with Detachable Rubber Tubing to Keep Wearer Afloat in Emergency

**AIR TUBES IN SWEATER MAKE
IT A LIFE PRESERVER**

Intended for wear by the fisherman or hunter, a buoyant sweater that will keep the wearer afloat in water for several hours now is on the market. It is like the ordinary garment except for rubber-tubing units down the front, which are filled with a material much more buoyant than cork. These units can be removed, if desired.

**CHROMIUM-PLATED OAR LOCK
SAVES BORING HOLES**

Weakening oars by boring holes in them to receive the oar locks is unnecessary with a chromium-plated lock consisting of clamps which are bolted around the wood. The clamps are egg-shaped to give a tight grip on the oar, and the forks are attached to the clamps by means of a swivel screw which can be made as tight as desired and locked with a nut to avoid slipping. The clamps also can be used to repair oars which have been broken at the locks.



Cont. Seco. H. E. Chardard
4528 Walnut St.
Phila.

My ser. Rodney True

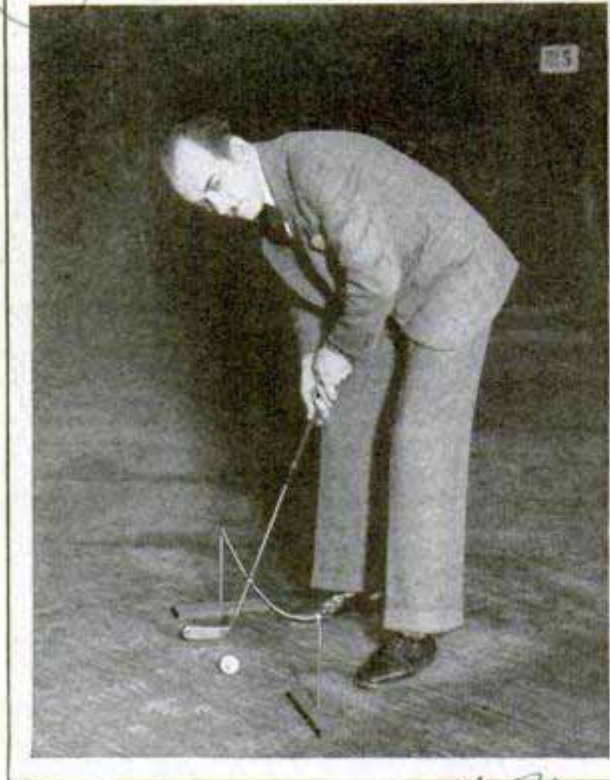
B. Botanic Gardens

The Hudson Bay
Lock Co. 17 N. 4th
St. N.Y.C.

7-50-87250
225 E 11th St.
Chattanooga, Tenn

Golf School, Letter Stars

296 E. Van Buren & State Chicago



Golf Club Attached to Guide Which Automatically Causes It to Describe Proper Arc for Putts

AUTOMATIC GOLF-CLUB GUIDE FOR SHORT SHOTS

Golfers who have trouble with short shots will be interested in a guide for the club which automatically causes it to describe the proper arc for putts, chip shots and short approaches. It is an upright frame, about a foot high, between the ends of which extends a metal rod bent to the curve the club should follow. The club is clamped to the guide for practice shots until the golfer learns the correct swing.

INDIAN SOLVES PROBLEM BAFFLING ENGINEERS

Three crows and an Indian recently solved a problem that had baffled engineers laying a cable in a Quebec wilderness. The cable was to span a river 900 feet wide, but because of the swift current and treacherous rocks, a boat could not be used to haul it over. First, a rocket gun, similar to those used by life-saving crews, was employed to shoot a line over, but the line always fell short. Then a reward was offered to

anyone with sufficient skill to throw a weight with a line attached across the stream, but this likewise failed. While linemen were trying to think of some other plan, the Indian, attracted by the reward offered, appeared with the three crows. He attached the line to a five-foot stick, then bound one foot of each crow to the stick with a cord, one crow in the middle and the others at the ends. When the birds were hitched, he released them and they flew across the river with the line, the Indian bringing them to earth on the other side by a pull on the cord. The light rope then was employed to pull the cable over.

442

HAY STACKER RUN BY TRACTOR ALSO LOADS GRAIN SHOCKS

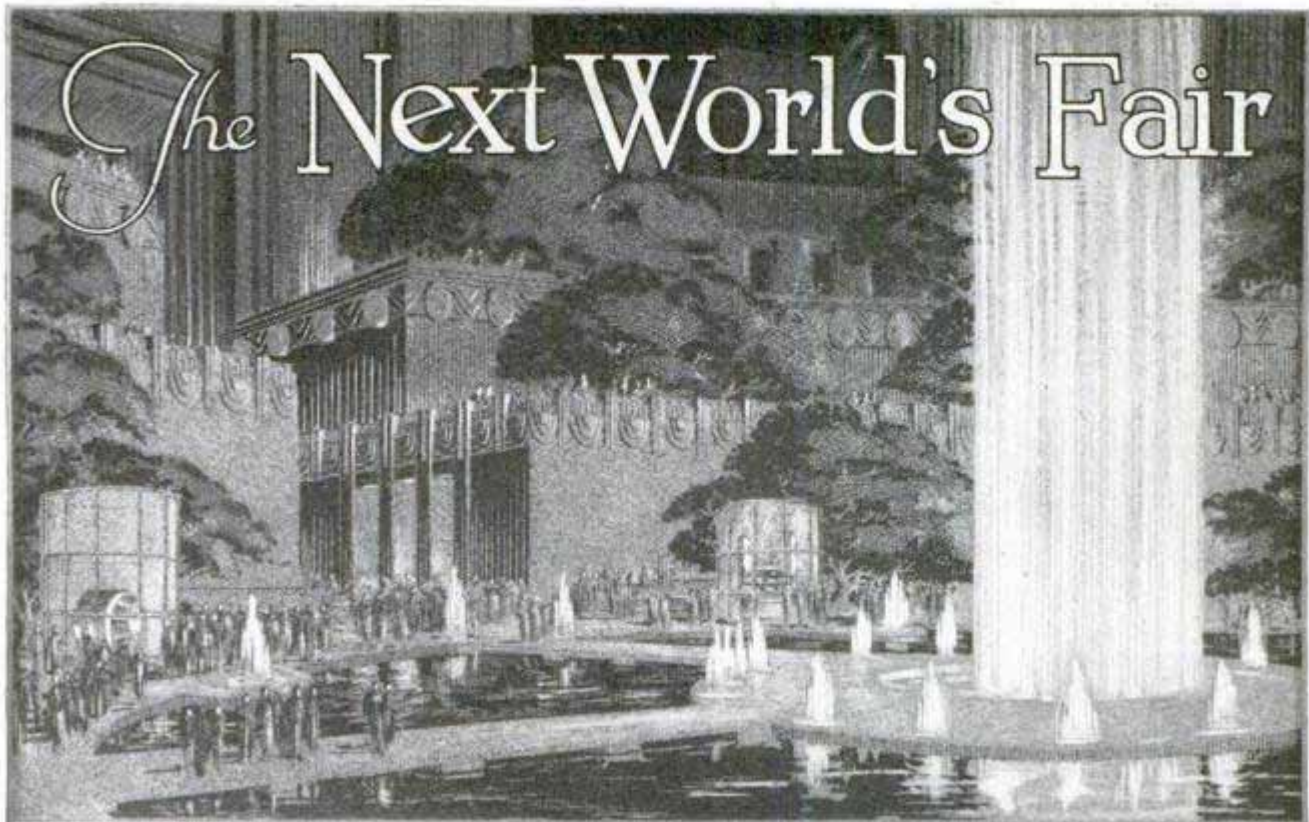
Hay stacker and grain-shock loader are combined in a single machine now being manufactured for use with a tractor. The apparatus consists of twenty-foot uprights and a fourteen-foot sweep head with nine-foot teeth, the load being hoisted with wire cable geared to the tractor's power take-off. The sweep is mounted in front of the tractor, and, in its lowermost position, gathers the hay from the ground, then hoists it to the stack and dumps it. In similar manner, it may be used to load grain shocks during the threshing season. It is able to do the work of two men, two teams, a stacker and a sweep, and can be operated by one man. Cables enable any desirable motion.



Hay Stacker Mounted in Front of Tractor; It Gathers and Piles the Hay in a Stack and Also Loads Grain Shocks

530
Cmhr Wm. P. Schramm
Balaton, Minn

Francis M. Anderson,
Wausau, Wisc



A Suggestion for One of the Courts, Arranged in Such a Way That Indoor and Outdoor Exhibits Can Be Combined; Terraced Buildings Afford Clear Views of the Court Interiors

By PAUL D. PADDOCK

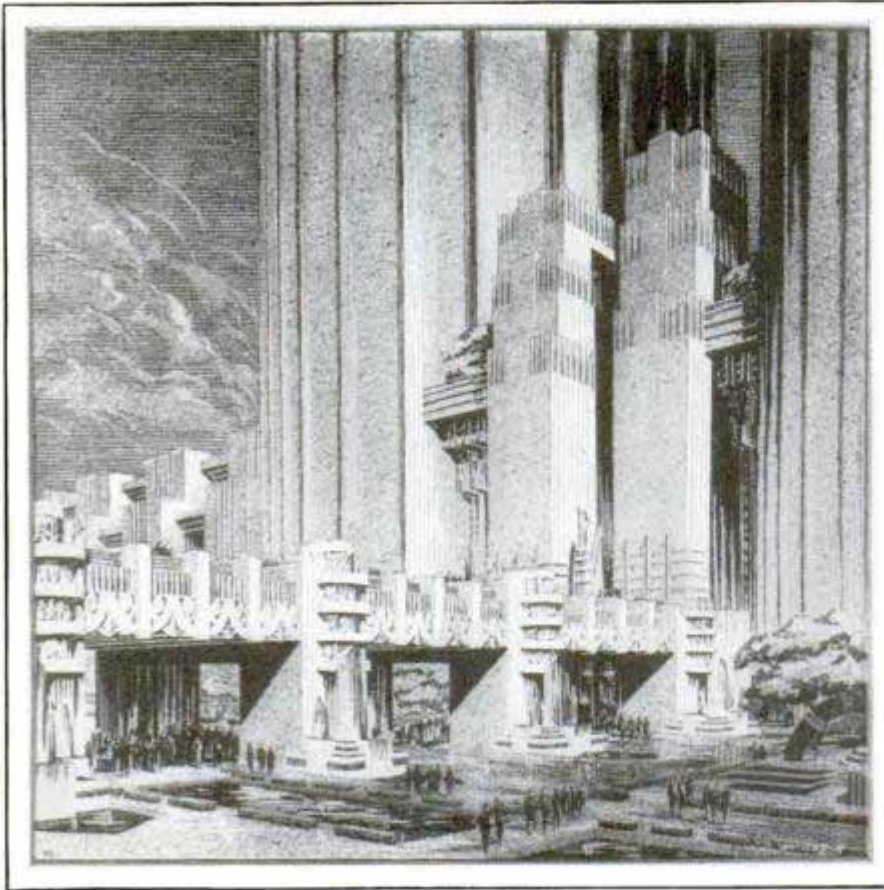
SCIENCE will strike the keynote of the Chicago World's Fair Centennial Celebration to be held in 1933, paying its chief tribute to adventurers in the fields of scientific research—workers whose discoveries have resulted in new worlds of comfort, joy and well-being for all mankind. Already the wonder city that is to house the exhibits is taking form on an 800-acre site of man-made shore, lagoon and island in Chicago's front yard along Lake Michigan, reaching from a point south of the loop district almost to Jackson park, scene of the famous fair of 1893. The ground plan of the exposition is a departure from past practice in projects of this sort, and is one that will permit a novel and effective showing for the modern miracles of lighting, and many other innovations, that are to be displayed.

Buildings will not be placed in as symmetrical arrangement as in other fairs, due to the shape of the site, but will be balanced in composition and will reflect modern tendencies in architecture. Save for a proposed high tower, which will be bathed in water cascading down its sides, most of the structures will be comparatively low, with stepped-back walls in the

form of terraces which will help form amphitheatres from which the 400,000 or more persons expected to visit the exposition daily can view the various pageants to be held on land, lake and lagoon.

One of the main units of the entire centennial will be devoted to the travel-and-transport show. It will tell, by exhibit and by pageantry, the story of transportation from the earliest days of civilization to the present. The principal building of this group will be a windowless structure, over 1,000 feet in length, terminating at either end in a dome, 200 feet in diameter and 125 feet high. Their tops will be suspended by "sky hooks," an innovation entirely new to the building craft.

Use of the sky hook, which is simply a support for the domes outside the main walls of the building, makes possible an interior entirely free from column or beam so that an unobstructed view can be enjoyed from any point. In order that a uniform plan of interior lighting may be carried out, windows are eliminated and a special system of artificial illumination has been developed. The outer walls of the structure will be of a special metal. At night, the entire building and its domes



Mr. Hood's Design for an Entrance to One of the Great Courts; Bridges and Ramps Would Expedite Traffic between the Buildings

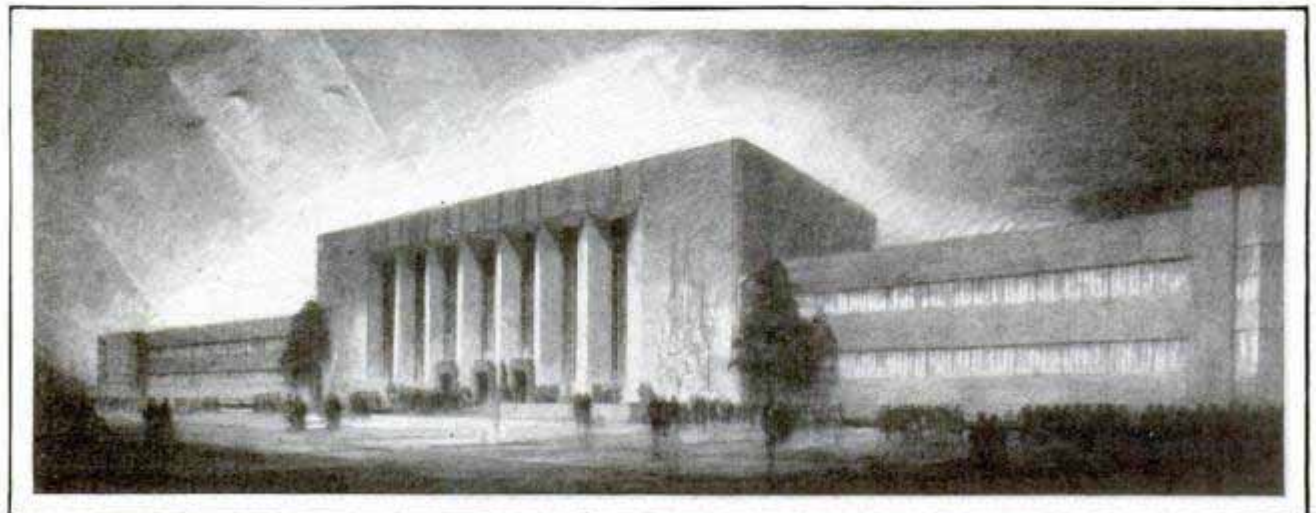
will glow under the changing colors of batteries of thousands of floodlamps, hidden in recesses about the structure and synchronized to produce varied and unusual effects. The result will suggest many-faceted jewels of gigantic proportions, gleaming and blazing like huge diamonds.

On the land and water near the transportation building and close to a grandstand that will seat approximately 10,000

persons, pageants will unfold the tale of travel. All forms of road transportation will be duplicated on a specially constructed highway. Along a stretch of railroad tracks, trains and engines from the earliest types to the latest will move under their own power. The entire history of water transportation will be enacted on the lagoons and lake near by. The transportation and administration buildings will be the first units to be completed.

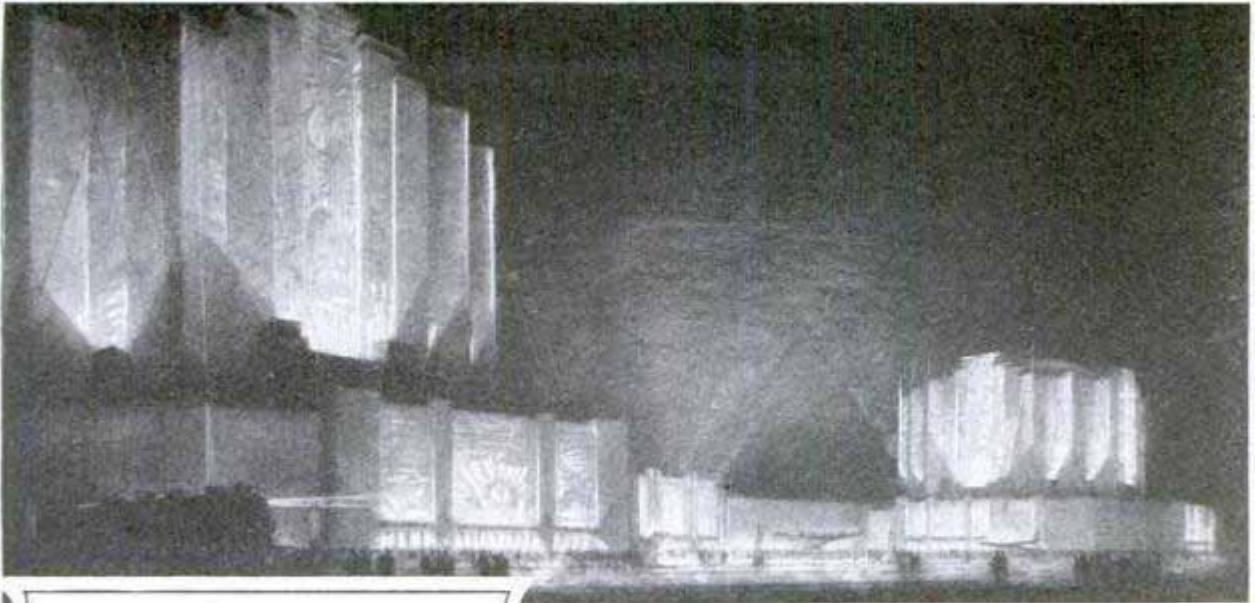
The idea of using working models wherever possible to explain the wonders of invention will be applied in all the exhibits, so that the fair will be the living story of science rather than a "dead circus" of lifeless displays.

A mammoth blade of grass of transparent material, so arranged that visitors can actually see how substances are taken from the ground and air and transformed into plant tissues, will be a feature of the agricultural exhibit, according to present plans. Working models on life-size scale are proposed to demonstrate the many methods of surface and underground mining, for which purpose a miniature range of mountains would be built.

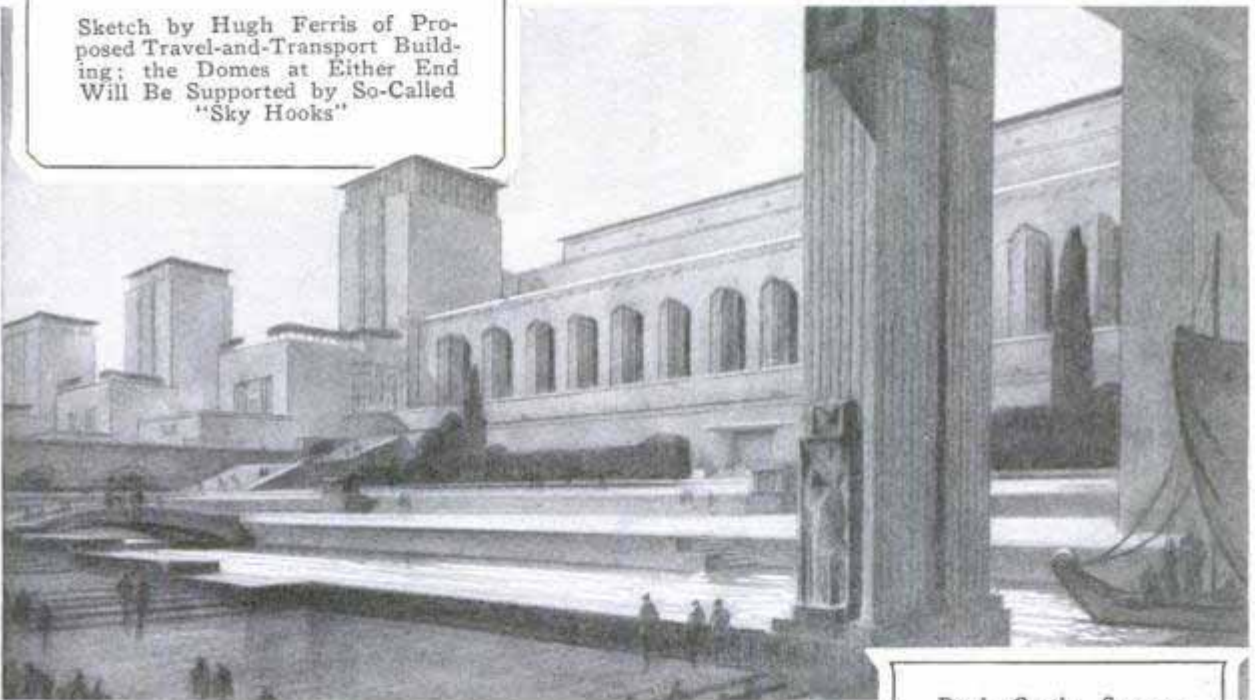


Main Facade of the Administration Building; It Will Be 350 Feet Long and 150 Feet Wide; It Is of Conservative Modern Design, Based on Classic Principles

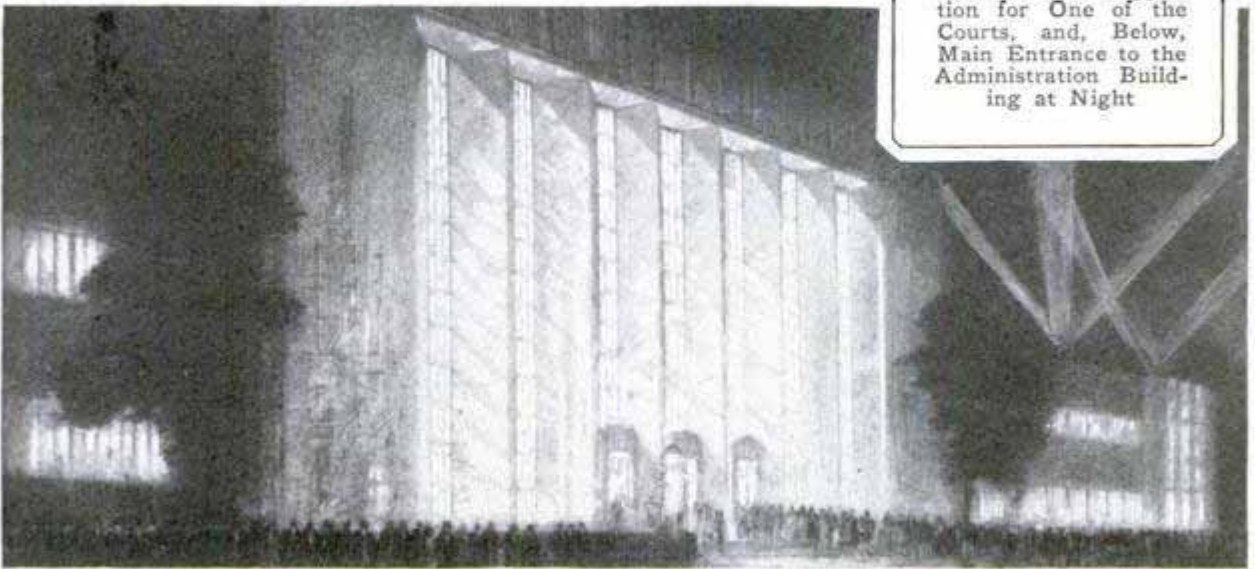
477



Sketch by Hugh Ferriss of Proposed Travel-and-Transport Building: the Domes at Either End Will Be Supported by So-Called "Sky Hooks"



Paul Cret's Suggestion for One of the Courts, and, Below, Main Entrance to the Administration Building at Night



THIRTY-SIX-HORSE TEAM IS DRIVEN BY ONE MAN



Thirty-Six-Horse Team Hauling Eight Wagons Containing 900 Bushels of Grain, One Man Handling All the Reins

Hauling 900 bushels of wheat at a load, an Alberta farmer hooks thirty-six horses to eight wagons and starts to market, handling all the reins himself. The skill of the driver is only equaled by the intelligence and dependability of the animals, as the horses have been trained to pull in eighteen pairs and the leaders turn corners and execute any maneuver possible with a single team.

called rigid parts may set up slight but important vibrations, so that the parts act like springs. This vibration hazard is not yet entirely overcome, but is being decreased by building the parts so that they are not likely to vibrate in unison.

ARROW SAFETY LIGHT FOR CAR INDICATES TURNS

Indicating by lighted arrows, front and rear, the turn or other maneuver a motorist contemplates, a safety light operated by switches on the dash now is on the market. The rear shell contains arrows

MAGNETIC "EYES" FIND CAUSE OF MYSTERY AIR CRASHES

Metal fatigue at hidden imperfections in airplane motors is considered the cause of some of the few aviation crashes in which the engines fail for no apparent reason, and to detect these faults, a device with magnetic "eyes" has been developed. Cracks and other blemishes that could not be seen by the unaided human eye are revealed by this instrument as the bar stock is fed through it. These weaknesses are especially dangerous on account of the intense vibrations to which the engines are subjected. It was this factor that broke three crankshafts during a single flight of the "Graf Zeppelin," according to engineers. Somewhat the same thing occurs when glass bowls are shattered by striking a synchronous piano note; the vibrations set up cause the glass to break. When an airplane motor is running, so-



also are lights which, when the switch is thrown for right or left turns, show that the indicators are operating. The rear shell is nine by five inches and is finished to match the car.

*Cont. Mrs. Mary C. Mc Lellan
543 Water St. Peterboro, N.H.*

*Science Service News Bulletin
467-8. 4/7/30*

Roland Chilton, consulting engineer, Paterson, N.J.

Arrow Safety Service Co., 302 Union St., Paterson, N.J.

*licensed manufacturer - do not have name of inventor
Candlen
1117 N. 4th St.
Paterson*

Mr. Allen S. Burgeff,
2019 Eye St. N.W.

Washington, D.C.

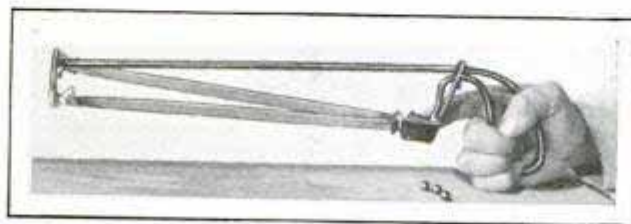
341

**POSTMEN'S SHOES
HELP FIND BEST
TANNING 504**

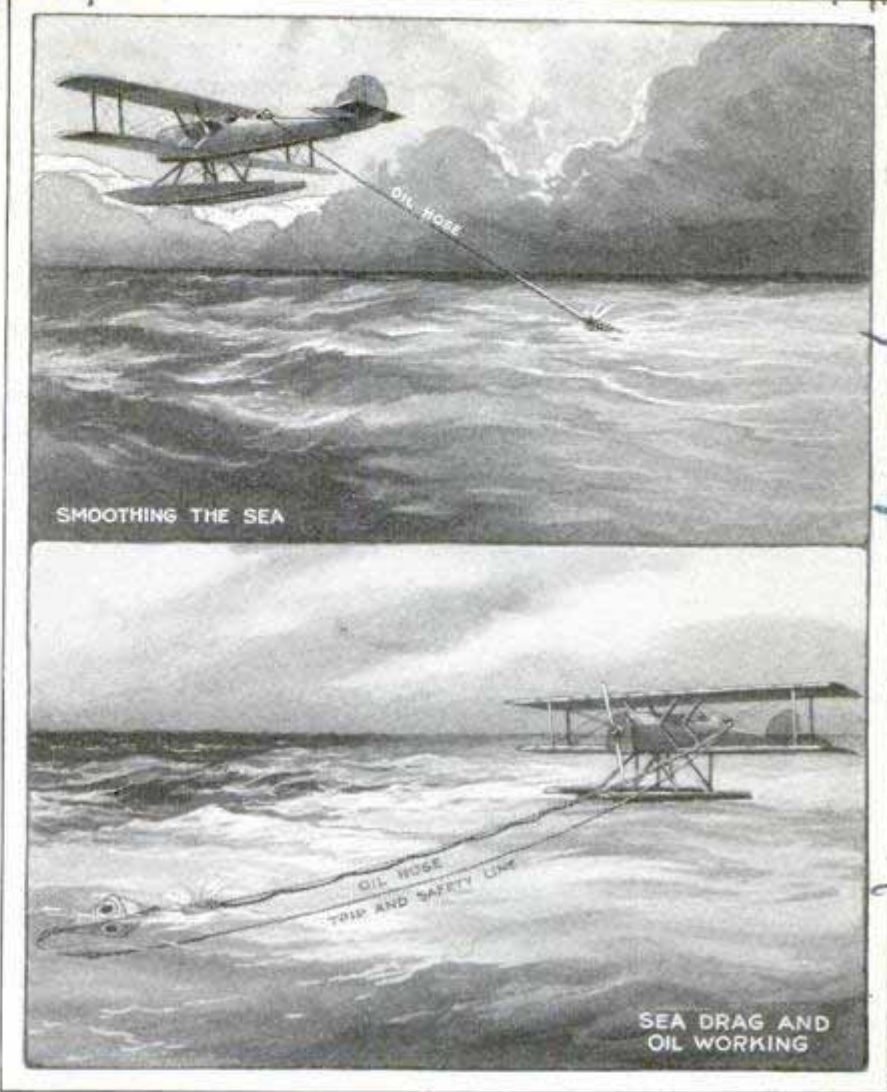
Washington postmen were pressed into service by the department of agriculture recently in making a scientific study of shoe leather to determine the best tanning process. Chemists desired to compare leather tanned by the vegetable process with that prepared by the chrome retan process, the latter combining chrome and vegetable tanning. Six first-quality hides were halved and mated soles cut from similar positions, the mates being tanned, one by each process, and put on the shoes of the letter carriers who daily recorded the wearing period in hours. The chrome sole was found to outlast the other, in some cases as much as eighty per cent, but in rainy weather this sole absorbed water and became slippery while the one tanned by the vegetable process did not. From the experiments the department hopes to determine the best tanning process to secure long wear in sole leather.

**SLINGSHOT PISTOL COMBINES
TWO TOYS FOR BOYS 240**

Two toys are combined in a slingshot pistol now on the market. Essentially it is a sling with a pistol grip, this and the "barrel" being made of heavy metal, while the ends of the rubber band are attached to the end of the barrel and the center to the trigger mechanism which releases the pellet when the pistol is "loaded."



Slingshot with Pistol Grip and Trigger to Release the Missiles from the Rubber Band



Above, Seaplane Spreading Oil on Rough Water before Landing; Below, Plane on Oil-Coated Water with Sea Anchor in Place

**OIL SPREADER FOR SEAPLANES
SMOOTHS ROUGH WATER**

To make possible safe landings of seaplanes in rough water, an oil spreader and automatic sea drag to serve as anchor now are being used. Before making a landing, the oil hose is dropped and oil is spread for about 200 feet. The ship then turns and lands on the oil-covered water. When landed, the sea anchor, in the form of an inverted cone, which fills with water, is run out, thus steadying the plane. The

anchor has a trip cord attachment for emptying it of water when it is to be pulled in. Little oil is needed, as it has been found that one drop spreads six feet.

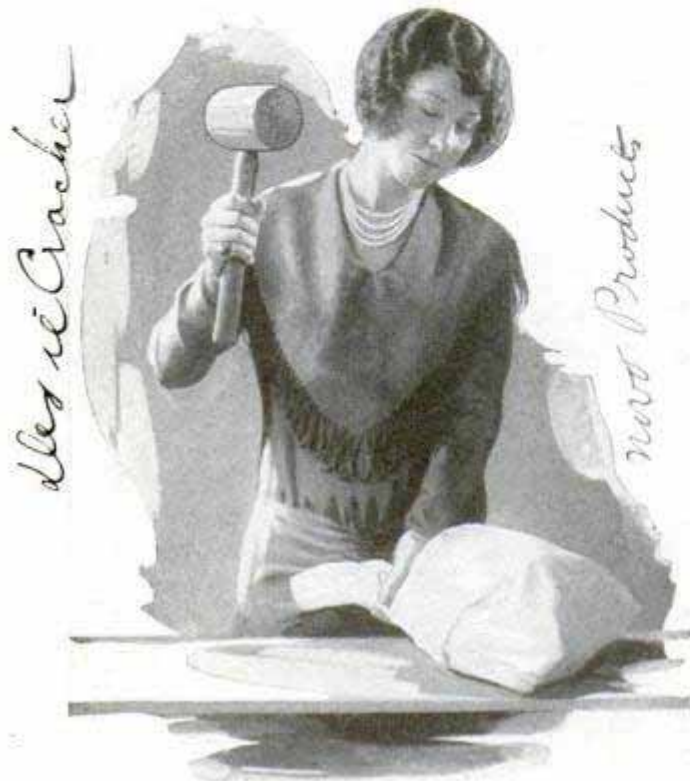
Mr. Harry W. Locking
Marine Hospital
N.Y.C.
Ellis Island

R. B. Specialty Co.
318 1/2 ...

Novelty Supply Co.,
Attn. S. Haggeth,
920

162 1270 Broadway, N.Y.C.
POPULAR MECHANICS
ICE-CRACKING SET FOR HOME
CONTAINS BAG AND MALLET

Cracking ice for home use, usually a task performed with makeshift tools, is made



Ice-cracker

Novelty Products

Ice-Cracking Set for Home, Consisting of Hardwood Mallet and Bag Made of Auto-Tire Fabric

easy with a set consisting of a hardwood mallet and a bag made of automobile-tire fabric. The bag is stronger than the duck material sometimes used for this purpose and is equipped with a holder by which it may be hung up to dry. It is nine and one-half by fifteen and one-half inches.

COIN RECEPTACLE OF RUBBER
UNINJURED BY WATER

Rubber coin purses containing slots for various sizes of coins are suitable for the bather because they may be taken into the water without damage and also may



be washed with soap and water. They are made from hollow pieces of strong rubber in which are punched holes the size of a dime. These holes stretch to fit any-size coin up to a

Donald Fairbairn
200 S. Algonquin St.

W. S. Wahlberg, formerly
U.S. Forest Service in
U.S. Dept. of Agric. publication
dollar, holding the metal in a firm grip, and returning to the original size when the coin is removed.

WEEDS KILLED BY CHEMICAL
501 TO PROTECT TREES

To kill weeds in seedling beds of evergreen trees at the Northern Rocky Mountain forest-experiment station at Missoula, Mont., a zinc-sulphate solution has been used effectively. It poisons the weeds at the roots but does not injure the sprouting trees, the tests have shown, and besides saving much time, the method eliminates the damage usually suffered by small trees in weeding by hand. One and one-eighth ounces of zinc sulphate, dissolved in a quart of water, are applied to every four square feet of seedbed soil. To counteract the acid effects of the chemical in the soil, it is sometimes necessary to apply lime. One other advantage of the treatment is that the zinc sulphate stimulates the growth of field peas which are planted after the tree seedlings have been removed and the ground plowed. The peas help to enrich the soil.

460-9
News Bulletin
Service
2/11/30

BATTERY, OIL AND GAS GAUGES
293 ARE SELF-CORRECTING

Enabling the motorist to keep constant check on his fuel, oil and battery solution, a trio of hydrostatic self-correcting gauges now are on the market. The gasoline level is given by a column of red liquid, oil readings are given in a yellow column, and the battery solution is shown in blue.



The battery gauge attaches to all three cells and shows the reading for the lowest. The gauges do away with the task of inspecting oil readings on a greasy rod or lifting up the floor to look at the battery, and are available in units or in combinations of two. An arrangement which automatically purges and clears the lines insures accurate readings.

Esabriel Snubbs Sales
Service Co., 15736
21st Cleveland Ohio

452 Mr. N. J. Wilkins Esq. 29 Bear Road, Berley Heath, nr. Lurgou, England

"S.O.S." Saves WHALERS

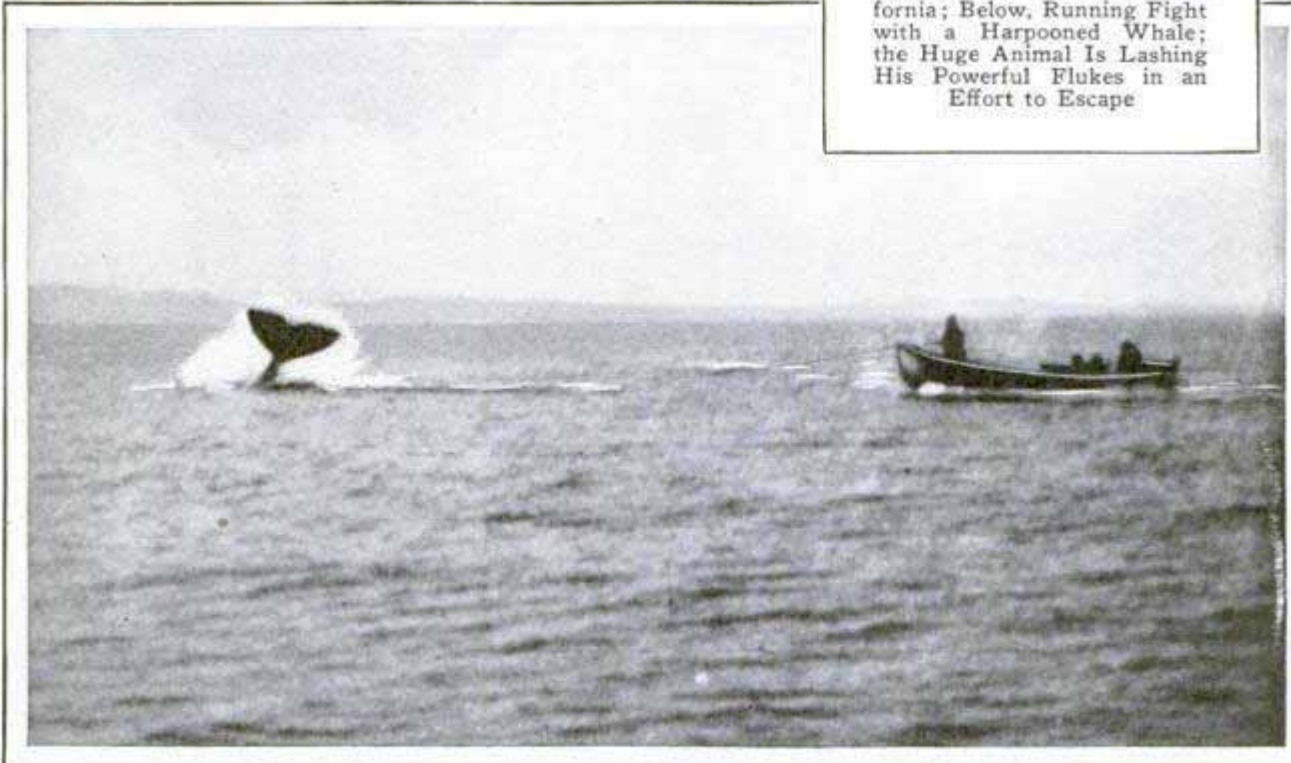
FAR south, on the edge of the icepack in the Ross sea, a few weeks ago, the radio operator, with ear-phones strapped to his head, was sitting in a cabin on a little steam whale catcher, when he caught the message:

"SOS, SOS, SOS. 'Southern Queen.' We've struck an iceberg. Can't last more than an hour. Call off catchers, and come to our help! Our position is ..."

The mother ship "Southern Queen" was about thirty miles away, a good two hours' steaming, and to make matters more difficult fog and ice mist soon covered the sea. A



Square-Rigged Type of Old-Time Whaler; This Photograph Was Taken through Porthole of Liner off California; Below, Running Fight with a Harpooned Whale; the Huge Animal Is Lashing His Powerful Flukes in an Effort to Escape

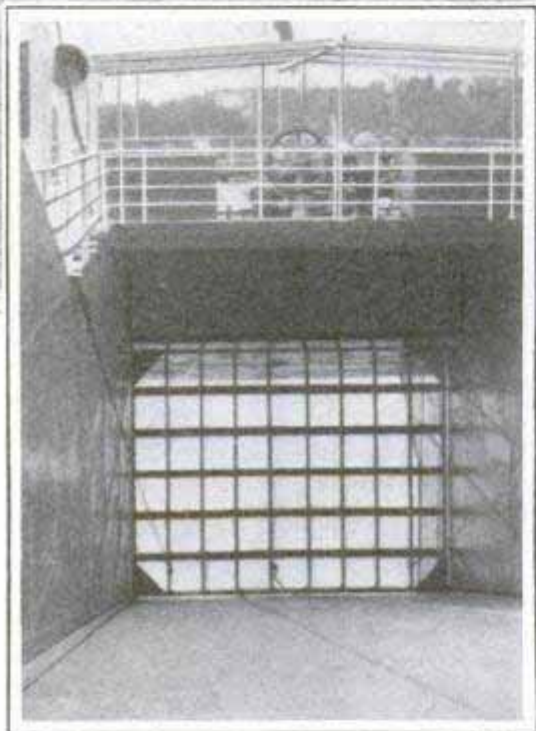
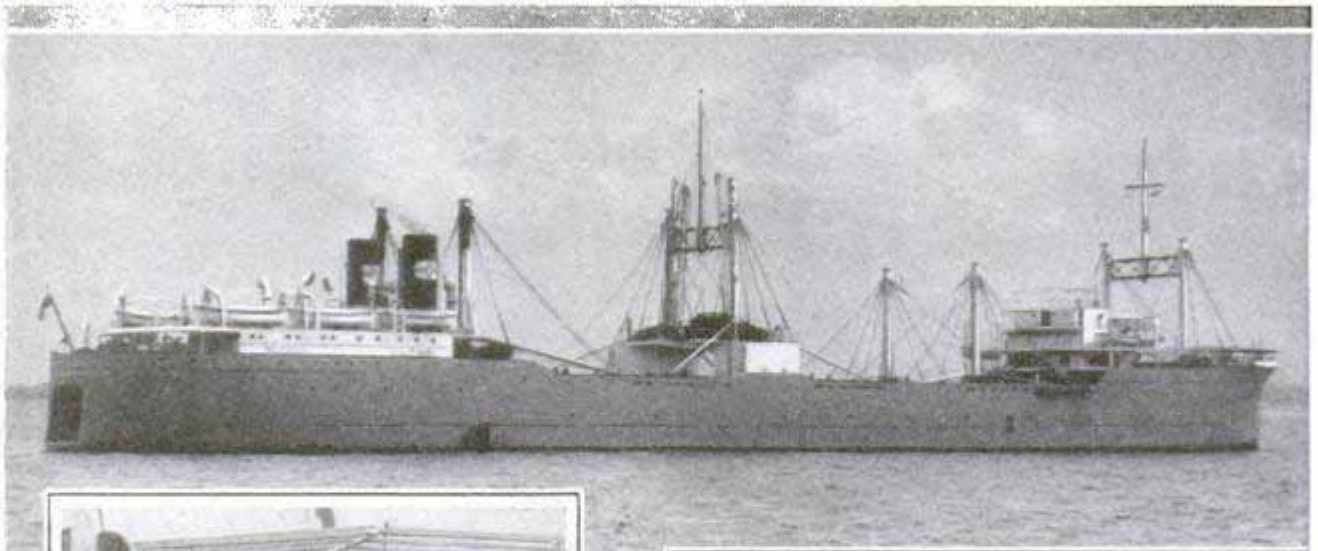


Top Photo © General Photographic Agency, Ltd.; Bottom, Courtesy Fox Film Corp.

little more than an hour later, the operator on the sinking steamer flashed a last

dramatic message: "Can't hold on longer. Decks nearly awash. Taking to lifeboats."

452-922



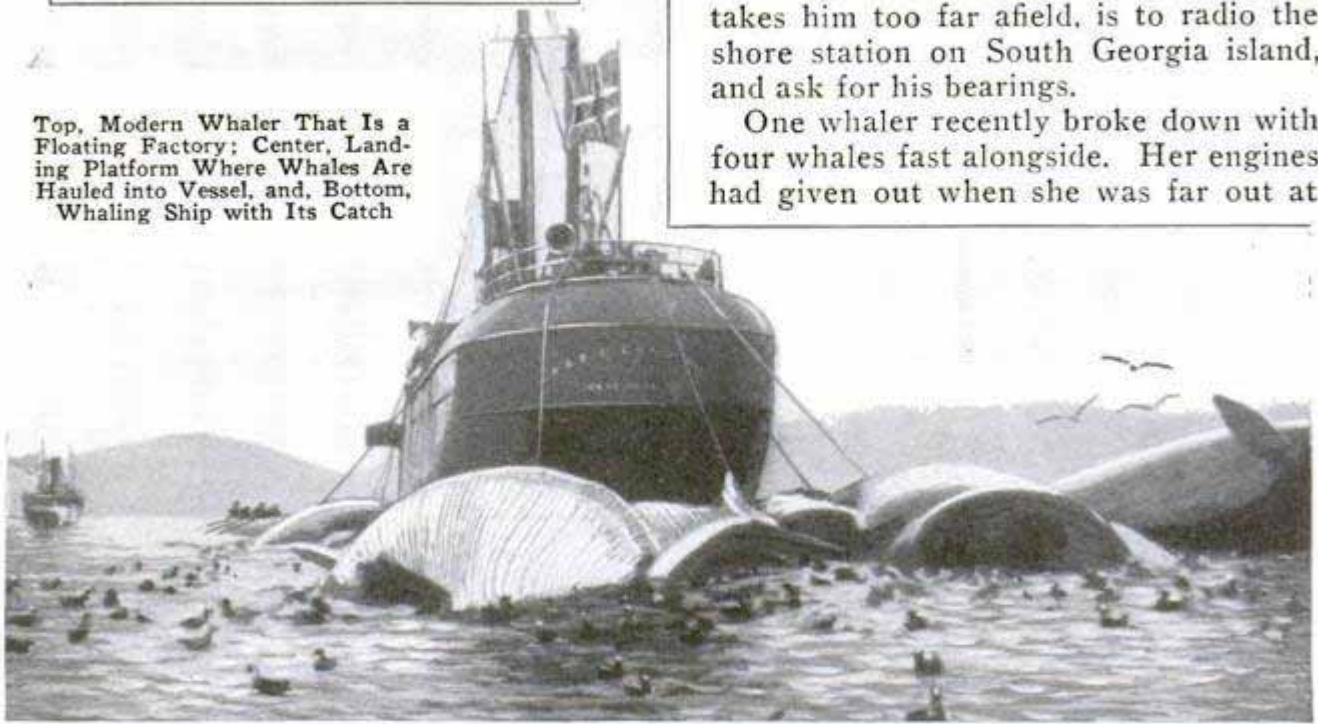
Fifteen minutes after the last bubbles had ceased to rise from the sunken steamer, the catchers had reached the spot and were picking up the survivors.

In 1930, the Marconi company began installing their new "Whaler Radio Telephone" with a wavelength of 600 meters in addition to the usual 300 meters. The alternative wavelength gives the operator a double line of communication with a range of from 250 to 300 miles under average weather conditions.

Before the radio compass came along, the gunner of a whale catcher would not run the risk of fog, since, when chasing a whale any distance from his base, he would lose his bearings. Today, all he need do, if the excitement of the hunt takes him too far afield, is to radio the shore station on South Georgia island, and ask for his bearings.

One whaler recently broke down with four whales fast alongside. Her engines had given out when she was far out at

Top, Modern Whaler That Is a Floating Factory; Center, Landing Platform Where Whales Are Hauled into Vessel, and, Bottom, Whaling Ship with Its Catch



405 Schless - Deynes,
Schlessdorf
Schless. Juch 89

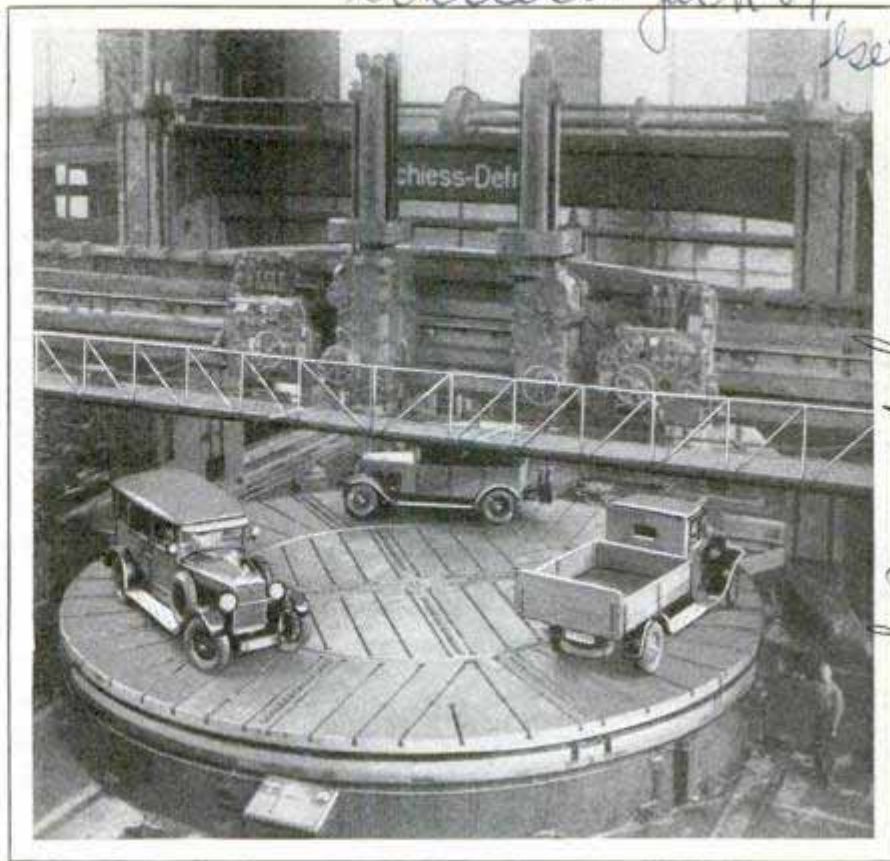
Germany

sea. The gunner spoke through the radio phone to another whaler, which at once went to her aid, and towed ship and whales to land, saving many thousands of dollars to crew and company.

A steam trawler, going home from Greenland to undergo her triennial survey by Lloyd's shipping corporation of London, crashed into an iceberg in thick fog. In a few minutes, the damaged ship was speaking to a sister ship, which came up and stood by her as a precaution. She managed to raise steam in her boilers, but was accompanied across the Atlantic by the consort.

Now operating on the whale herds in the Ross sea is the giant "Kosmos," a whale ship which has actually only 500 tons less displacement than the Cunard liner "Mauretania." She is the last word in scientific machinery. Radio and airplanes aid her to spot and capture the whales, while whale shooters go out in seven boats. She has a crew of 200 to catch and prepare the killed monsters. The inflated carcasses are drawn aboard to the floating factories through big portholes or a great landing stage at the stern.

The most valuable man, on the modern whaler, next to the navigator, is the gunner. He can earn a salary of \$25,000 in an average season, and as much as \$50,000 in a good one. "A good whale shooter is worth his weight in gold," said one of the biggest Norwegian whaling fleet owners. "We can't do without him even in this day of airplanes and radio."



© P. & A.

Largest Boring Mill, Recently Completed in Germany; It Is Eighty Feet in Diameter and Weighs Seventy-Five Tons

No U. S. Agent known

WORLD'S LARGEST BORING MILL EIGHTY FEET IN DIAMETER

Germany has recently completed the largest boring mill in the world. It has a diameter of eighty feet and its total weight is more than seventy-five tons.

HOUSE RESEMBLING AIRPLANE MOVED ON "LANDING GEAR"

Planned to carry out the owner's conception of what an air cottage of the future may look like,



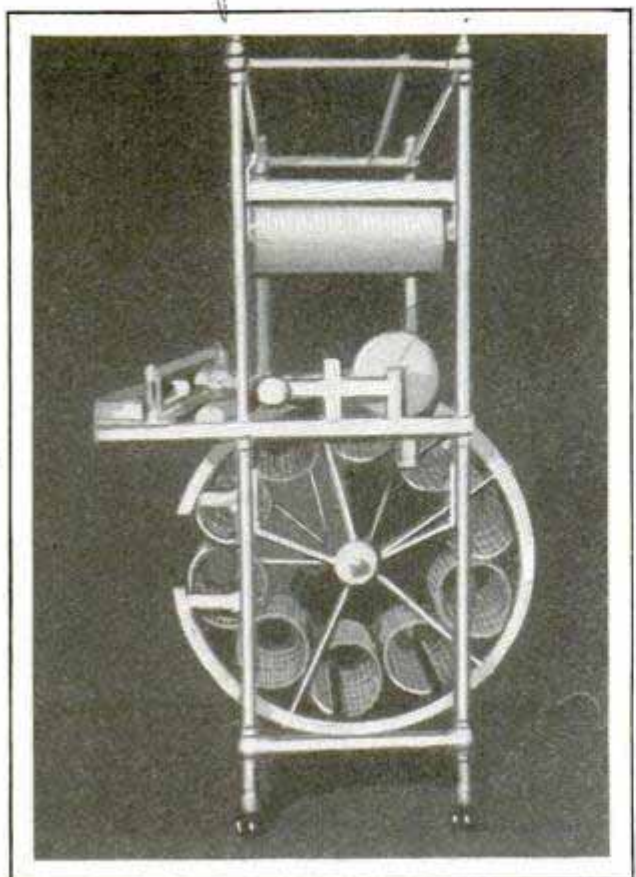
Summer Home Resembling an Airplane, Mounted on Substantial Wheels so It May Be Moved Easily

one man has built a summer home resembling the fuselage of an airplane. The house, which looks like a big passenger ship, is mounted on substantial wheels, thus making it portable. The interior is spacious and provides plenty of room for living and sleeping.

Messrs Workman Clark (1928) Ltd
Cnr George J. Paul
Car 809, 537 & Harbour

2817
924

Wm. William Roycraft
Superior POPULAR MECHANICS
Bureau of Biological Survey



Wire-Screen Dispenser Which Measures, Rolls, Cuts and Wraps Screening at the Turn of a Crank

WIRE SCREEN CUT AND ROLLED BY AUTOMATIC DISPENSER

Particularly adapted to the needs of the hardware store, an automatic wire-screen dispenser, which measures, rolls, cuts and wraps screening up to thirty-six inches in width and in any desired length, recently has been made. It consists of a revolving cylinder within a metal framework. Ten cylindrical holders for screen of varying width are contained in the revolving piece. The cylinder is turned until the bolt rests beneath the measuring instrument, a handle securing the cylinder while the screening is drawn through the measuring apparatus, then through a cutting blade, and placed between double rollers along with wrapping paper. The screen and paper are wound around one of the rollers by means of a handle.

ALLIGATORS HAVE ODD DIET AND ARE FRIENDS TO FISH

Although alligators devour some kinds of fish, they are friends to other species, for they prey on the garfish, a fresh-water variety that is destructive to kinds used by man for food. Department of agri-

culture scientists recently examined the stomachs of 157 alligators and discovered among the contents, pebbles, large stones, cinders, coal, burned wood, feathers and even the metal caps of shotgun shells that the reptiles had swallowed along with their food. Alligators eat many kinds of insects, snakes, crabs, turtles, ducks and other birds besides larger animals, such as muskrats and minks, and are particularly fond of crawfish. This tendency is an aid to the farmer in the region where the alligators are found, for the crawfish are burrowing pests. Although the reptiles have been known to eat dogs and pigs and will attack men when cornered, they are usually afraid of human beings, and the scientists state that they are not seriously destructive to useful forms of wild life.

282 HOOKLESS SPECTACLES EASE PRESSURE ON EARS

Spectacle bows terminating in a loop instead of a hook to hold the glasses in position now are on the market. The straight part is held firmly by slight tension against the head. The loop completely encircles the small protrusion or "bump" on the occipital bone of the skull just behind the top of the ear, the forward end of the loop being curved to fit into the slight depression in the contour above the ear. The bump and the depression thus are utilized to hold the glasses in position without undue pressure on head or ears.



Spectacles Held in Position by Loop at End of Bows Which Fits Depression in Skull

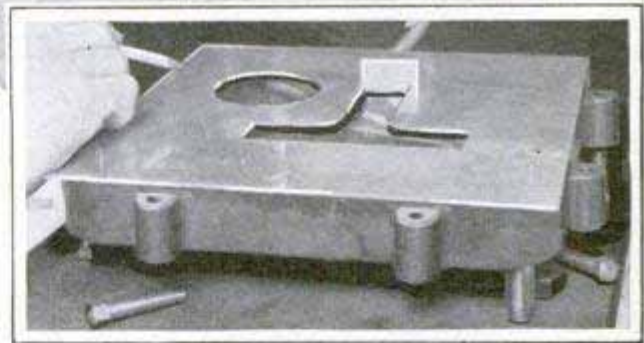
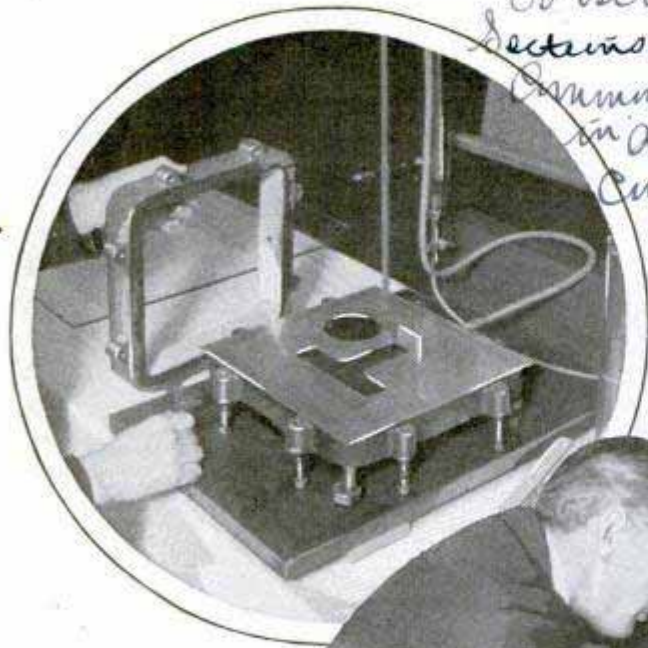
Wm. A. C. Meester 107 S. 22nd Ave. Phila

613

Cont. John C. Benhart
944 Broadway St. Los Angeles Calif

J & P Optical
30 d Irving Place

BLOWING BUBBLES HELPS BUILD STRONGER PLANES



Bubble Outfit; George W. Trayer Adjusting Glass over Chamber, and Close View of Openings from Which Bubbles Arise

To measure the strength of various airplane parts under twisting strains, engineers at the United States Forest Products laboratory at Madison, Wis., have been blowing bubbles. The method saves time and expense and solves problems that cannot be worked by mathematics. The bubbles are blown in a special glass-covered chamber from openings in a sheet of aluminum. The apertures shape the film to resemble the form of the part that is to be studied. A map is made of the bubble while it is under the glass and its volume is computed. By comparing this with the volume of a circular bubble, blown under the same pressure, and with the strength of a cylindrical member, a factor that can easily be figured, the strength of the odd-shaped member, represented by the special bubble, is quickly estimated. This saves building models of the parts that are to be tested and the method applies to parts of almost any shape and of all materials. The bubbles are prepared from a special chemical and are exceedingly tough. Some of them have lasted as long as twenty-four hours under the glass cover. Care is taken not to inflate them too far and to have the air pressure uniform under both bubbles, the

special one and the circular one with which the other is compared.

NAILS CUT BY ELECTRIC SAW WITHOUT DULLING EDGE 502

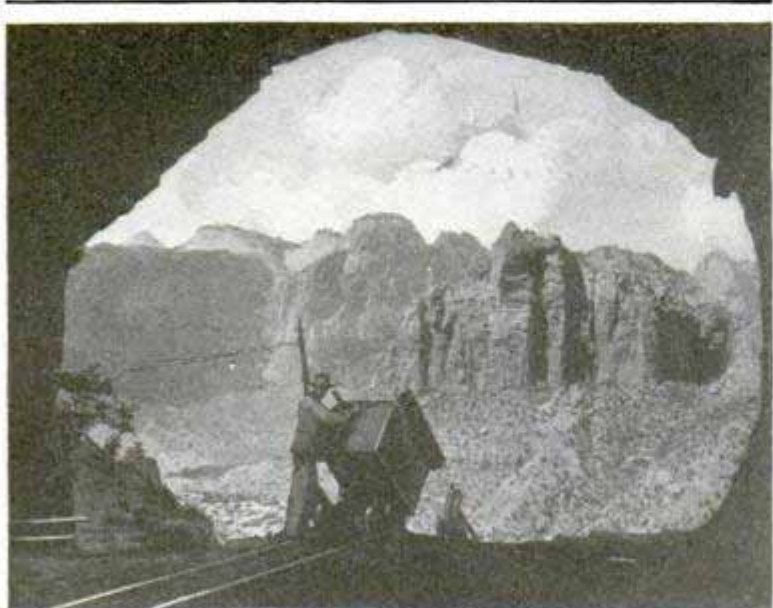
Cutting steel of a character hitherto unknown is contained in an electric-hand-saw blade capable of cutting through nails encountered in wood without dulling the edge. The blade is given a recently developed heat treatment to enable it to retain its cutting edge. It has been found particularly useful for cutting and salvaging old lumber, and for opening boxes.

Skilsaw Inc. 3310
Elm St. Chicago

*Little
forming member hanging
Sections
Common
in aircraft
Construction*

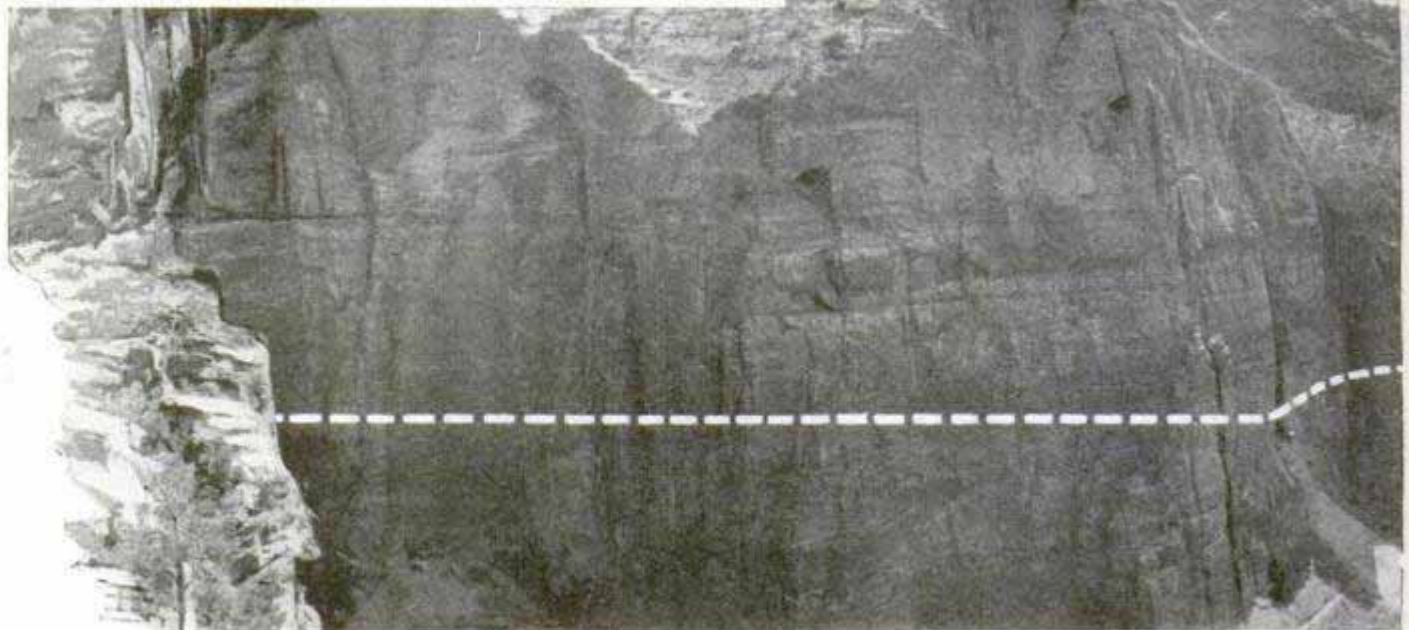
*Experiment described in National Advisory Committee
for Aeronautics report No 534, by George W. Trayer
and H.W. March. 280 cub. inch. instrument printing*

4 5 **NEW MOUNTAIN HIGHWAY HAS MILE-LONG TUNNEL**



A NEW automobile highway which, in spectacular features, ranks with any in the world, has been opened between Zion National park and Mount Carmel in southern Utah. Its outstanding feature is a two-way illuminated tunnel a mile and an eighth in length, the longest non-urban highway tunnel in the United States. There are five galleries in the sides of the tunnel at which one may stop in an automobile and look out on the colorful formations of Zion National park. To bring the highway up to the west portal of this elevated tunnel it was necessary to construct six switchbacks, or to build nearly four miles of road to cover the airline distance of less than a mile.

All through the building of this highway there has been a touch of the dramatic. When the engineers had determined that it was impractical to start the tun-

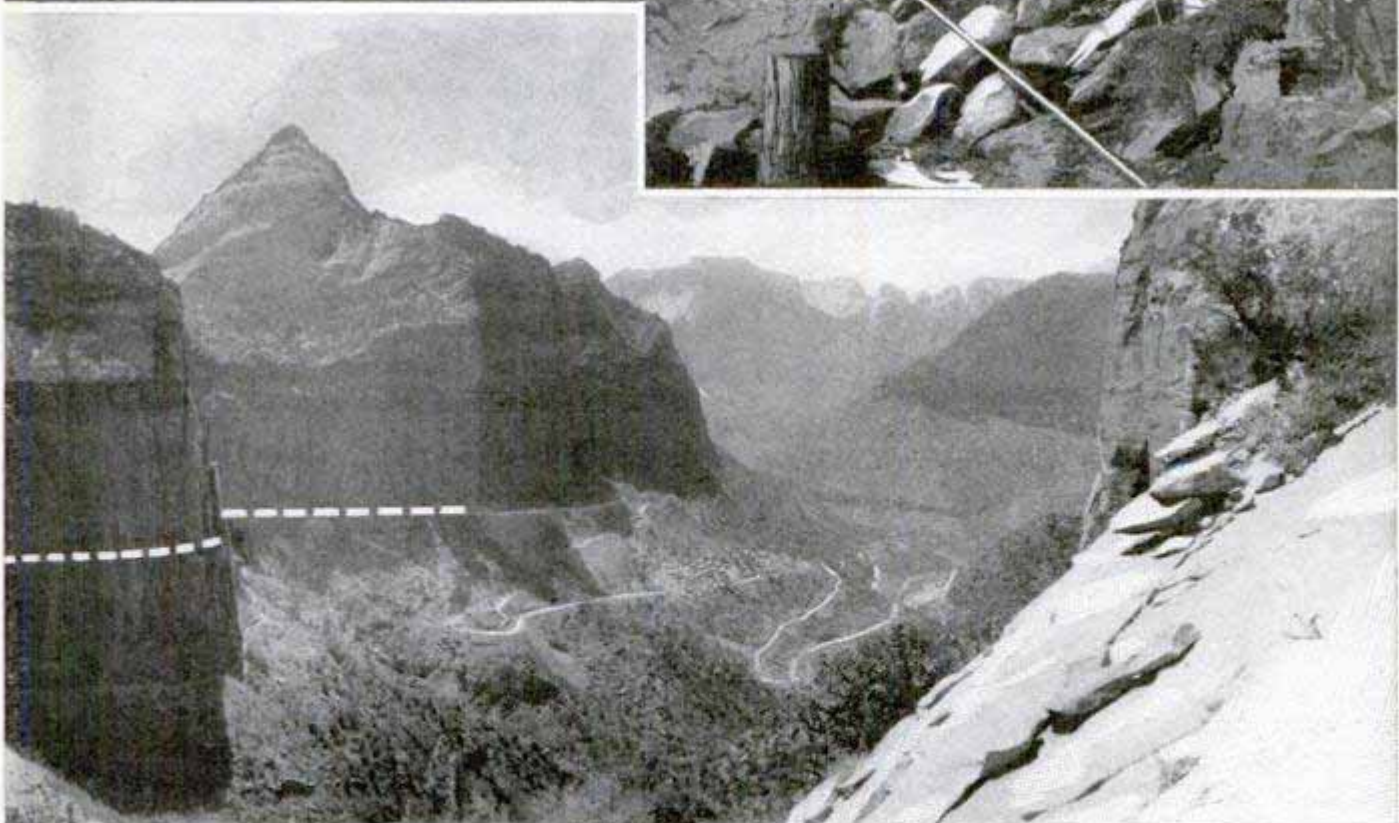
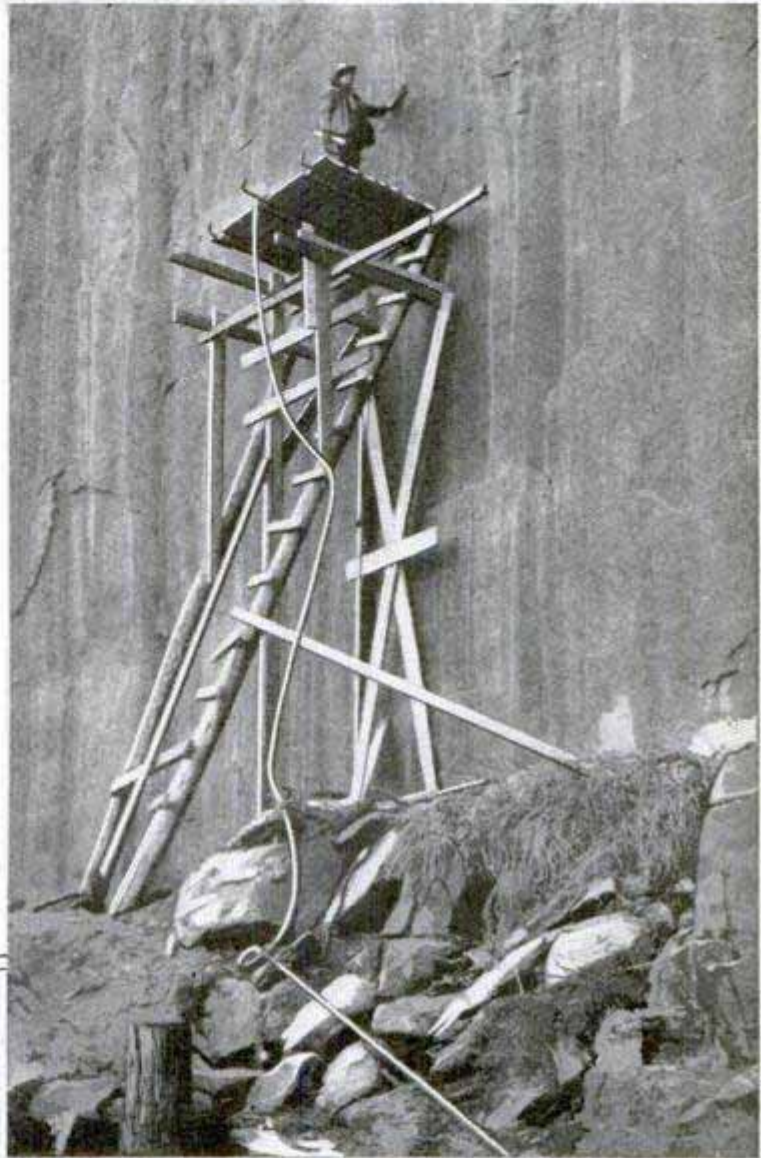


Skyline along the Zion National Park as Seen from One of the Gallery Openings; West Portal of the Zion Mount Carmel Highway Tunnel, and Dotted Line Indicating the Tunnel's Course

WITH FIVE GALLERIES TO GIVE VIEW OF ZION PARK

nel from either end, they did the next best thing. They spotted a point on the face of the cliff where it was practical to erect a scaffold and began boring. A small tunnel was first bored and then this was enlarged by the process known as "ring blasting," that is, holes were drilled in circles around the original bore and dynamite was placed within them and more rock torn away. If these sections could have been taken out whole, they would have resembled huge stone doughnuts. The bridges and masonry walls along the highway have been planned to harmonize with the surrounding country. The masonry is of the same color, in fact is the selfsame rock, as the cliffs themselves, and the bridges employ a rustic design that enhances the natural beauty about them.

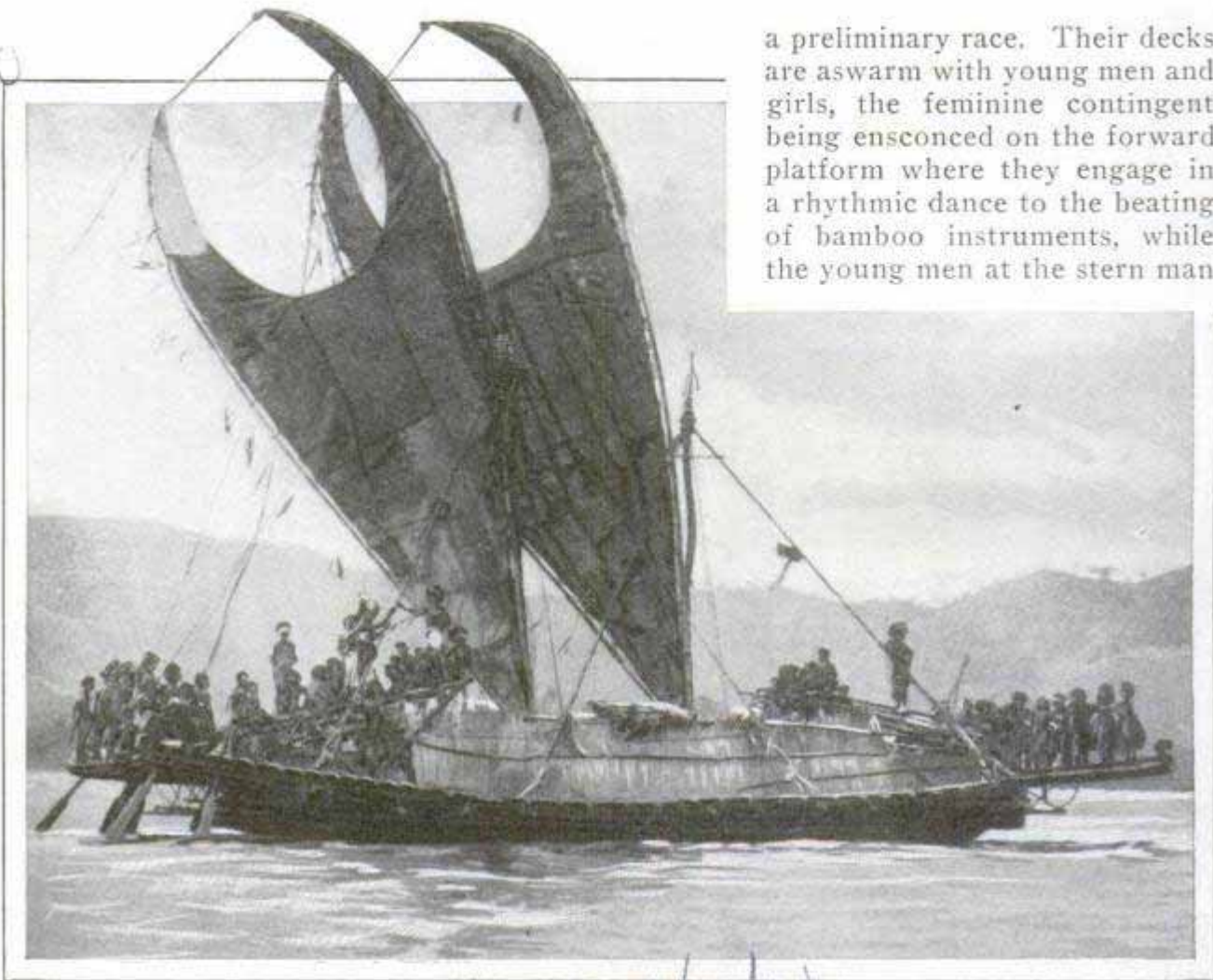
The new highway provides shorter schedules between the national parks in this part of Utah.



The Tunnel Is a Two-Way Passage, a Mile and One-Eighth Long, and, as Shown, Penetrates the Canyon Side; Above Is One of the Scaffolds Erected for Cutting Out a Gallery or Opening for the Tunnel

THE WORLD'S MOST EXTRAORDINARY "YACHT RACE"

a preliminary race. Their decks are aswarm with young men and girls, the feminine contingent being ensconced on the forward platform where they engage in a rhythmic dance to the beating of bamboo instruments, while the young men at the stern man



Courtesy The Illustrated London News

P. 235, 2/15/38
Native Sailing Craft of a New Guinea Tribe Participating in World's Queerest "Yacht Race"; Note the Crab-Claw Sails and the Dancing Girls on the Platform beyond the Bows

Cumbersome and unwieldy native sailing craft of the Motu tribe near Port Moresby, New Guinea, engage annually in what is probably the world's most extraordinary "yacht race"—a contest of speed among these boats with their crab-claw sails as a preliminary to an annual trading expedition. The boats, known as "lakatoi," are built amid many ceremonial rites and with the strict observance of superstitious customs handed down from past generations. When completed, the craft is composed of three or four huge dugouts lashed together to form a canoe raft. As there is no sailing against the wind, the ungainly craft often turns about crazily, and the stern half of the boat and its commander find themselves in the lead. In October, when these vessels are ready to set sail with loads of Papuan pottery, they engage in

the unwieldy steering gear. The queer crab-claw sails are decorated with leaf streamers representing the badges or banners of the various clans, and the contests sometimes last for several days.

536

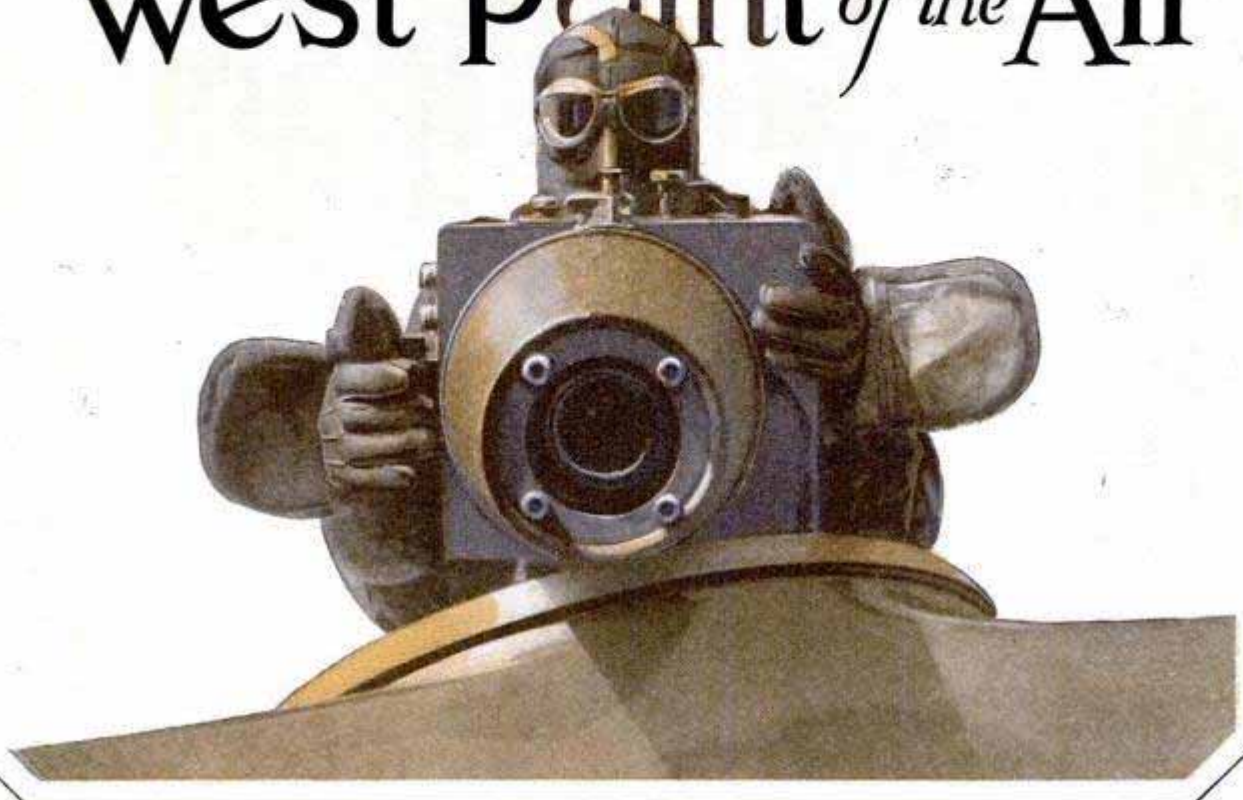
HOUSES WITHOUT MATCHES

Almost without realizing it, owners of modern homes find themselves no longer dependent on matches, and many such homes are operated without striking a single match from morning until night. In the up-to-date kitchen, the electric range goes on at the turn of a switch, or the gas stove is dependent on its pilot light. The gas or oil-burning furnace is lighted in the fall and requires no further attention, and electric lights appear at the touch of a button. Even the smoker has become independent of matches.

Illinois Committee on
Public Utility Information

news Bulletin # 570
3/17/30

The "West Point" of the Air



Equipped for Cold Weather and High-Altitude Flying, the Photographer Is Using a K-6 Camera in Position for Making Oblique Pictures from the Cockpit of a Speeding Plane

WHILE planes are flying over Kelly, Brooks and March fields, and cadets are winning their wings in the skies, two other important centers of the army air corps are training men for service in aviation. At Scott field, near Belleville, Ill., rise the huge hangar and the barracks of the balloon and airship school, and at Rantoul, not many miles to the north, Chanute field, the air-corps technical school, offers a dozen or more different courses in the field of mechanics, communication and photography, phases of flying that are becoming increasingly important with the development of new motors and the wider application of radio and the camera.

At Scott, primary training lasts about six months and includes various interesting ground-school subjects and flying training with free balloons, captive balloons and one-man controlled airships. In the advanced work of five months' duration, the student is graduated to two-man controlled craft, semi-rigid airships and larger units that may be available for instruction purposes.

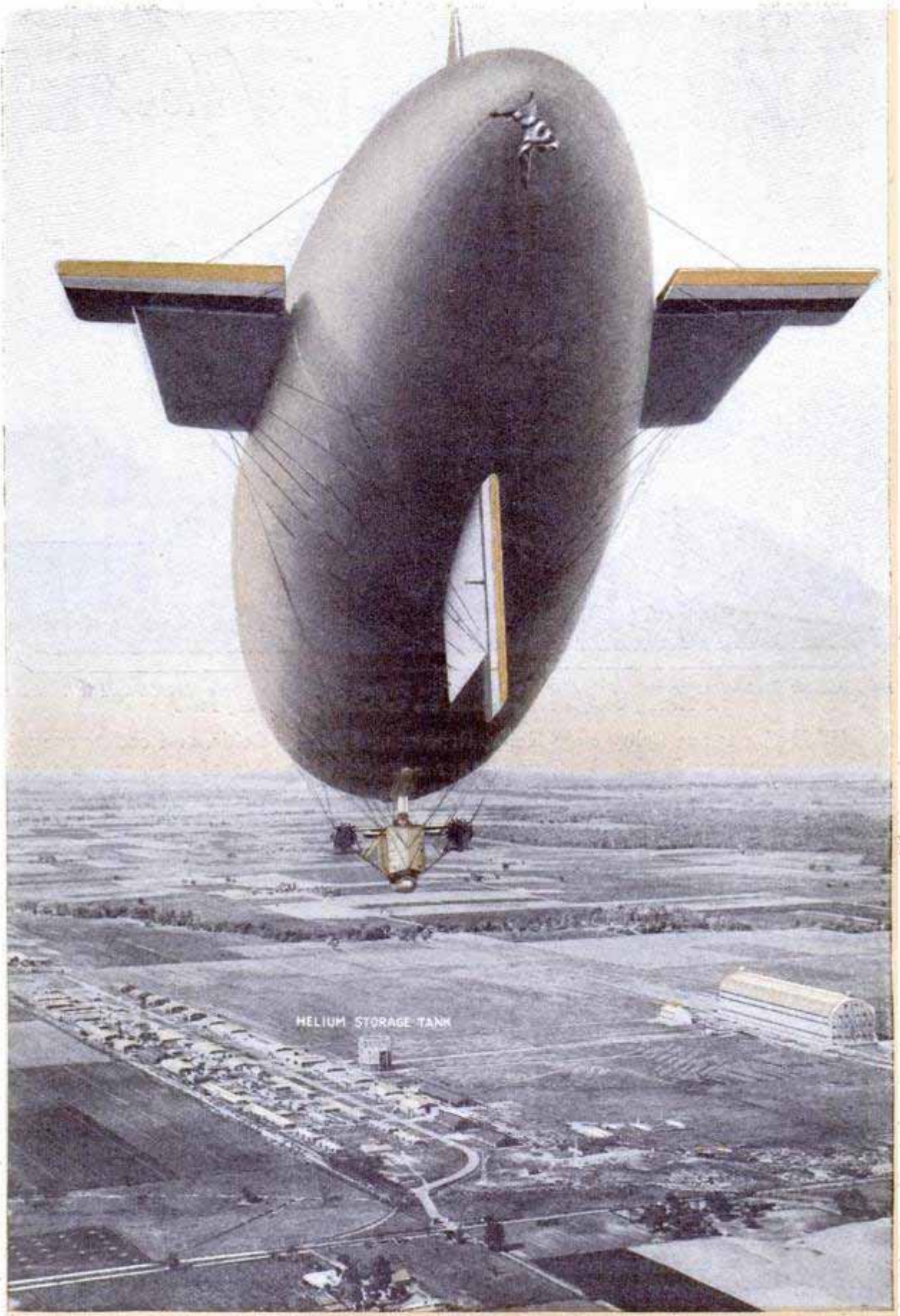
Chanute, named in honor of Octave Chanute, the famous pioneer glider and aviation trail blazer, has graduated more than 9,000 men since 1921. Enlisted men and officers, too, are students here, receiving thorough training in the various technical branches necessary for the operation and maintenance of an efficient air corps.

Men seeking admission to Chanute must have had four years of high-school work or its equivalent, and must be proficient in mathematics, as this subject is essential in almost every phase of the instruction here and, in the past, has proved the chief stumbling block to those not well prepared. It is also highly desirable that the applicant have an eagerness to follow some particular line of work in the courses offered, for initiative and willingness to study hard are highly commended and rewarded.

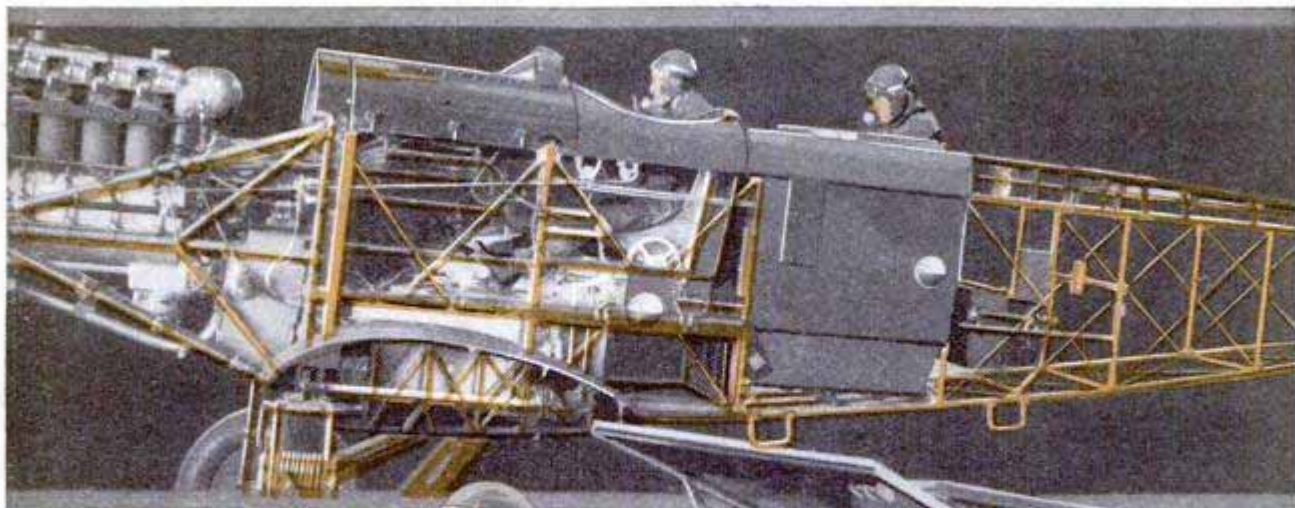
The air-corps technical school has been of great value to the country as a whole, as well as to the army, for scores of men who have entered commercial aviation received their training here under highly skilled army and civilian instructors.

(To Be Continued)

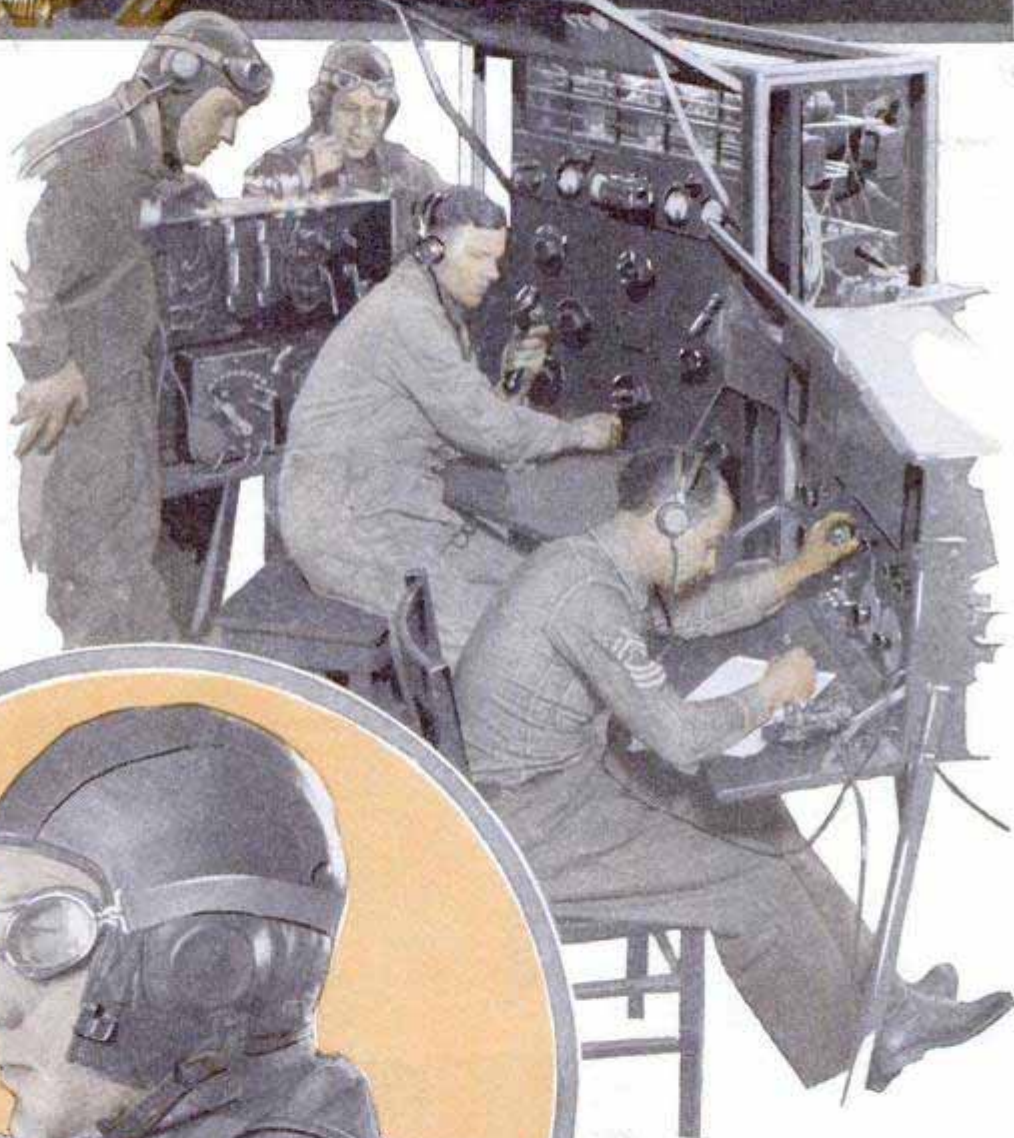
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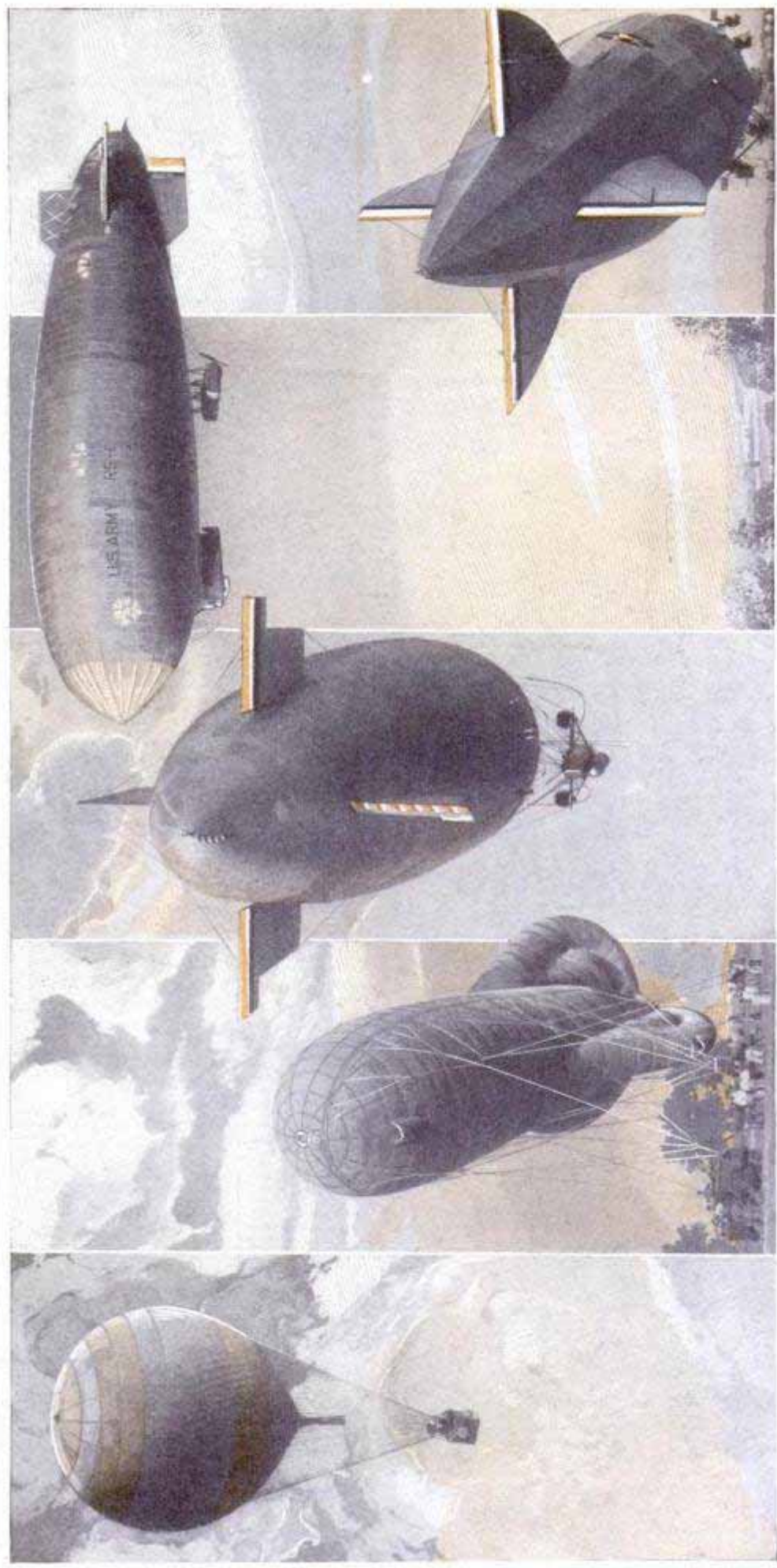
The Largest Non-Rigid Airship in the World Hovering over Scott Field; the Big Hangar Is Seen at the Right, and the Helium Tank Is Designated; This Is Connected to the Hangar by Pipes for Inflating the Big Bags of the Airships



In the Radio Schoolroom at Chanute Field are Skeleton Planes with Sending and Receiving Sets to Aid Students in Wireless Communication Work; the Generator for the Transmitter is Connected to the Airplane's Engine; at Right, Students in the Laboratory at the School Base Communicating with Ships Flying at Some Distance; the Transmitter is in the Center and the Receiver is at the Right



Student Wearing Radio Head-phones and Using Speaking Tube to Transmitter during a Flight; Besides Learning How to Repair and Install Sets, the Students Receive Valuable Instruction in Actual Radio Communication during Test Flights from the C-mp Base; Orders are Issued and Received through the Air, and Maneuvers Similar to Those That Would Be Necessary in War Time are Carried On by Radio Communication



FREE BALLOON

Scott Field Students Take Night and Day Trips in Balloons Until They Are Able to Maneuver the Bags Alone

CAPTIVE BALLOON

Captive Balloons Are Used Principally for Observation Purposes; Cables and Motor-truck Winches Control Them

NON-RIGID AIRSHIP

As the Name Suggests, This Type of Craft Has No Rigid Skeleton; It Consists Chiefly of Bag, Car and Two Motors

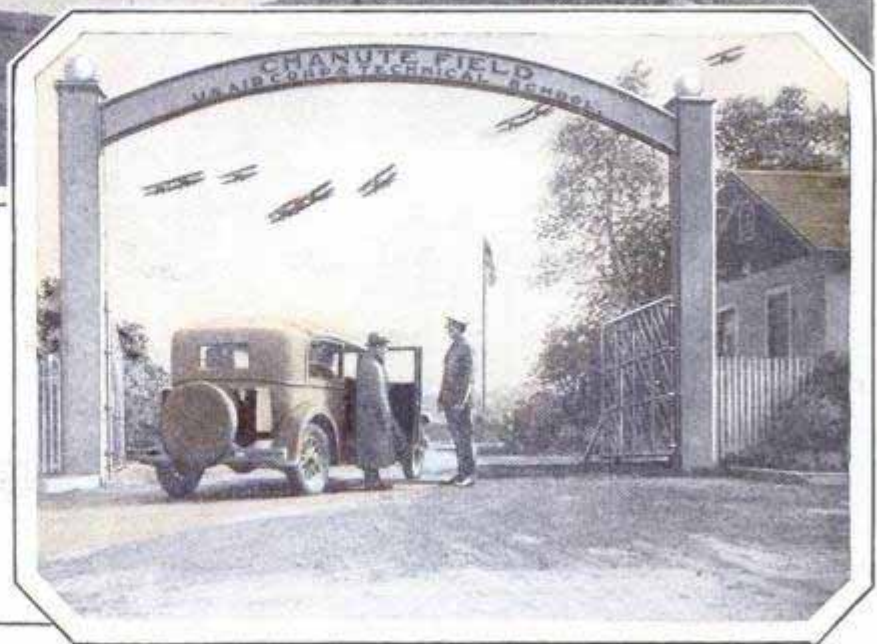
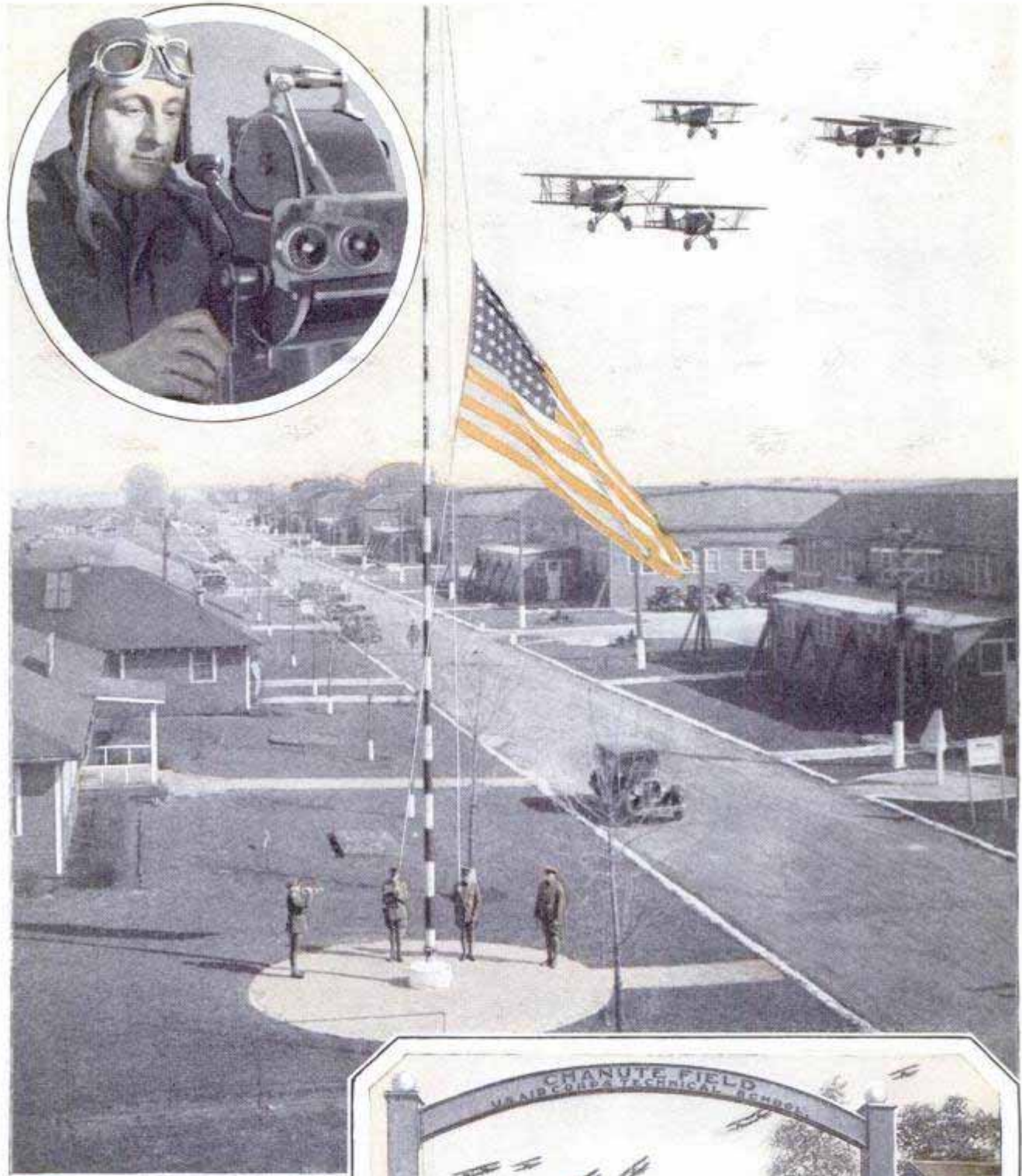
SEMI-RIGID AIRSHIP

Has a Framework on the Lower Portion of the Bag and Is Usually Much Larger Than the Non-Rigid Kind

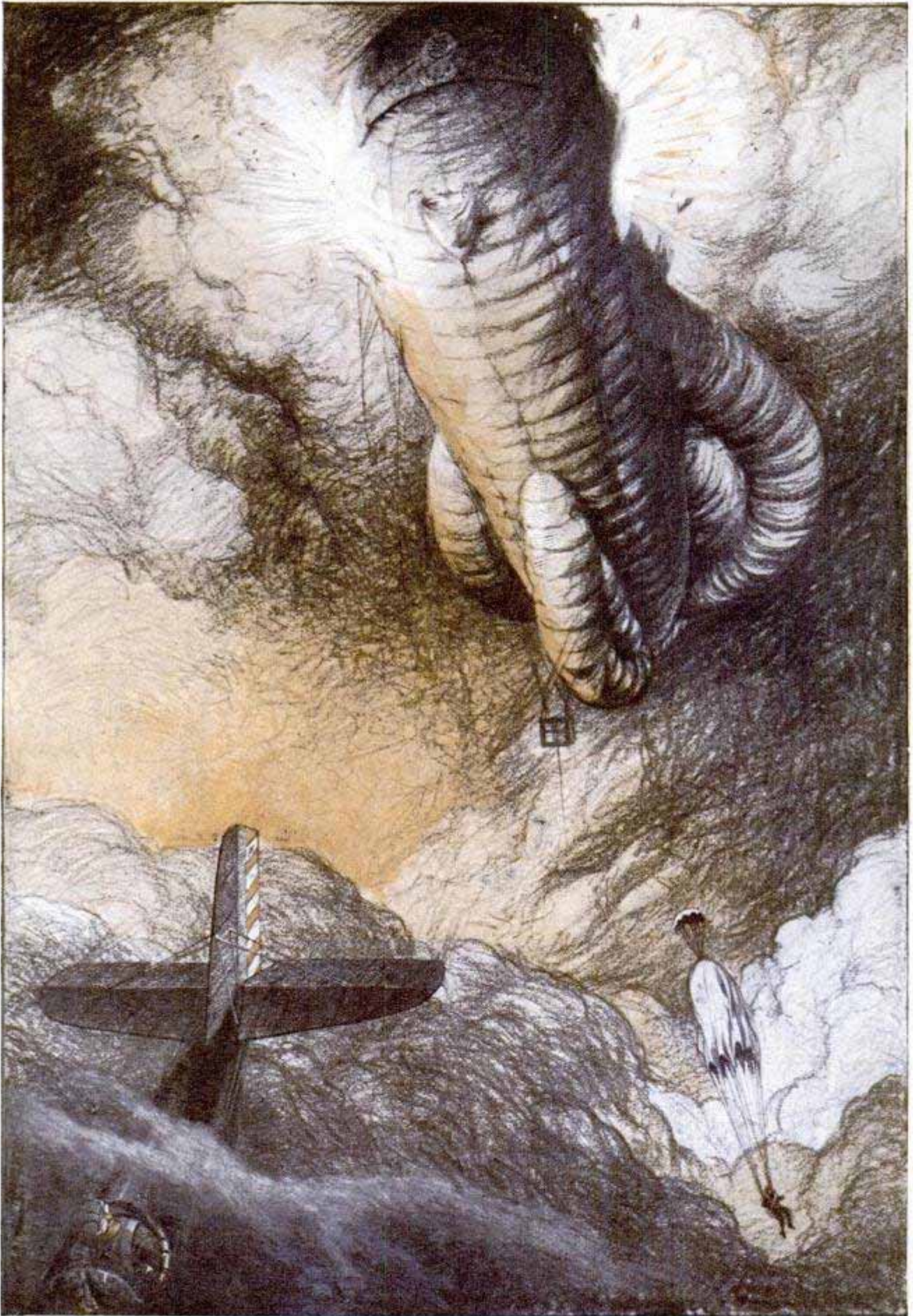
DIRIGIBLE

Has a Framework throughout the Bag; the "Graf Zeppelin" and the "Los Angeles" Are True Dirigibles

The Five Principal Kinds of Lighter-Than-Air Craft Illustrated and Described; Students at Scott Field Become Familiar with All of Them Before They Are Graduated and Learn Helpful Points in the History of the Craft from Balloons to Dirigibles

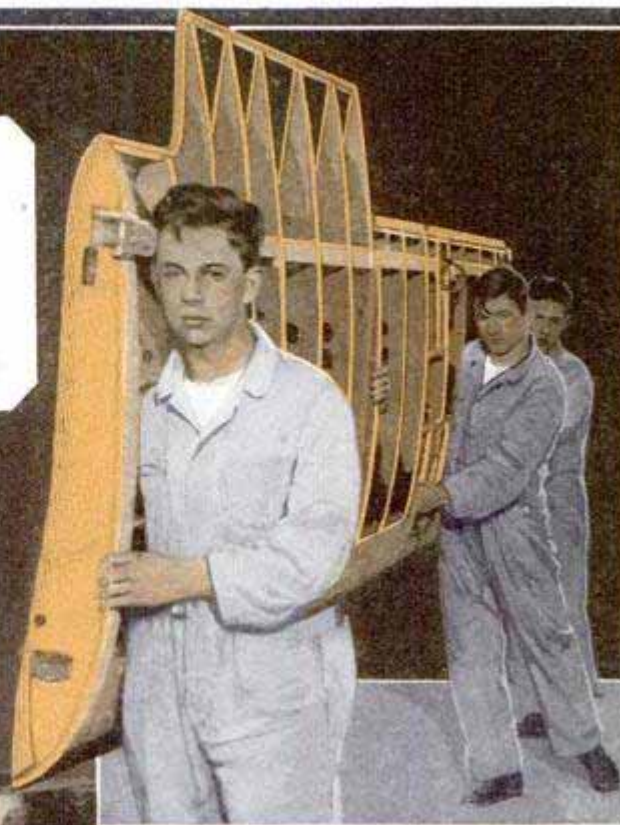


Inset, Chief of the Photography Division at Chanute Field; Center, General View of the Post from Headquarters Barracks, and, at Right, the Entrance to the Field; the Air-Corps Technical School Had Its Beginning in the Fall of 1917 at Kelly Field, Texas; It Boasted a Number of Tents, Hangars and Planes, but a Texas "Norther" Happened Along and Blew Them to the Four Winds; a Few Days Later, Two Steel Hangars Were Built

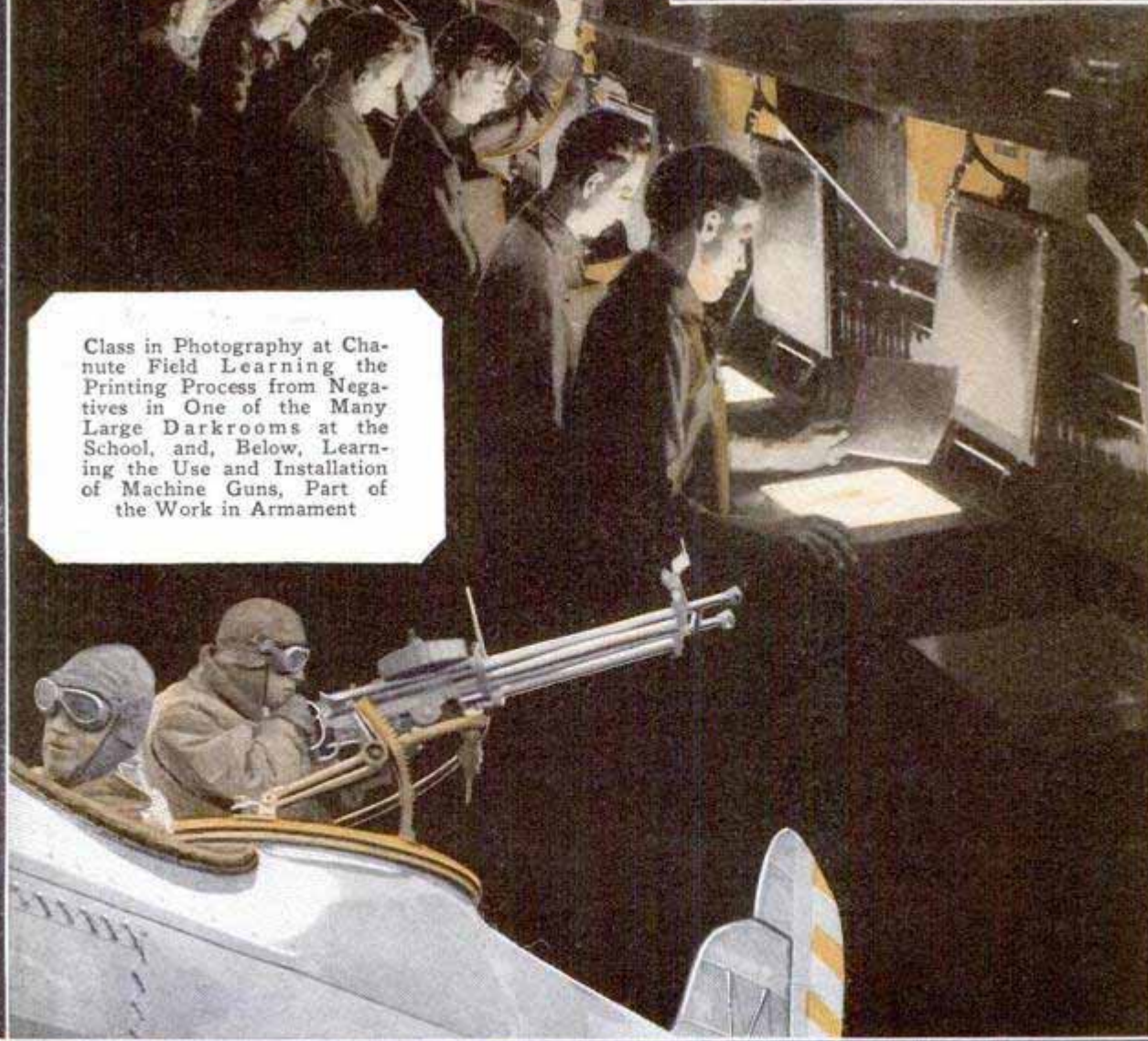


Artist's Drawing of Captive Balloon Exploding, and Observer, Who Had Been Stationed in the Suspended Car below the Bag, Escaping in His Parachute; Destruction of Such Balloons during the World War Furnished a Thrilling Chapter in Air Adventures

After Learning How to Assemble Wings and Airplanes, Test and Repair Engines and Do Many Other Important Tasks, Students Attending the Air-Corps Technical School at Chanute Are Better Able to Learn to Fly in Case They Choose to Study Further for a Pilot's Position.



Class in Photography at Chanute Field Learning the Printing Process from Negatives in One of the Many Large Darkrooms at the School, and, Below, Learning the Use and Installation of Machine Guns, Part of the Work in Armament.



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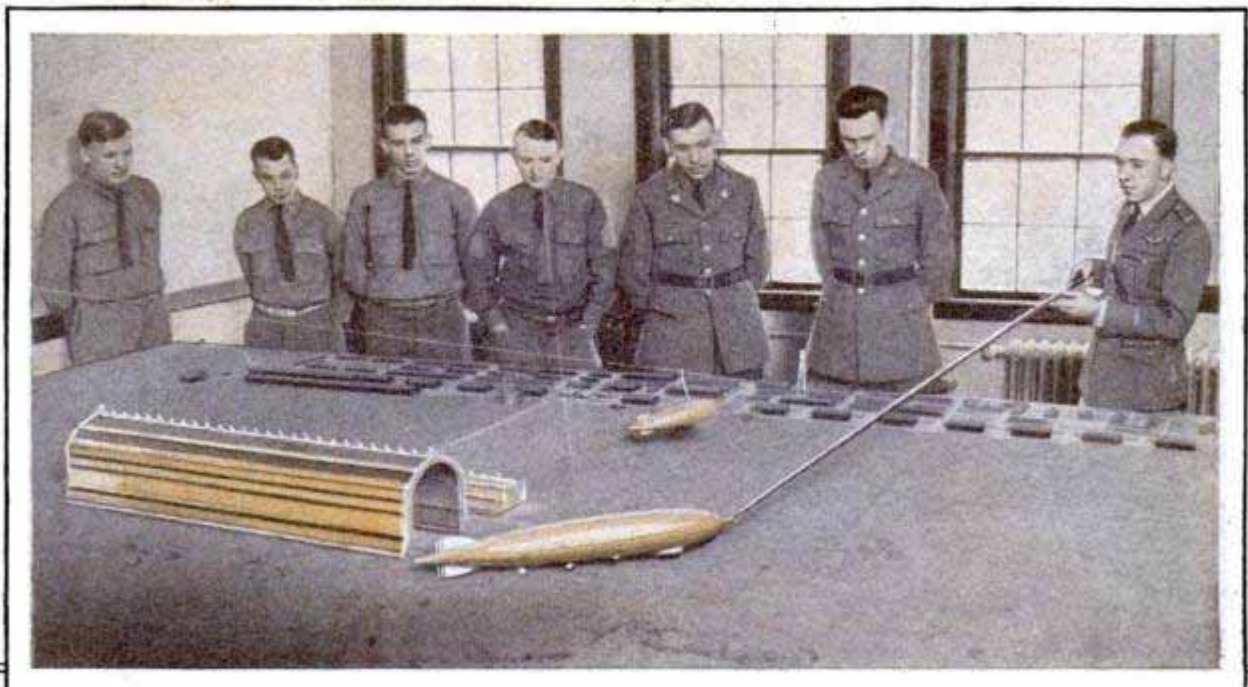


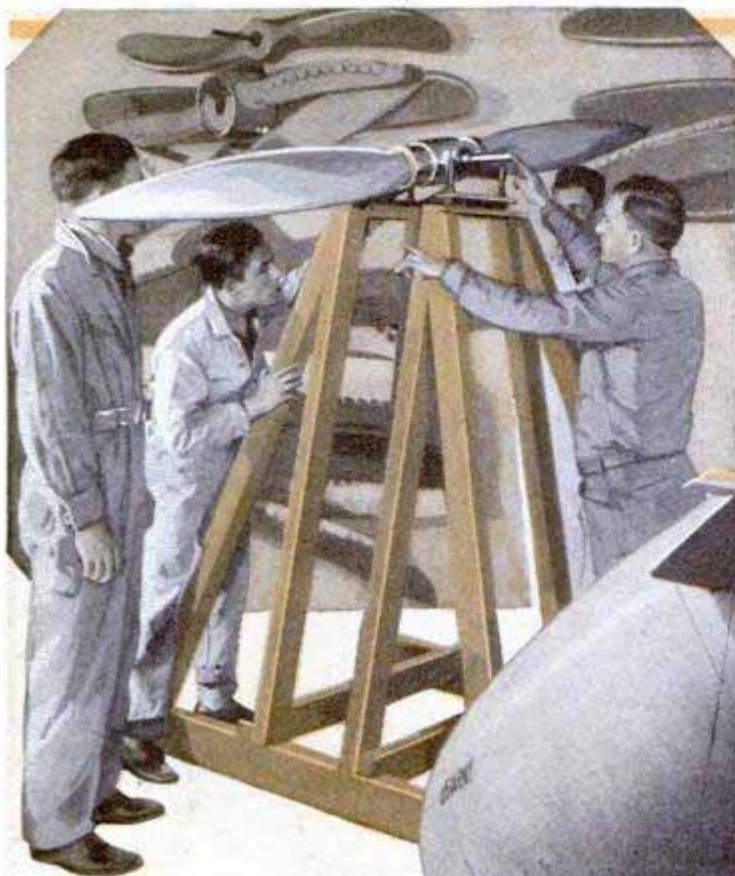
Navigation Class at Scott Field, Using Sextants to Tell Location and Time of Day by the Position of the Sun; This Is But One of the Important Phases of the Ground Work Given to Men Who Are Learning How to Operate Airships, and Extensive Training in "Avigation" Is Given during Actual Flights to Make the Future Pilots Familiar with the Behavior of Their Craft in Varying Wind Currents, and to Teach Them How to Arrive at a Destination in the Most Direct Way

Attack Plane Fully Armed with Machine Guns and Bombs; Gun Muzzles Are Seen on Hood and on Lower Wing

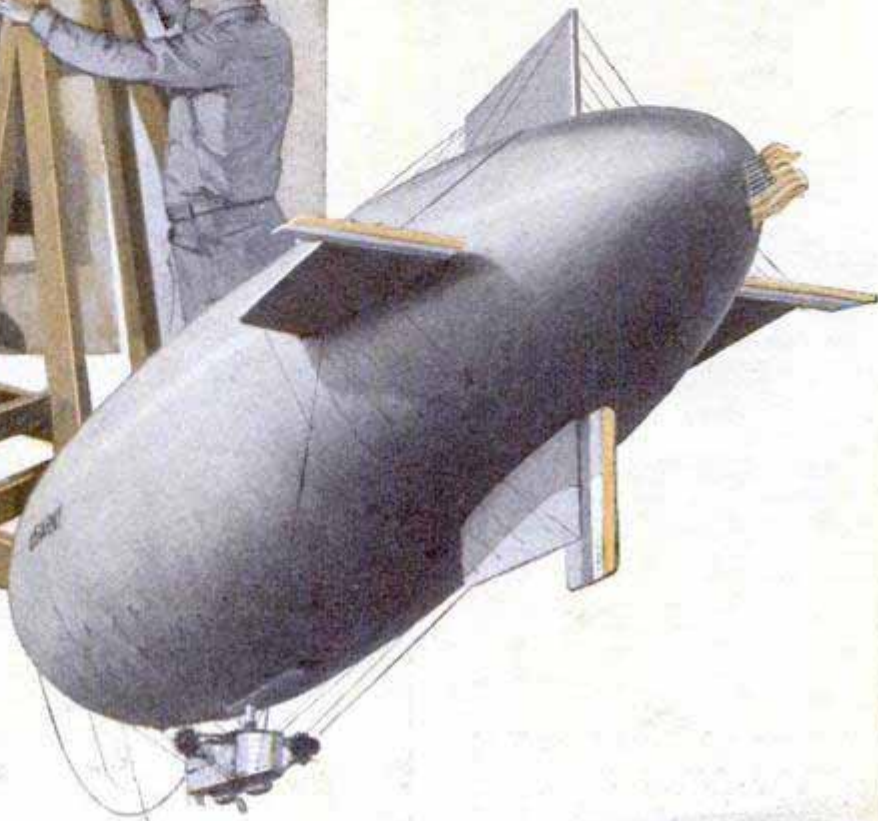


Learning How to Take Airship Out of Hangar by Using Small Models to Demonstrate; the Wind Is an Important Factor and Is Simulated in This Test by an Electric Fan

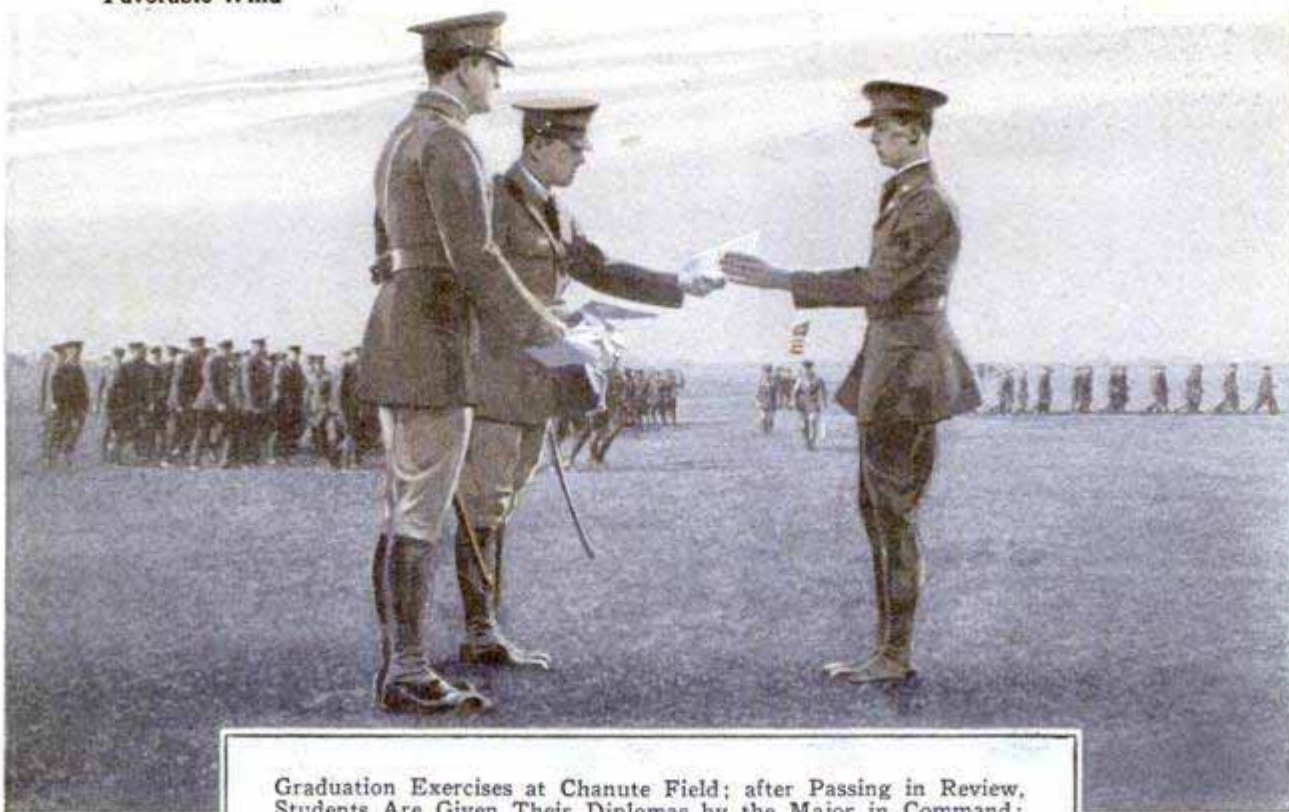




Checking Up the Balance of a Propeller at Chanute Field; in the Department of Mechanics at the Air-Corps Technical School Here, Thorough Instruction Is Given in Machine-Shop Practice, Welding, Airplane Wires, Woods and Covering as Well as Propellers and Airplane Construction and Repair



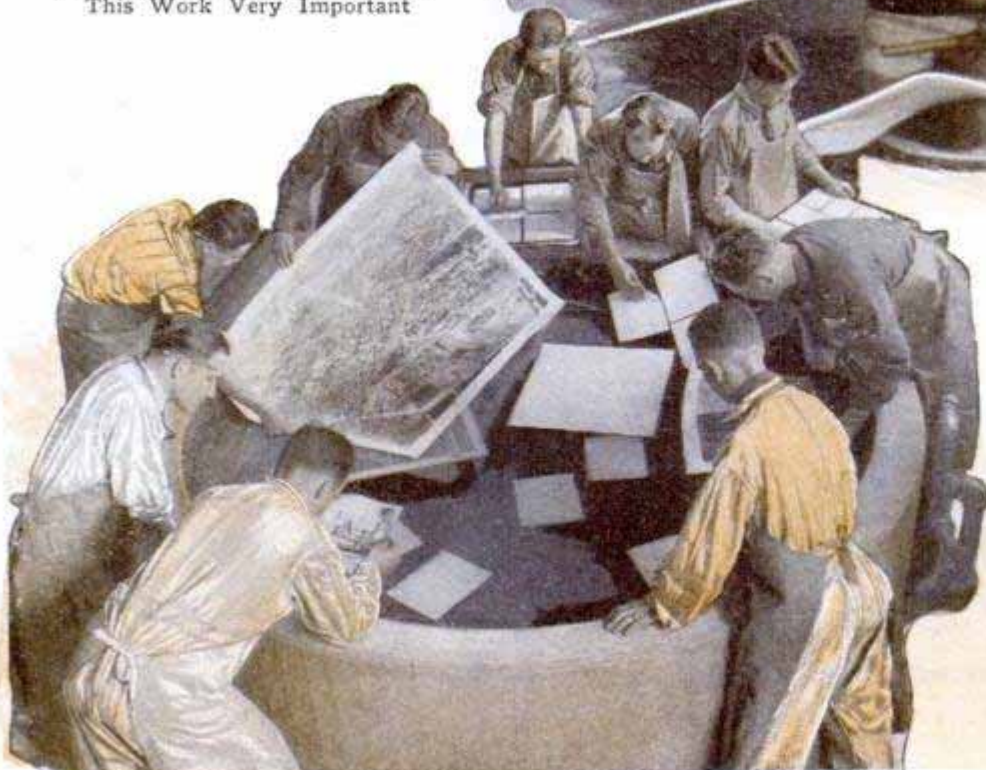
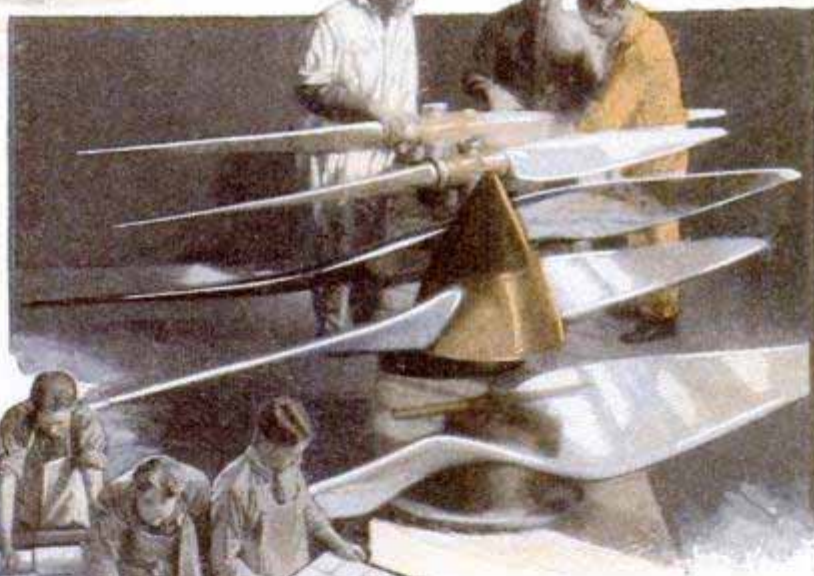
A Non-Rigid Airship Flying over Scott Field; This Ship Has a Closed Cabin and Can Attain a Speed of Fifty-Five Miles an Hour; More with a Favorable Wind



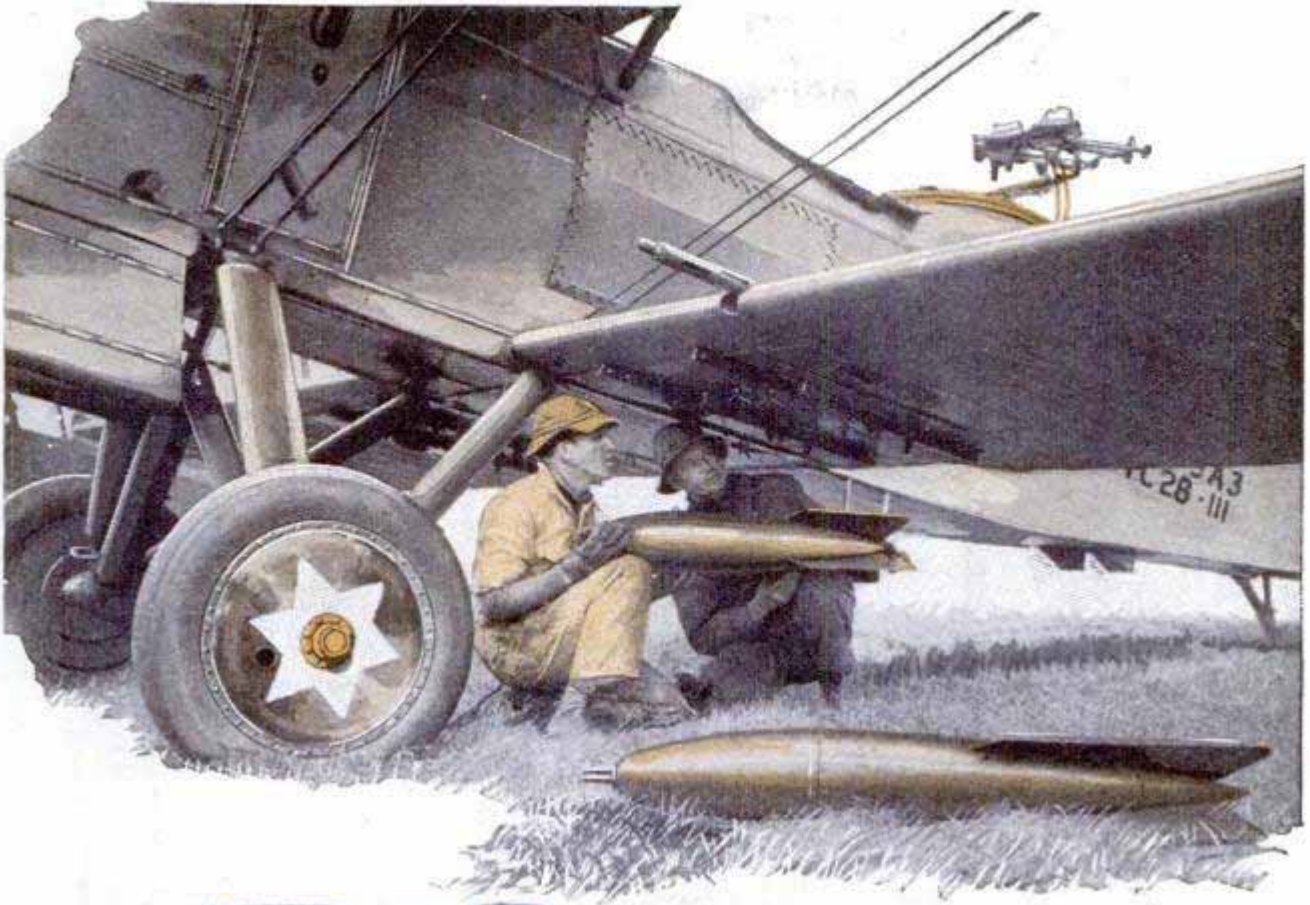
Graduation Exercises at Chanute Field; after Passing in Review, Students Are Given Their Diplomas by the Major in Command; There Are Several Less Ceremonious Graduation Days in the Year



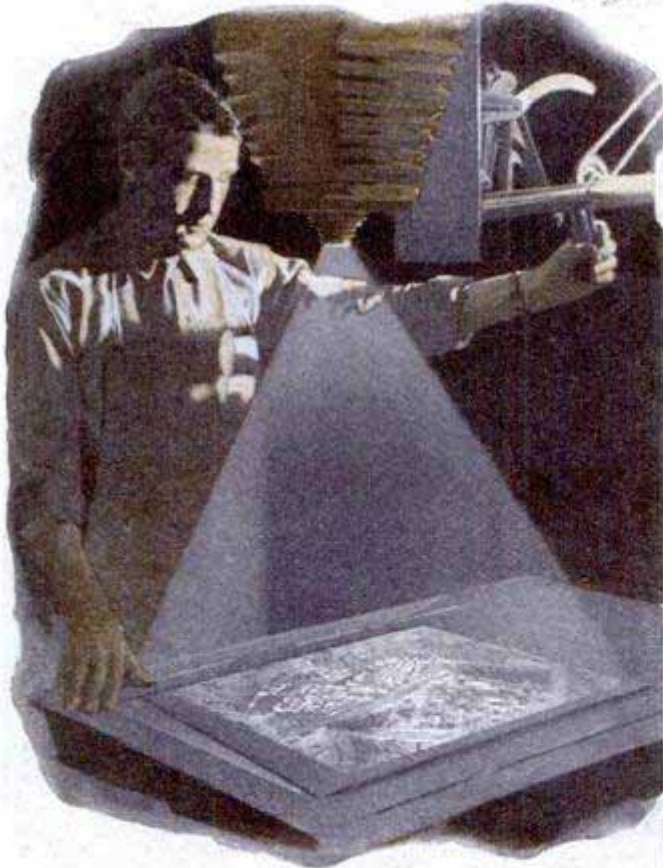
Inflating a Balloon; Scott Field Students Become Efficient in This Work through Careful Training, Which Fits Them for Emergencies as Well as for Routine Duties; at Right, Studying the Various Types of Propellers and Their Connecting Parts; Introduction of Reversible and Variable-Pitch Propellers Makes This Work Very Important



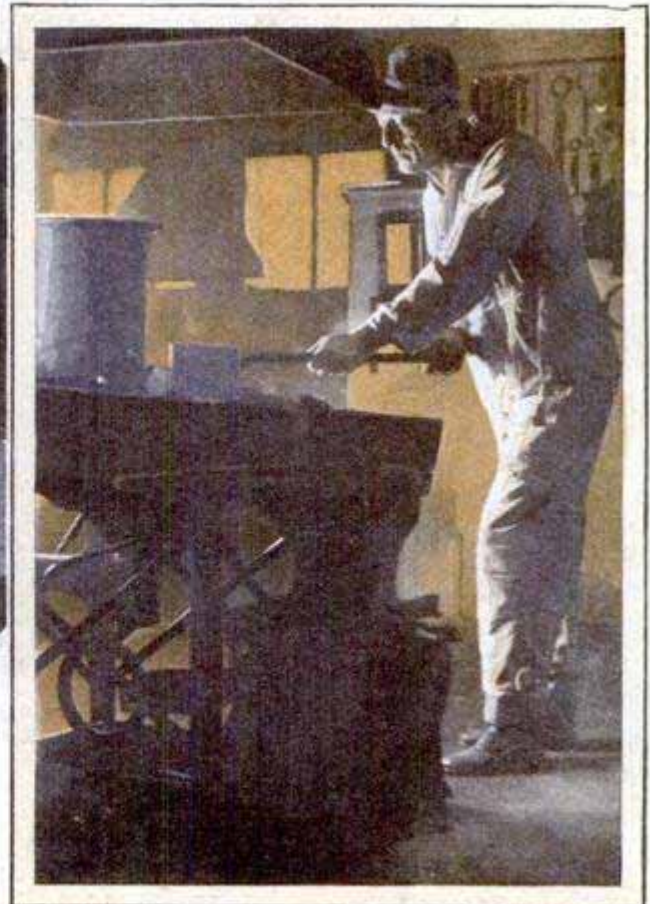
Photography Students in the Air-Corps Technical School at Chanute Field, Washing Prints in the Huge Tank Designed Especially to Accommodate the Many Enlargements That Are Made; the Boys in the Upper Left of the Picture Are Holding a Good-Sized Print from a Negative Made during an Airplane Flight; Many Thousands of Prints and Negatives Are Developed in the Photography Division of the Technical School Each Year



Hanging Bombs under an Attack Plane at Chanute Field; Note the Machine-Gun Muzzle Just above the Edge of the Lower Wing

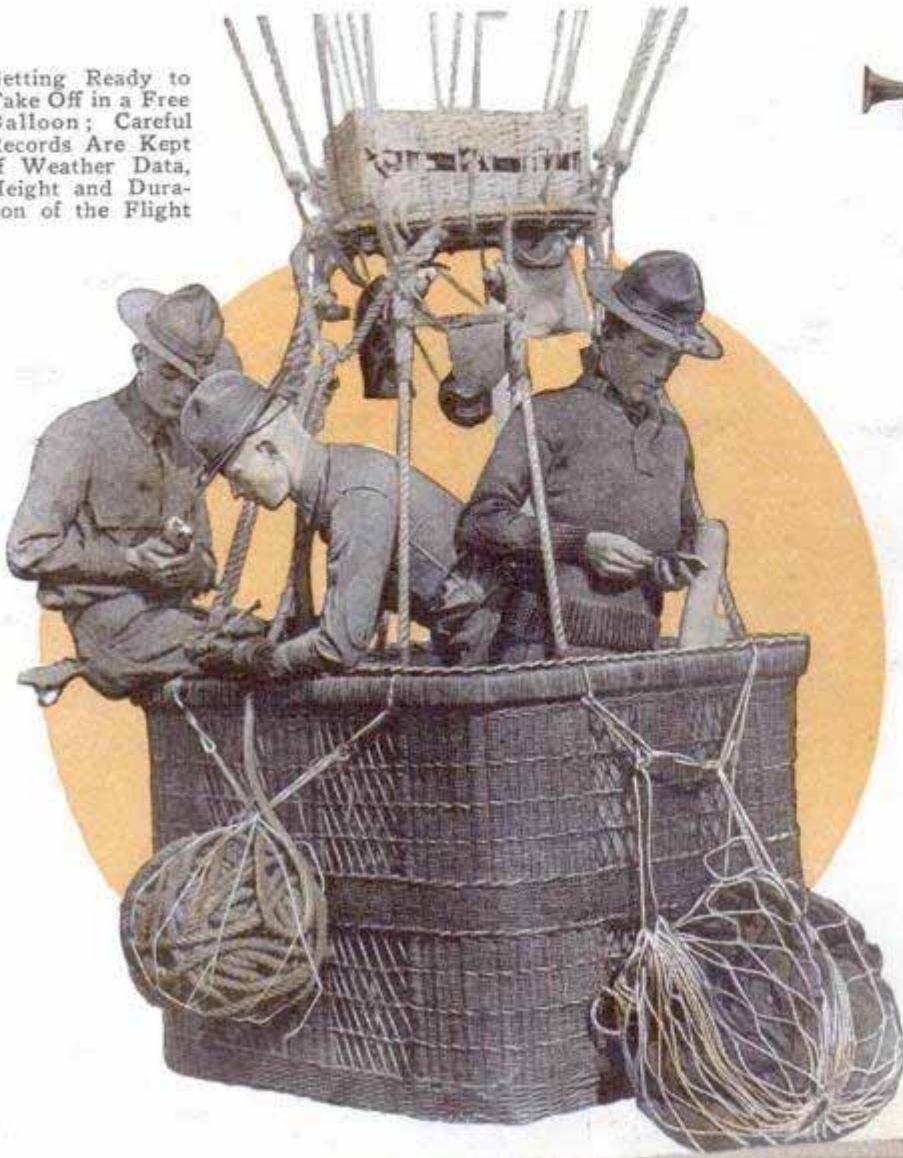


Above, Making Enlargements in the Photography Department at Chanute Field; Prints of Unusual Size Are Prepared for the Better Interpretation of the Area Represented and to Help Plan Campaigns; at Right, Machine-Shop Student Learning Essentials of Blacksmithing

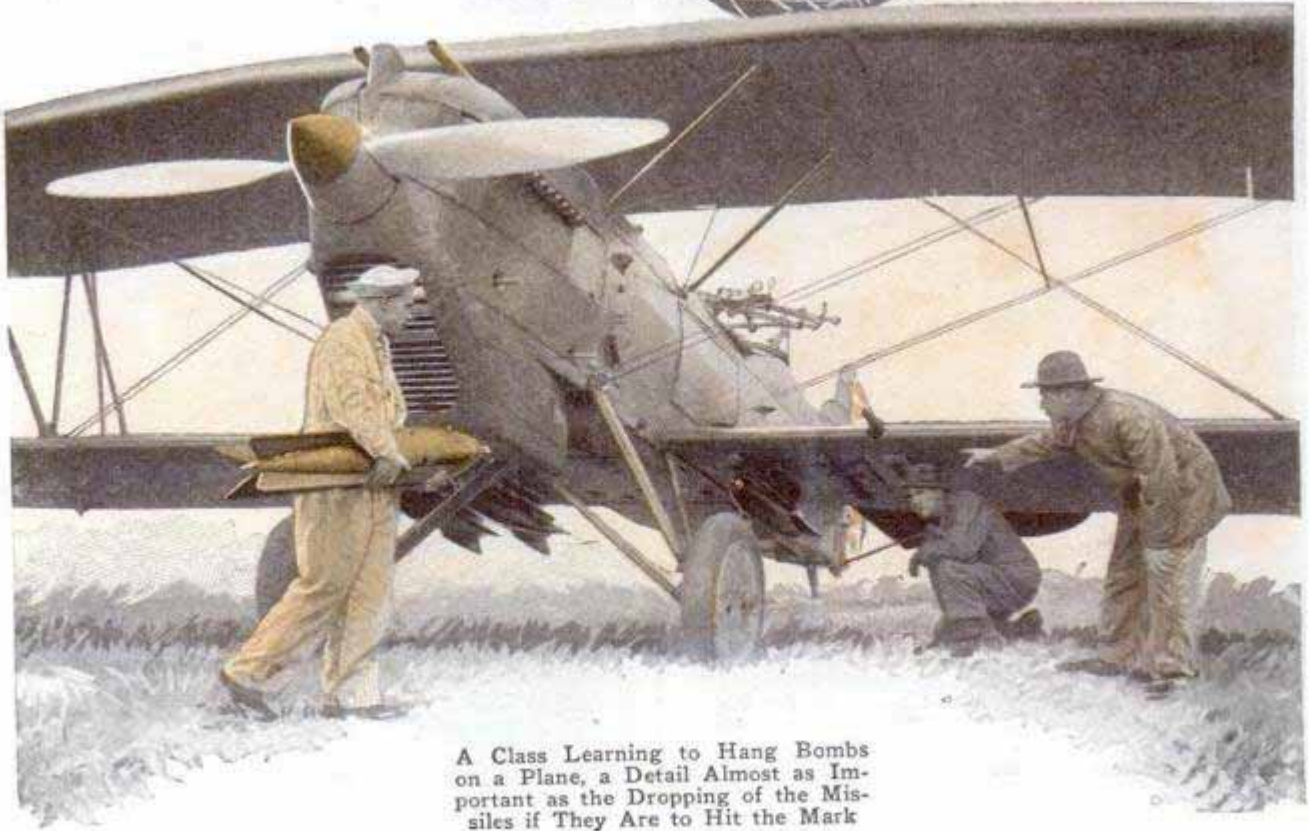


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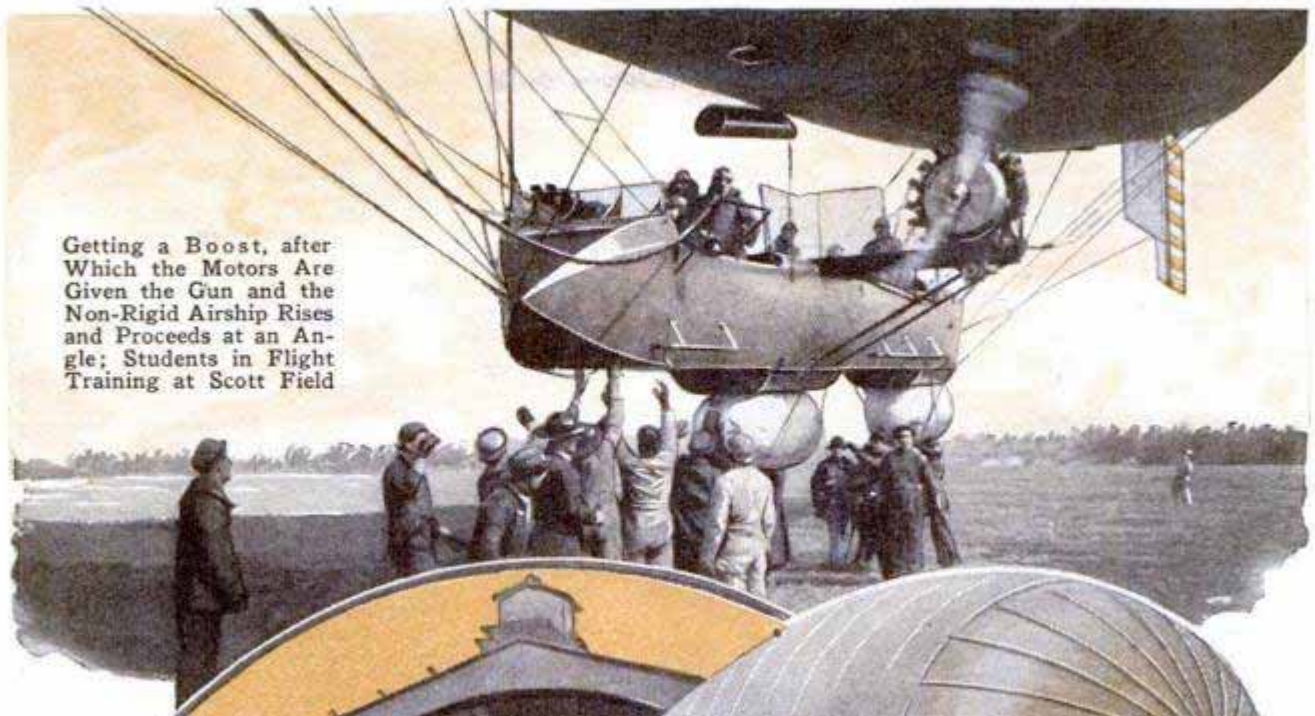
Getting Ready to Take Off in a Free Balloon; Careful Records Are Kept of Weather Data, Height and Duration of the Flight



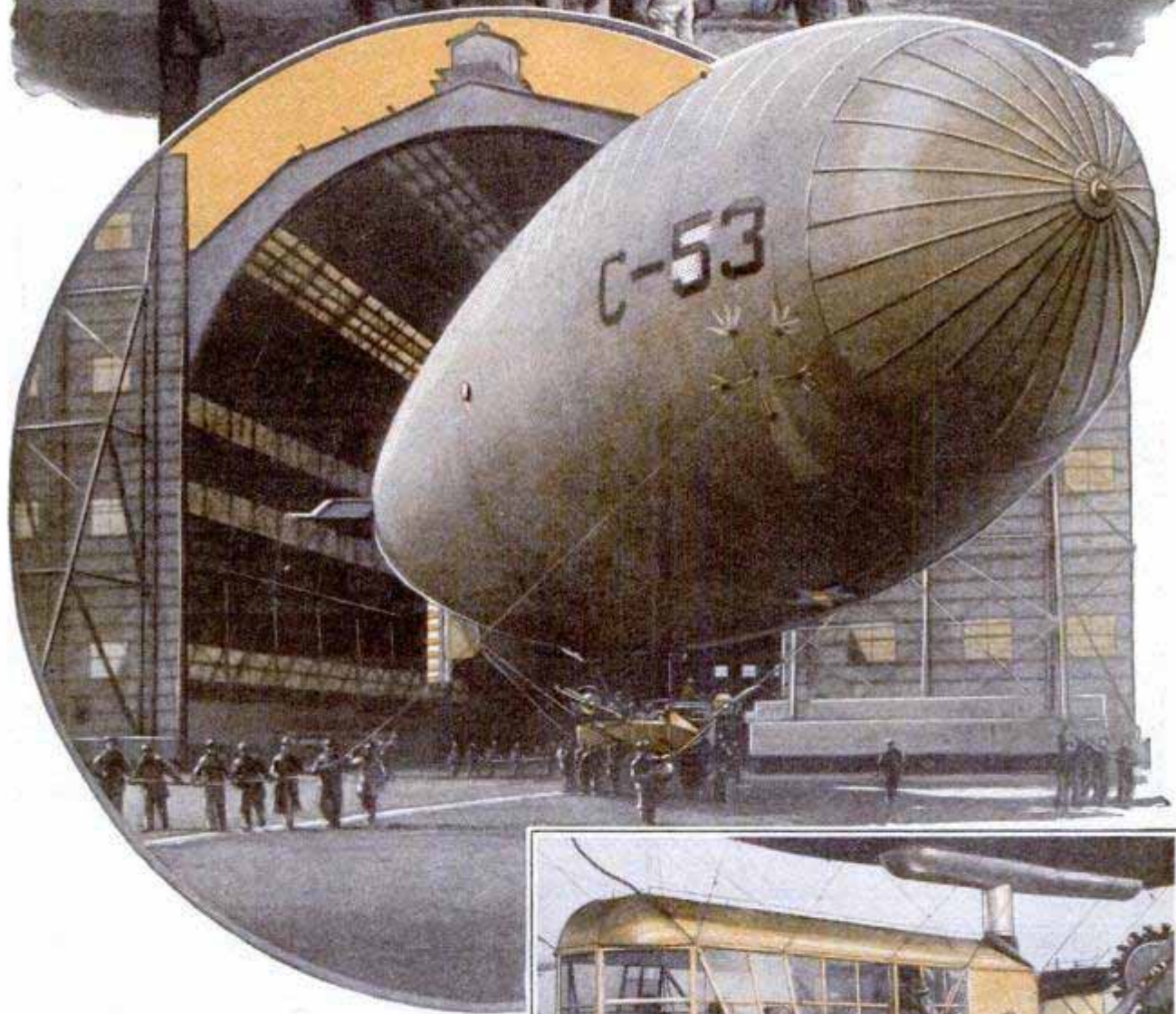
Bugles Play an Important Part; Although the Soldiers Are Training for the Air, Mess Call Is Always Heeded



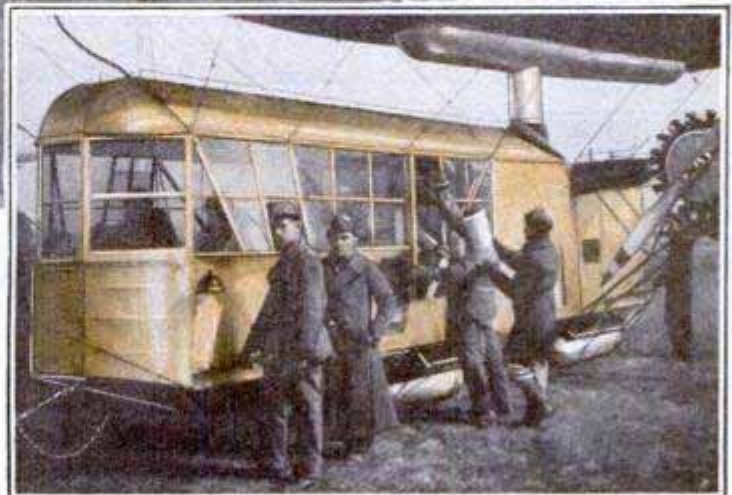
A Class Learning to Hang Bombs on a Plane, a Detail Almost as Important as the Dropping of the Missiles if They Are to Hit the Mark

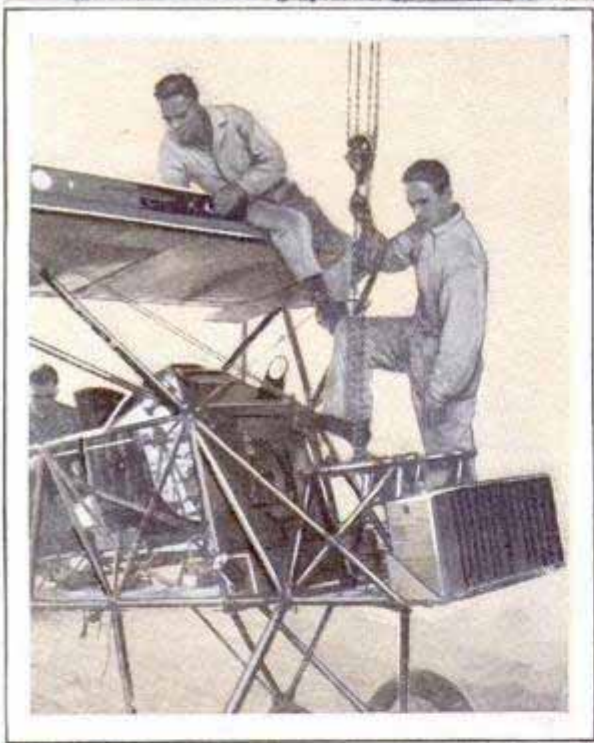
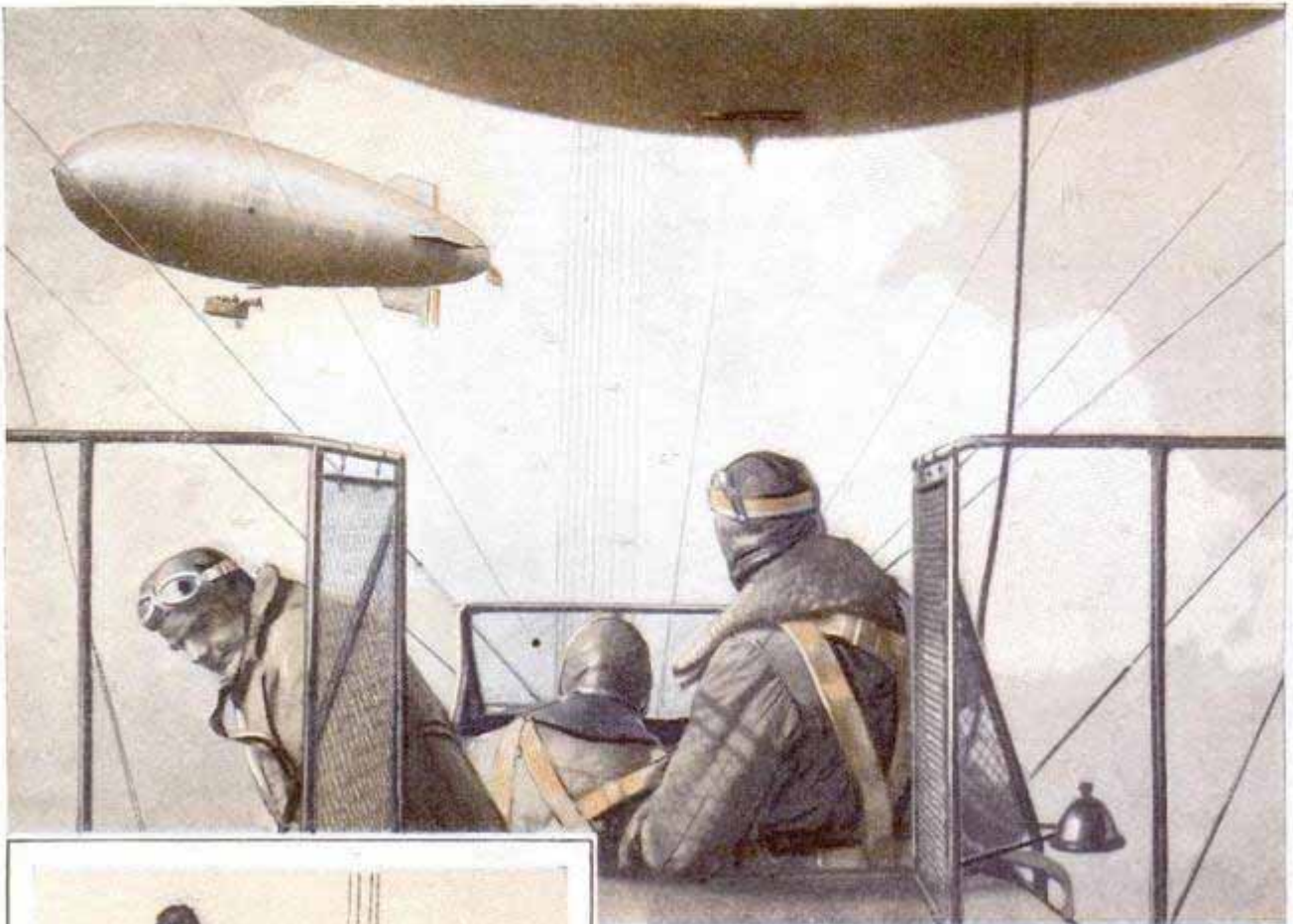


Getting a Boost, after Which the Motors Are Given the Gun and the Non-Rigid Airship Rises and Proceeds at an Angle; Students in Flight Training at Scott Field

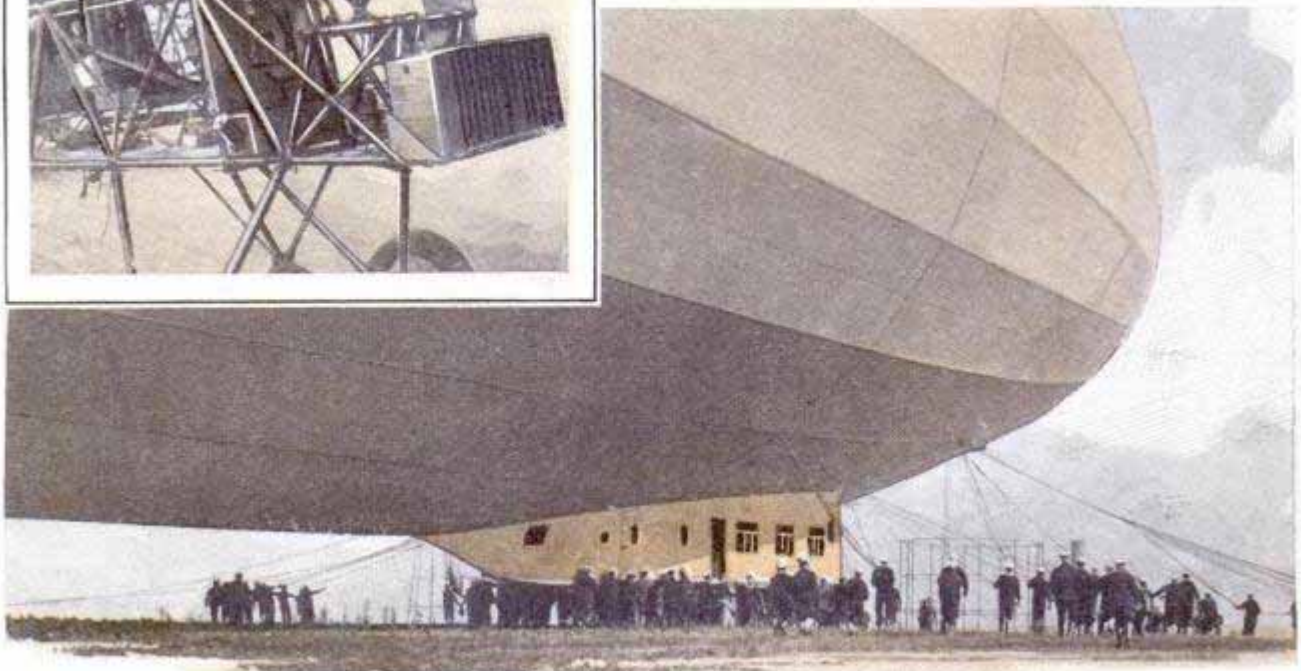


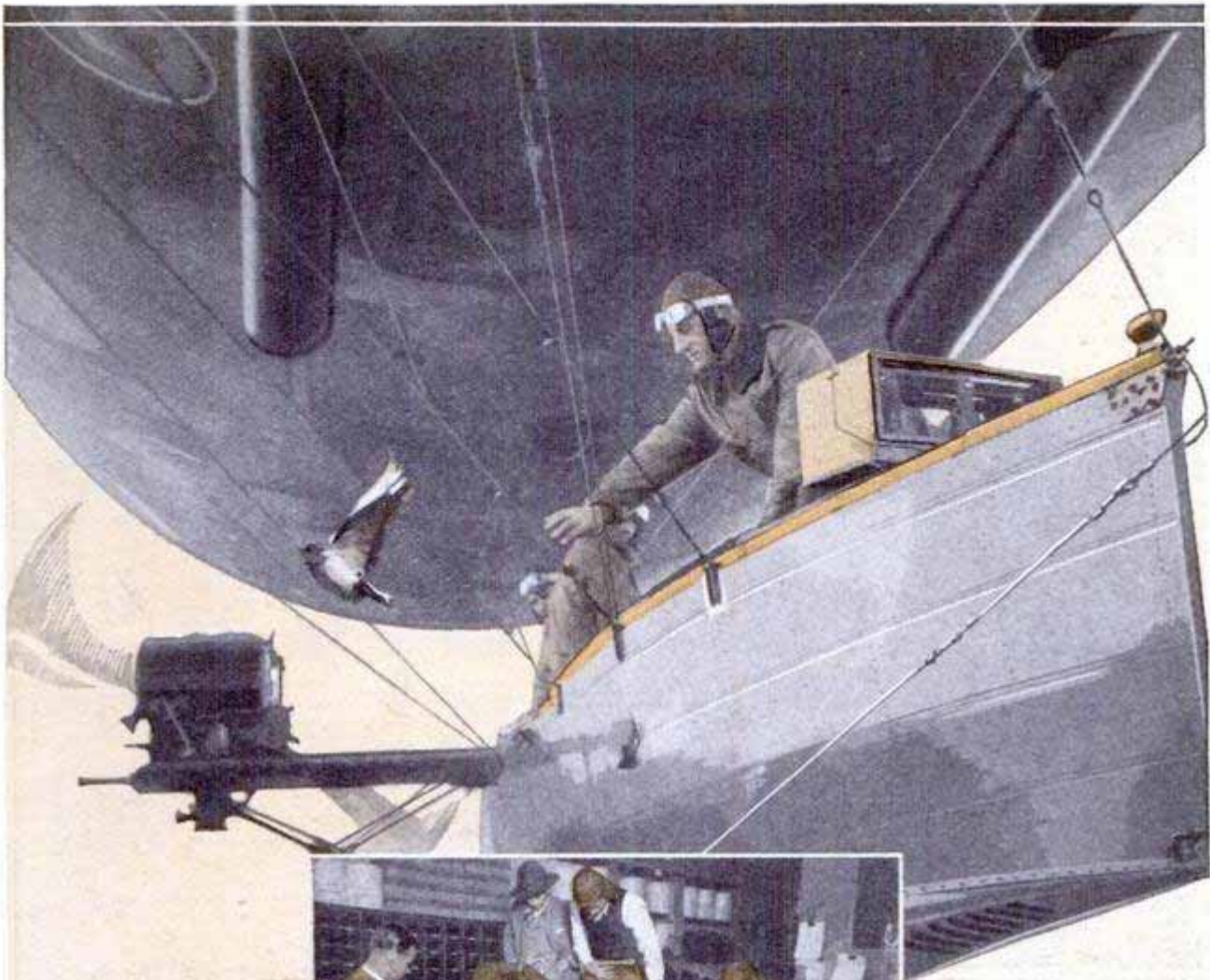
Easing an Airship Out of the Huge Hangar at Scott Field, a Delicate Maneuver to Avoid Injuring the Bag; at Right, Close View of the Car of a Non-Rigid Airship; Grips at Sides Simplify Handling and, in Flight, the Cabin Helps Shut Out the Noise of the Motors, Adding to the Comfort of the Trip





Floating Along, Every Man on the Job; the Pilot Is in Front; Each Airship Carries a Radioman to Maintain Constant Communication with Headquarters; This View, Taken near Scott Field, Shows a Sistership at the Upper Left-Hand Corner; at Left, Students Assembling an Airplane at Chanut Field; This Is Just One of the Many Activities That Help Make Efficient Technical Experts Out of Men in Training; Below, When the Mighty "Los Angeles" Dropped Down for a Visit at Scott Field; a Big Ship like This Is an Inspiration to Men Who Have Worked with Smaller Craft





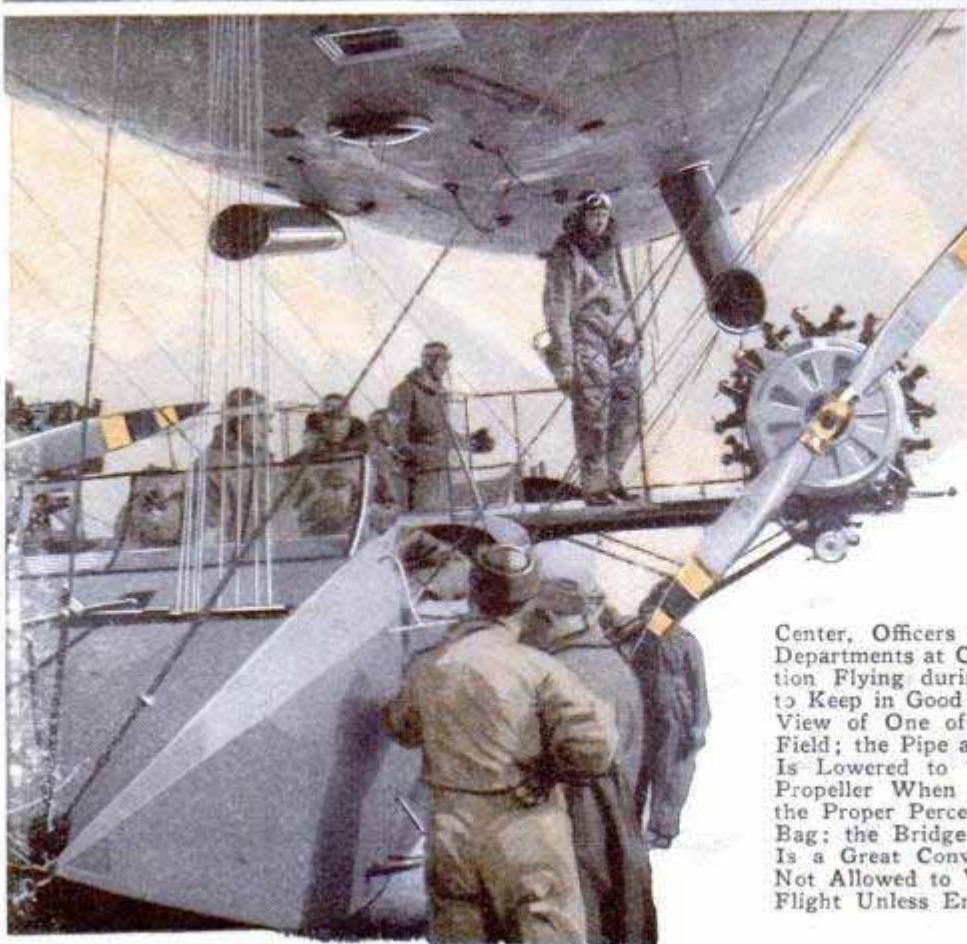
Training Carrier Pigeons for Releasing Them from an Airship Some Distance from the Home Station; While the Birds Play a Less Important Part in Military Maneuvers Than Formerly, the Army Is Careful to Give Those It Uses Thorough Training

At Left, Students at Chanute Being Fitted for Their Uniforms, and, Below, Close View of the Carriage of an Airship Showing the Bumpers That Help Reduce the Shock at Landing; They Are Filled with Air and Well Braced to the Car



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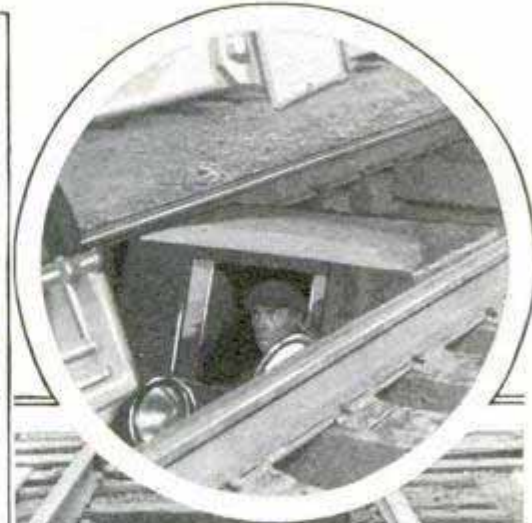
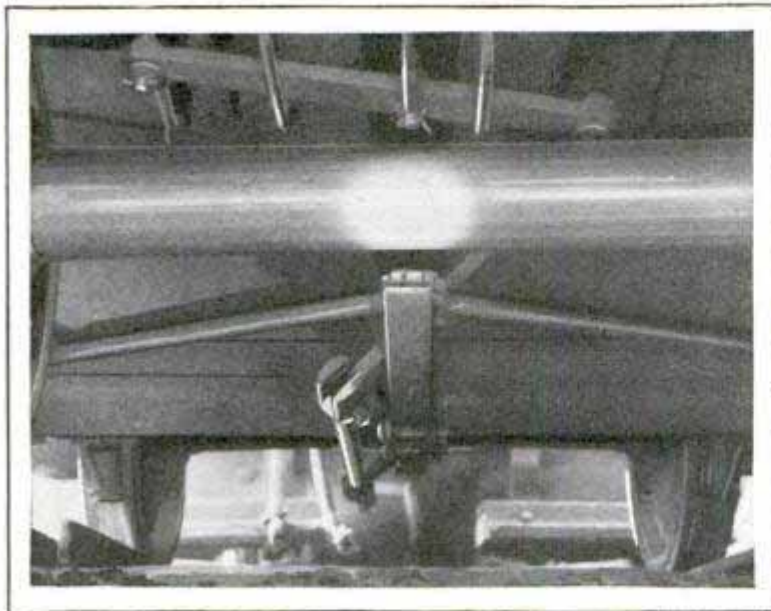
Holding Down Airship at Scott Field during a Change of Crews; Each Man Is Required to Put in a Certain Number of Flying Hours Each Month; Students Receive a Minimum of Five Hours' Flying Instruction Monthly



Center, Officers in Charge of Various Departments at Chanute Field in Formation Flying during Cross-Country Trip to Keep in Good Trim; at Left, a Close View of One of the Airships at Scott Field; the Pipe at the Right of the Bag Is Lowered to Take in Air from the Propeller When Running, to Maintain the Proper Percentage of Air inside the Bag; the Bridge Leading to the Motor Is a Great Convenience, but Men Are Not Allowed to Walk upon It during a Flight Unless Engine Trouble Develops

435 *Chas. Murray 65 Broadway New York*

MOVING CARS ARE SPOTTED FROM PIT UNDER TRACK



Above, Photo Taken from Pit under Track in Which an Inspector Watches Moving Railroad Cars for Defects; Right, Inspectors at Work

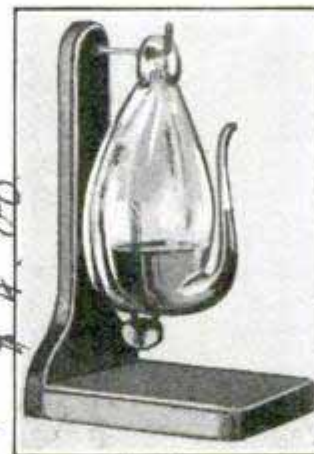


To enable rapid inspection of the underside of freight cars for defects, the Pennsylvania railroad has installed an inspector's pit beneath a "hump" track in the yards at Altoona, Pa., from which he is able to watch the bottoms of the moving cars as they pass over his head. The pit is placed at a slight elevation in the center of the track with an entrance at the side. Floodlights and a spotlight facilitate the work of the inspector, who marks defective cars with a whitewash spray operated from the pit by compressed air. At the same time he sprays a car needing repair, the inspector also presses a button which rings a warning bell in the conductor's room at the top of the hump, so the defective car can be cut out. The cars move over the pit at about two miles per hour, and the pit inspector is able to find many repair cases not spotted in the ordinary yard inspection.

of cane sirup. It consists of a mixture of small sugar crystals, surrounded by a film of sirup mixed and beaten into a thick mass.

CLIPPER-SHIP WEATHER GLASS SHAPED LIKE A TEAPOT

Somewhat similar in shape to the ordinary teapot, weather glasses like those used on the early clipper ships now are being manufactured. The glass responds instantly to sudden changes and is as sensitive as a barometer. Colored water is placed in the glass, and the liquid rises in the spout as bad weather approaches and falls to indicate clearing weather. Weather glasses like this were the only means of early seagoing men for forecasting storms.



*409
man offered to order, man
98 Federal St.*

CREAM MADE OF CANE SIRUP USED FOR CAKE ICING

Cane cream from cane sirup, the department of for sandwiches and ng. It is said to satisfactorily than waste, keeps a all the food value

489

44.00

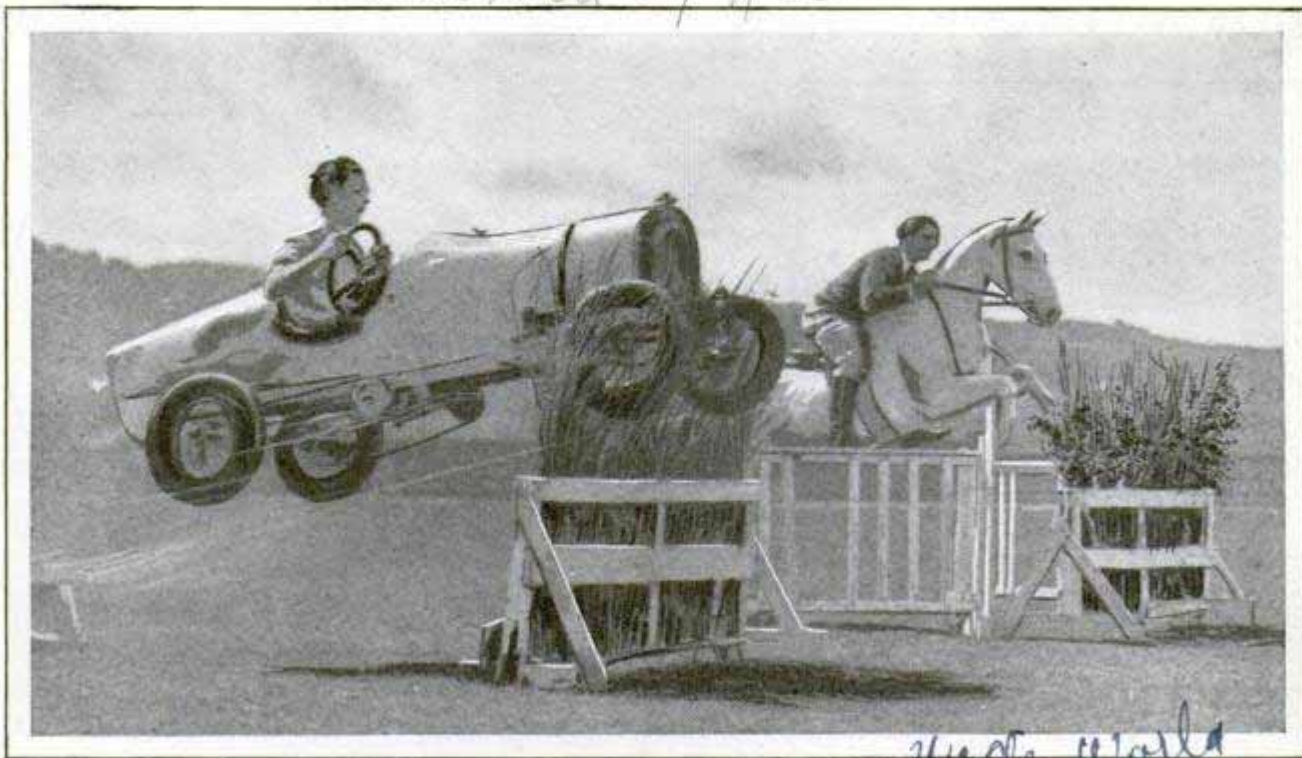
SWIFT AND ANDERSON, INC.
98 FEDERAL STREET
BOSTON, MASS.

weatherglass.

Bureau of Chemistry and Soils

*Swift & Anderson
1728 Pittsfield Blvd*

Sanborn's map of Washington, D.C.



Automobile and Horse Leaping the Hurdles Together; the Race Was Staged to Settle a Wager, and the Car Made the Leap as Easily as the Jumper, after Running up an Incline

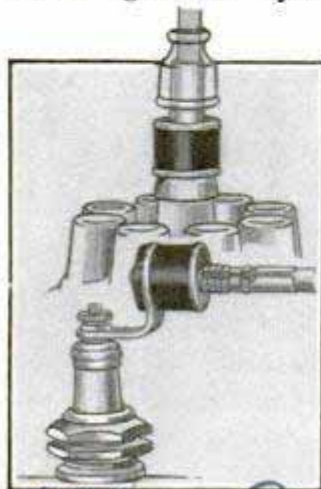
AUTO JUMPS OVER HURDLES IN RACE WITH HORSE

Ward & James

To settle a wager, a Los Angeles man sent his small, chain-driven automobile over the hurdles recently with as much ease as his opponent took the barriers on a spirited jumper. Car and horse raced down a field side by side, the auto taking the leap over the barrier after running up a short platform incline, both machine and animal going over together.

RADIO ON CAR IS IMPROVED BY PLUG RESISTORS

For radio-equipped automobiles, resistors for the suppression of interference from ignition systems now are being produced. Individual resistors are furnished for each spark plug and for the common cable to the distributor. They increase the resistance of the high-tension ignition system and minimize the disturbing oscillations in the igni-



tion circuit which interfere with operation of radio in the car. When used with suitable by-pass condensers in other parts of the ignition circuit, the need of shielded ignition cables is avoided. Power output is not affected, and no difficulty in starting is introduced to hinder operation of the car when the resistors are installed.

TROLLEY-CAR RAILS INCREASE IN SIZE AND WEIGHT

Startling comparison between the sixteen-pound street-car rails of the horse-car era and the 116-pound girder rails in use today was offered recently when excavators in Los Angeles uncovered some of the iron used in 1877. Traction lines have followed the example of the railroads in using heavier and larger rails for the heavier, longer and faster cars. In 1858, railroads generally used fifty-pound rails, but today the standard is the 130-pound rail, which means that weight for each three feet of length. The horse-car rails have the appearance of toys beside the modern kind.



Leonard Ellison on horse.

Chicago, 500 N. Dearborn

Made world

490
1275 2 Ventura Blvd.
Van Nuys, Calif.

Ant. Stanley, N. J. 1000, 65 Broadway, N.Y.

The Allen Bradley Co.
386

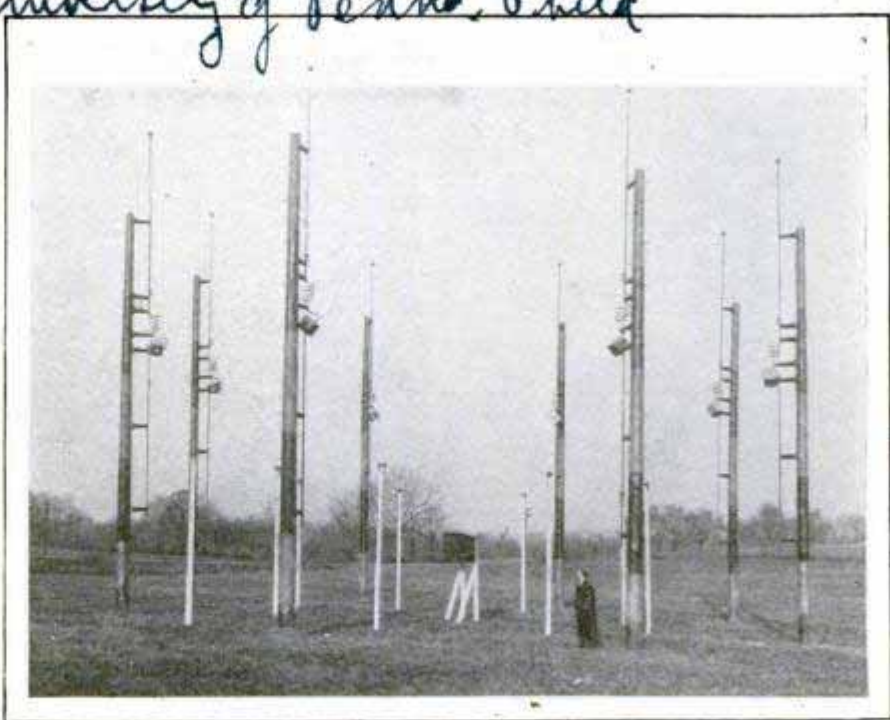
Los Angeles Railway

*Mr. James Lambert,
Director Botanic Gardens
University of Penna. Phila*

947
3/18

**FLOWER GARDENS
IN SCENT GROUPS
FOR THE BLIND**

Flower gardens, arranged particularly for blind persons to enjoy, are laid out by experts in perfume groups, regardless of color combinations or appearance, so that each group will give a distinctive scent that may be associated with the flowers. Perfume groups are so arranged that scents will not blend into each other, and varieties are labeled with aluminum tags on which botanic and popular names are embossed so they may be read by the trained fingers of the blind. Heliotrope, wallflower, sweet alyssum and the lemon-scented verbena were found the most satisfactory annuals, while lavender was the most popular of the perennials. Sweet-scented geraniums formed a separate group, and the lilac and mock orange were selected from the shrubs.



"Totem Pole" Radio Masts Equipped with Birdcage Aerial, Which Have Been Found to Overcome Many Obstacles in Broadcasting

**"TOTEM POLE" MAST FOR RADIO
IMPROVES RECEPTION**

"Totem pole" radio masts, eight in number, each 110 feet high and set in a circle 800 feet in diameter, have been used for station KDKA to eliminate the interference often caused by the ordinary kind. The birdcage aerial suspended from the masts overcomes many obstacles of high-power broadcasting. It reduces ground interference, shooting nearly all the energy skyward, and the antenna does not send a "blanketing" signal over near-by territory, although it sends a powerful

one to distant points. By reversing action of the antenna, it is possible to send out a strong ground wave and weak sky wave, and by decreasing the sky wave of the weaker station, its "nuisance" area is reduced so that it does not interfere with reception. The antenna is of special benefit to stations serving a wide area.

*Designed by Mr. Frank Westinghouse Electric & Mfg. Co.,
Pittsburgh, Pa.
Conrad*

**SPRINGS ON BOTTOMS OF SHOES
FOR EASY WALKING 403**

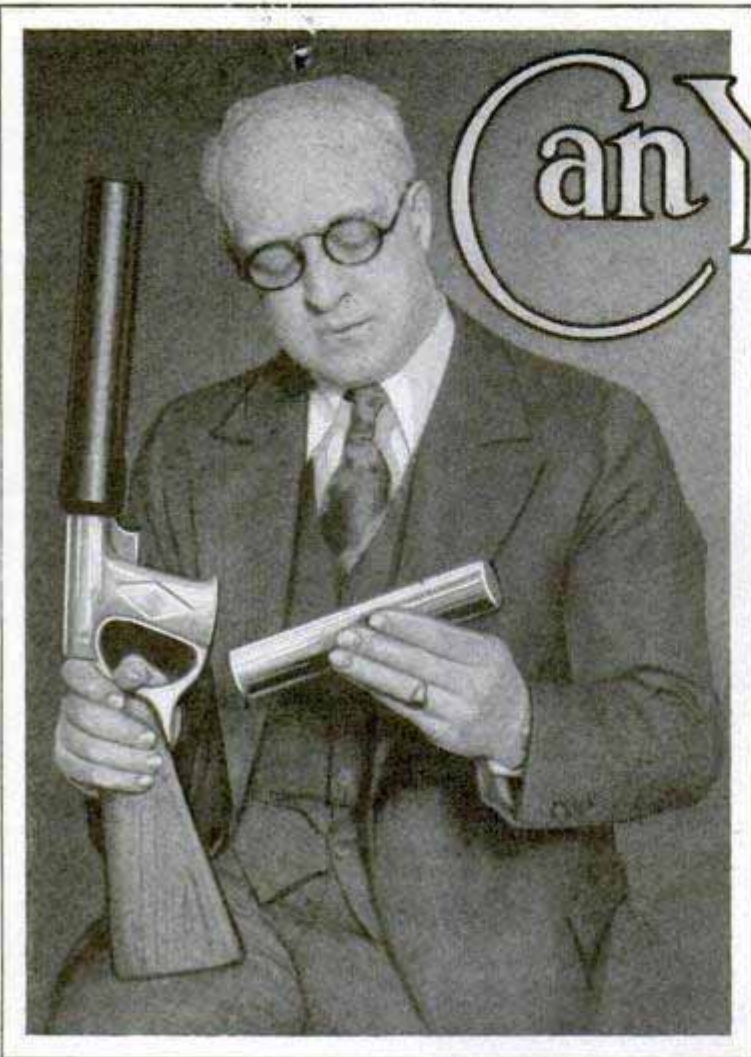
Springs for attachment to the soles and heels of shoes to relieve walking strain now are on the market. The attachment consists of a foot-plate strapped to the shoe, the springs being fastened to this plate and to a sole and heel plate beneath it which comes in contact with the pavement. The springs make rubbers unnecessary for protection, as the sole of the shoe does not come in contact with the ground. They are quickly removed on entering the house.



Metal Foot Plates Fitted with Sole and Heel Springs Which Ease the Strain of Walking

*Letourneau Spring
Attachment 20845 Drexel Ave*

372



Can You Solve

Link together the skilled microscopist and the photographer and they will actually split hairs. In fact, to all intents and purposes, they did split two hairs lengthwise and put halves of each together to form a new filament, when working on a certain famous case, that later assumed international importance. What's more, they took a picture of the combination hair.

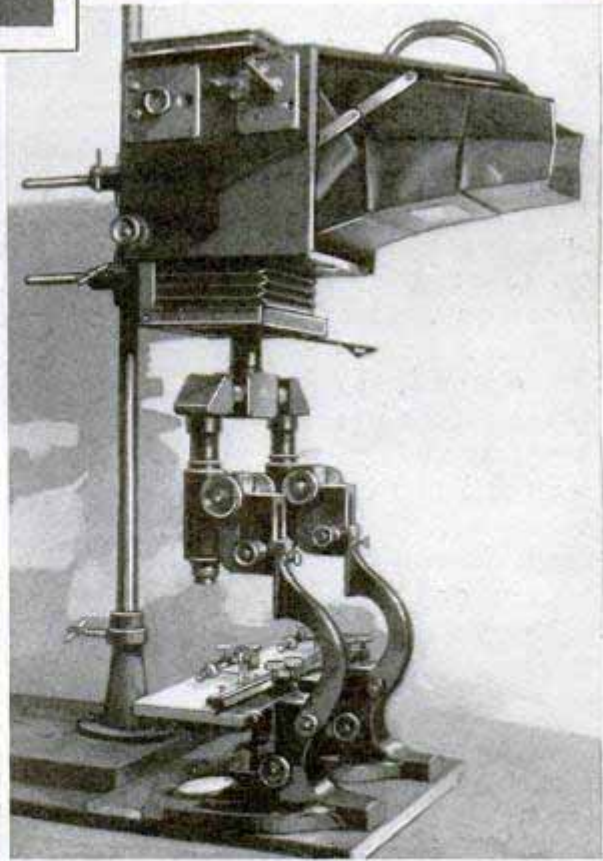
In that case, a cap was left behind by one of a pair of payroll bandits, who killed a man in the commission of the holdup. On the sweat band were found two hairs from the wearer's head. Two suspects were in custody.

Capt. John Eagan, of the Chicago Detective Bureau, Examining One of the New Tear-Gas Guns

By JOHN FRANKLIN COGGSWELL

16 Edgemoor Road
EACH day the detection of crime and the solution of mysteries become more scientific pursuits.

Microscopist and chemist collaborated to bring the perpetrator of one interesting crime to the dock. A bank teller turned his back for a few moments while a man stood before the grilled window. When the visitor left, a package of twenty-five \$20 bills was missing. The suspect was rounded up. In his automobile was found a long, flexible stick, tipped with a gummy substance. Beneath the microscope, this was found to be chewing gum. The chemist determined the brand of the gum. A part package of the same gum was found in the suspect's pocket. Hidden in his room, was a single \$20 bill, with a bit of gummy matter adhering to it. Analysis showed this also to be the same gum. This evidence, with the teller's identification, was sufficient to convict.



Two Powerful Microscopes with Graflex Camera for Making Comparative Studies of Bullets

Belmont News

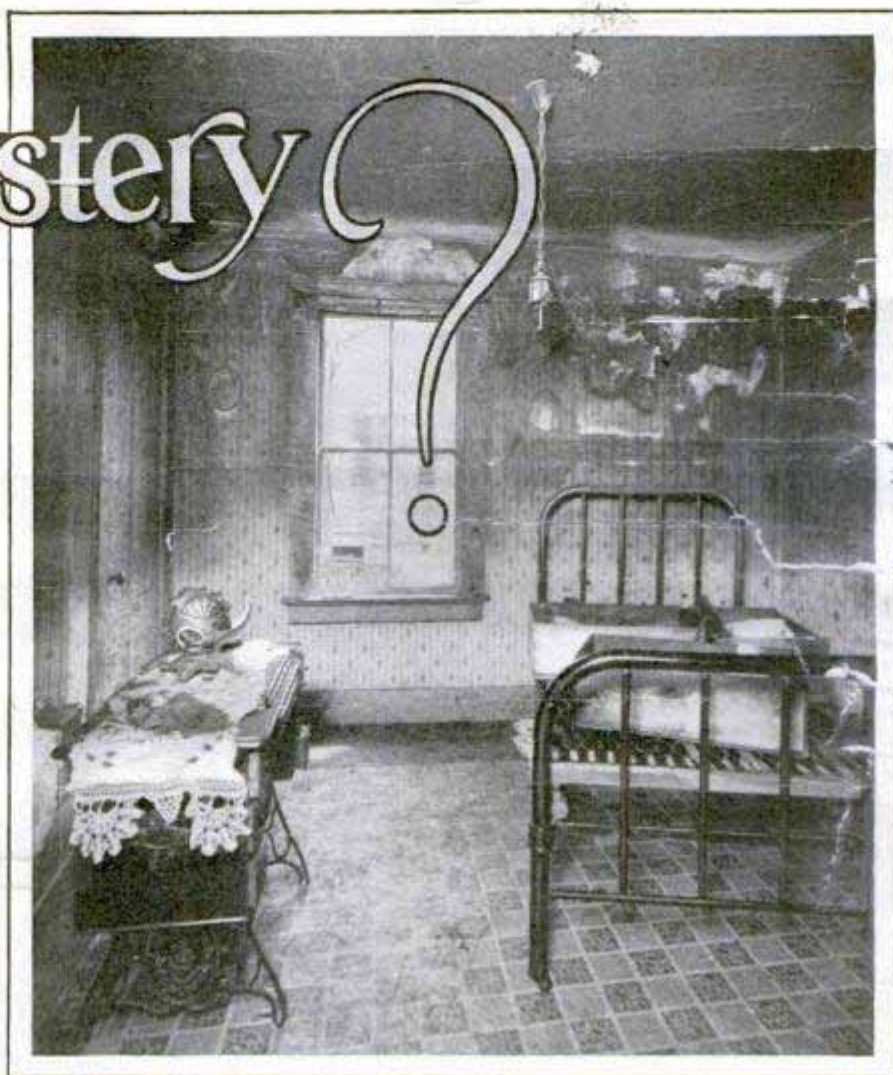
this Mystery

Each was given a new comb. Later the combs were removed from the cells, with hair adhering to each.

Under a powerful microscope, a hair from the cap appeared exactly like that from one of the combs. To make a better comparison, two compound microscopes were placed in combination and joined by a comparison eyepiece, thus throwing half the viewer's field of vision through one microscope and half through the other. A hair from the cap was mounted on a mechanical stage, capable of universal movement, beneath one of the lenses. Under the other, a hair from the comb was mounted in the same manner. Moving the stages brought the two hairs into such position that, through the eyepiece, they appeared as one hair, with a dividing line running from end to end down the center. The right side of the combination hair was that from the cap; the left that from the suspect's head.

In pigmentation, pattern of cortex—the small scales forming the outside surface of every hair—and general conformation the hairs were identical. The lens of a camera was placed to the eyepiece, and the resulting picture showed the combination hair magnified to a diameter of nearly two and one-half inches.

An expert hesitates to place such delicate evidence before a jury, unless he needs it absolutely, for the matter of identification by hair has not as yet progressed to anywhere near an unchallengeable po-

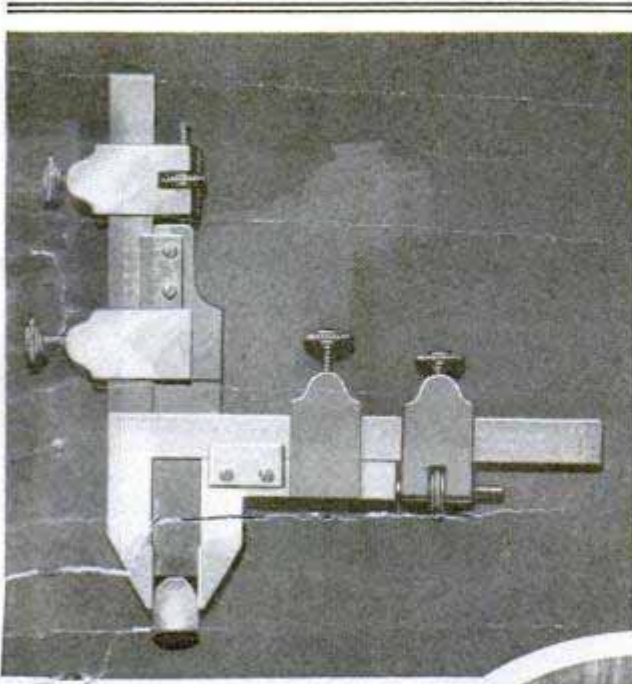


Firemen answering an early morning alarm found the body of a woman in this bed. Her skull had been fractured. It was claimed that a heavy picture hanging over the bed fell and not only killed her but also set fire to the room by overturning a kerosene lamp that stood upon the sewing machine near by. This photograph proved the truth or falsity of this claim. Can you tell how?

sition. But authorities do believe that study and research will some day enable them to state certainly whether two hairs are from the same or different heads.

The firearms expert uses the comparison eyepiece joining compound microscopes—and also the camera—for examining and photographing the characteristic markings on mortal and test bullets in combination. Thus, he is usually able to tell exactly what kind and caliber of gun fired any bullet submitted.

A few months ago, the proprietor of a wayside stand was shot to death. The fatal bullet, placed in the hands of Capt. Charles VanAmburgh, ballistic expert of the Massachusetts department of public safety, was nothing like anything he had ever seen before. He measured it and weighed it to the fraction of a grain. Then, after consulting his tables, which



show all details regarding every projectile and shell designed for use since the inception of the breech-loading pistol, he announced that the bullet could have been fired only from a gun made in the early '70's. Such a firearm is found only in the collections of relics.

Surely, such a gun could have no place in a 1930 holdup, but, a few weeks later, two youths were captured, one of whom was found in possession of a similar gun. Under the questioning of the police, he confessed participation in the holdup that had resulted in the killing. The pistol and ammunition had been stolen from a noted collection of firearms.

There was a woman dead in Boston. Firemen, answering an early morning alarm, found the body lying on smoldering bedclothes, in a room scarred by flames. Investigation showed that the woman had died, not by burns or suffocation, but by a blow that had fractured her skull. Her husband told his story. Sleeping in an adjoining room, he stated, he had been awakened by smoke. He jumped from his bed and attempted to

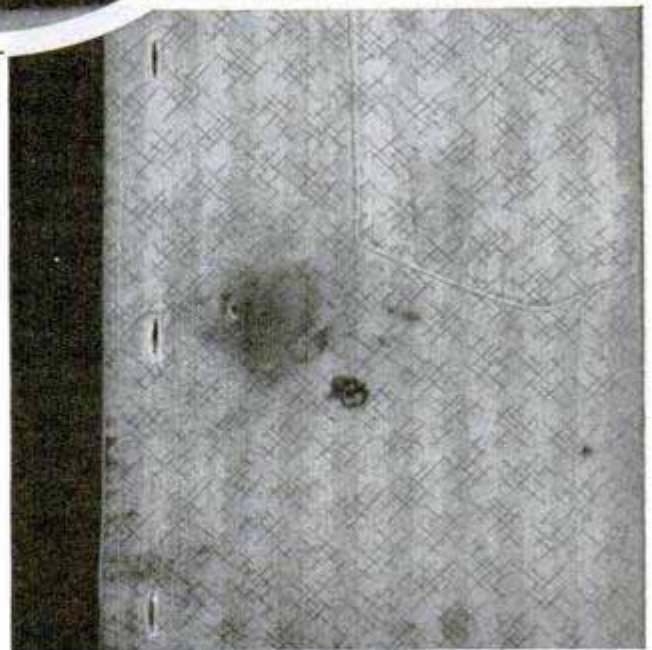
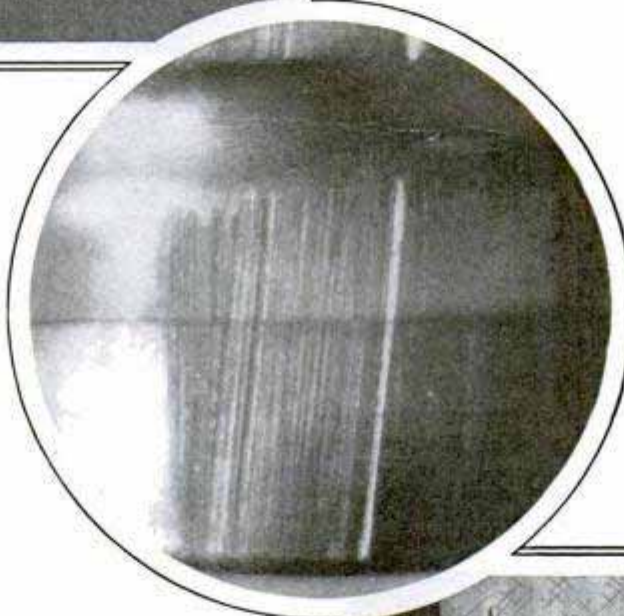
enter his wife's chamber, but was driven back by the flames.

How about the fractured skull? Easy to answer, according to the defense. A heavy picture, that hung above the head of the woman's bed, fell and not only killed her but also set fire to the room by knocking over a kerosene lamp that stood upon a sewing machine near by.

The bureau of expert assistants, of the Massachusetts department of public safety, was called upon to investigate the case. They heard the statement made by the defense, looked over the scene and took two photographs, one of the room in which the woman had died, the other of the husband's room. That was all.

But the photographs were enough, by themselves, to prove the utter falsity of the man's statement and cause him to offer a second-degree murder plea which was accepted by the state.

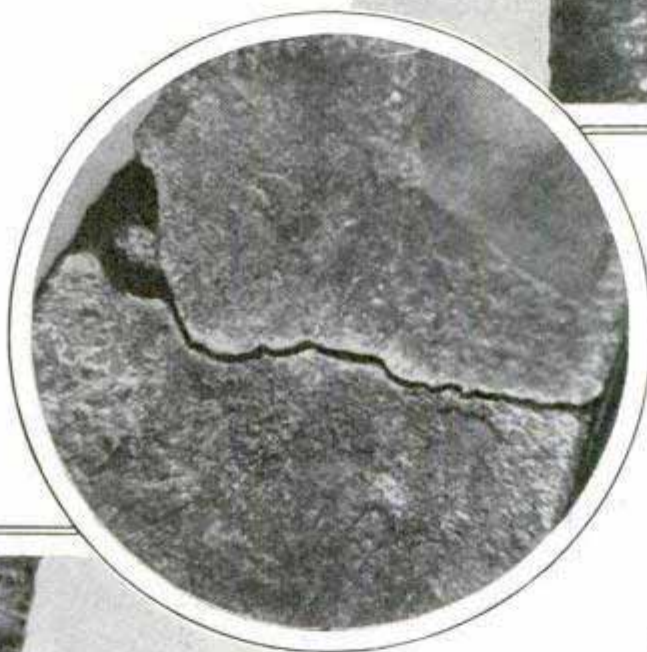
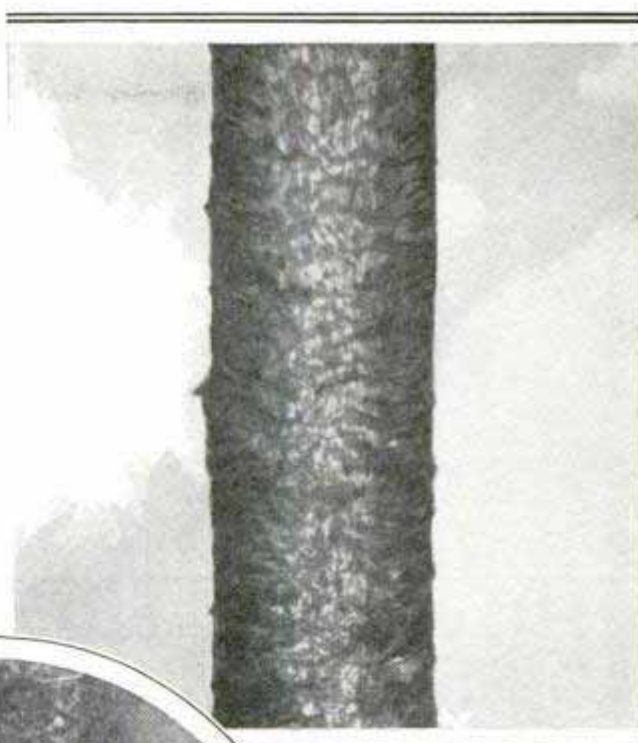
One picture displayed three damning bits of evidence. It proved



Measuring Bullets with Calipers; Mortal and Test Bullets Compared, and Holes Made by Bullets Fired at Different Angles

that this had been no slow-spreading fire, kindled by an overturned lamp, but a "flash" fire, caused by ignition of an extremely volatile combustible liquid, with which the room had been showered in advance. There was a clear line of demarcation, below which the flames had not even scorched the wall paper. Above the line, the fire had burned a short distance into the paper and then gone out. The firemen found nothing blazing except the bedding.

There was a distinct outline on the wall, where the heavy picture, blamed for the fatal blow, had hung; the wall paper was barely scorched in the lower part of the area. Obviously, the bottom of the picture had protected the paper from the fire and it had not fallen until the cord was burnt through by the flames. In addition, a cloth beneath the overturned lamp bore no mark of fire. In the second picture, the bed, from which the husband claimed to have jumped, was



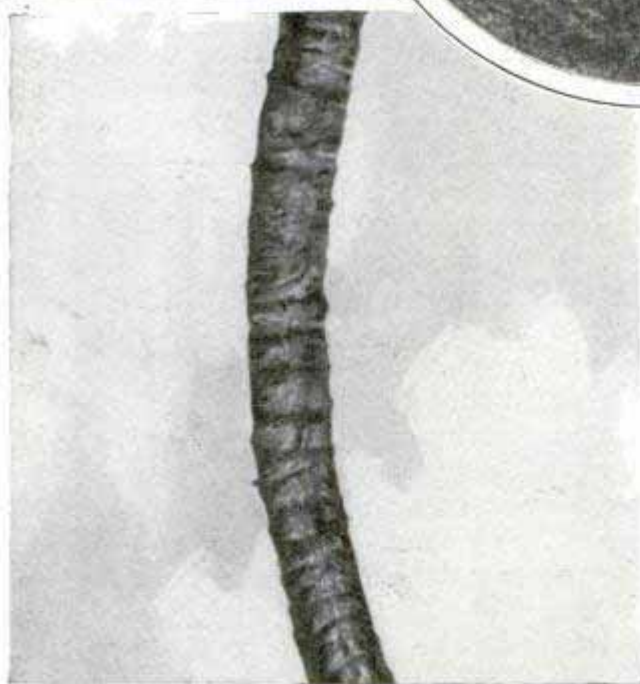
neatly made; had he tidied up while awaiting the firemen?

Behind the scenes, these expert detectives work, surrounded by a multitude of instruments as aids in bringing the lawbreaker to justice. Most of them seldom visit the scene

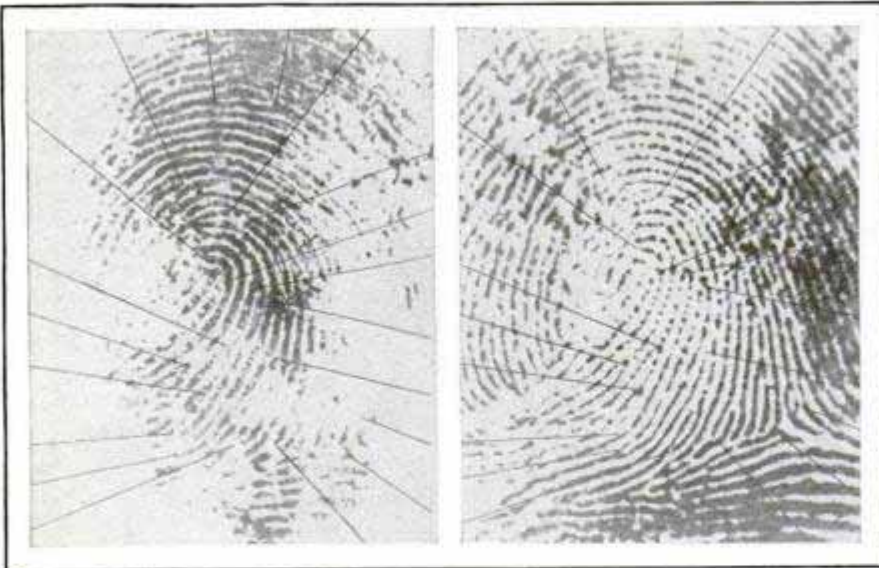
of the crime; some of them never. But, without them, many a crime solved by mechanical methods would remain a mystery.

There's the firearms and ballistic expert. His office is cluttered up by literally scores of magnifying glasses—the detective's oldest mechanical aid—microscopes that enlarge to a thousand diameters and more, analytical balances that will weigh a fine pencil mark on a sheet of paper, vernier calipers accurate to a ten-thousandth of an inch, microscopic scales that will measure to four hundred-thousandths of an inch.

In the next room, is the chemist, busy with his retorts and test tubes. He must be an expert in combustion, explosives and analysis. The photographer and the photomicrographist must be masters of



Human Hair Greatly Magnified; a Broken Punch Tip That Led to a Confession, and Strand of Lamb's Wool Highly Magnified



Fingerprint at Left Was Found on Ginger-Ale Bottle; at Right, the File Record; Lines Point to Identical Characteristics

scopes, that show objects in three dimensions.

The fingerprint expert—best known of the mechanically equipped detectives—requires a large room to hold the filing cabinets where are stored thousands of imprints of the finger tips of known and suspected criminals. The prints are classified by their whorls and convolutions nearly as accurately as the dictionary arranges words. Over them the experts work with magnifying glass and scale.

their craft, able to take good pictures under conditions that would beat the ordinary cameraman. Upon them devolves the task of preparing for submission to the jury much of the evidence gathered by the other experts.

At only one crime scene in fifty is a legible fingerprint found. In one such discovery in four is there a suspect in custody or a print in the files that matches up. So, in the actual detection of crime, the fingerprint plays a part in about one case in two hundred. Its great importance—so great that the fingerprint bureau commands the largest financial outlay of any of the expert bureaus—is a means of accurate identification and description of known criminals.

The microscopist sits entrenched behind a battery of magnifying instruments. They range from an ordinary eyeglass, such as is used by a watchmaker, to powerful compound microscopes, that make a hair appear as a rope, and binocular micro-

Developed by Thomas Madgley, Jr. and Mr. A. L. Penins

Controlled by Refrigerator Corp. Washington, D.C.
CHEMICAL TO COOL ROOMS
ALSO PUTS OUT FIRE
Hayton Ohio

Room cooler is made by
 Sleeping rooms can be kept cool and comfortable even on hot summer nights, it is predicted, by using a refrigerant recently announced by the American Chemical society. It can also be employed to cool submarine interiors and mines and to extinguish fires. Tests have shown that it is not injurious to animals or human beings even when present in large quantities. The substance is a mixture of carbon, chloride and fluorine and has a boiling point at eighteen degrees below zero, Fahrenheit.

MOTORBOAT LANDS ON BEACH BY LIFTING PROPELLER

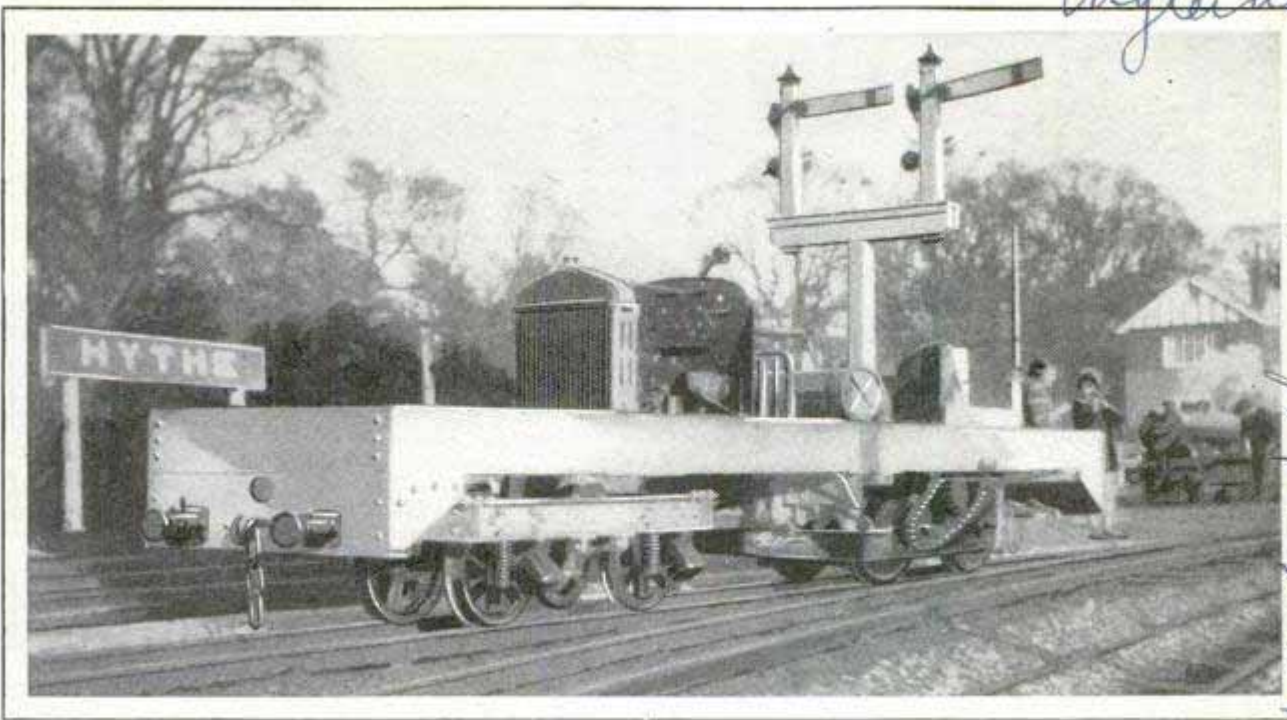
Allowing a large motorboat to be landed on a beach or float, an attachment has been invented for lifting the propeller and

shaft so the craft can be hauled out of the water easily. The lifter is bolted to the stern of the boat. At the bottom is a slot to raise the shaft and propeller. A hanger, with movable joint at the bottom, through which the shaft runs, is carried on the stern attachment so that, by following the leads on the attachment, shaft and propeller are elevated above water. The chamber of the device



is a tunnel slightly larger than the shaft into which the latter fits as the propeller is raised. The shaft is connected to the engine by a universal joint, allowing for the difference in pitch of the propeller shaft when in use and when hoisted.

Mr. Timothy J. Collins, 51 Avon St. Somerville Mass.



© The Motor

In Foreground, an Auto Locomotive Powered with an Automobile Engine, and, at Right, a Pygmy Engine Built Like a Large Locomotive; Both Operate on a Nine-Mile British Railroad

PYGMY ENGINE AND RAIL AUTO ON NINE-MILE RAILROAD

Pygmy steam locomotives and railroad autos—cars powered with automobile engines—operate side by side on a nine-mile stretch of railroad in England. The little locomotives are about one-twentieth the size of the modern engines, but are exactly like the big ones in every essential detail. The auto engine is used to operate a large steel car.

ground. Locusts that come to earth are attacked with poisoned food and with spray pumps that direct deadly chemicals over the insects. Casualties in this war are not counted, they are weighed. In one case, eleven tons of locusts were killed.

MASK FOR TREATING ASTHMA PROVES SUCCESSFUL 304

Asthma is being successfully treated in Berlin with a mask, similar in appearance to the gas masks used by mine rescuers and others. The patients breathe through tubes, which are connected to cabinets in which the curative elements are produced.

FIGHT LOCUSTS WITH FLAMES USED IN WORLD WAR

Flame-throwers and instruments of chemical combat such as were employed in the World War are being directed against the swarms of locusts that descend in clouds over certain areas in Egypt. In one district, eighteen batteries of flame-throwers have been mobilized. They meet the enemy on the move and mow down the swarms that do not show an inclination to settle on the



Asthma Masks Connected to Cabinets Containing Curative Elements; They Are Similar to Gas Masks Used by Mine Rescuers and Others

Science Service News Bulletin 470-A, 3/24/30

Sinai

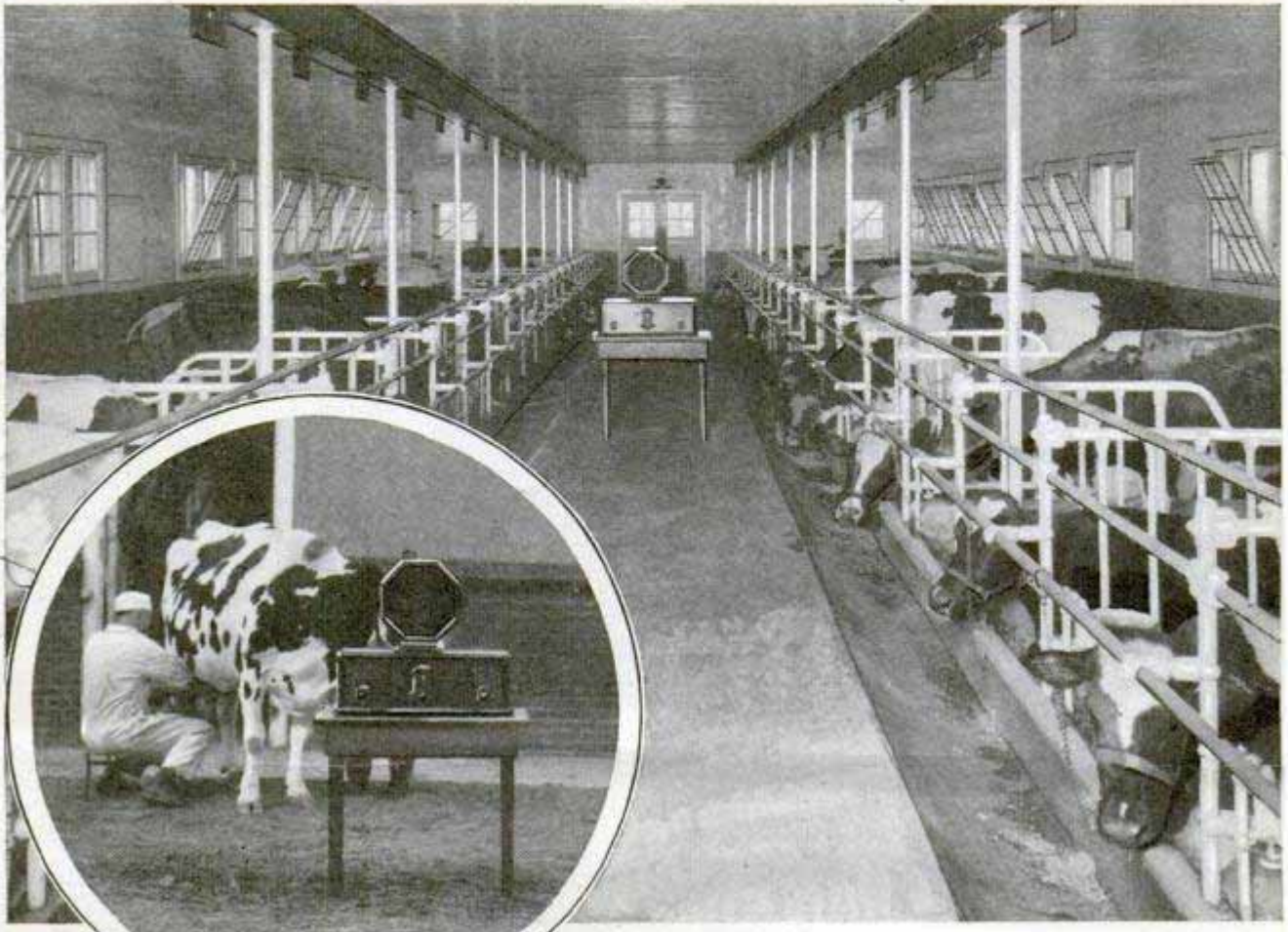
Dr. Frankel and Dr. Uday Levy, with

Com. H. S. Wilkins, Esq. Colombari 29 Ocean Road Brooklyn: Death in London Eng. Deutsche Gasglockhlich Amer. from H. Berlin, O. 17, Rotherstr. 16/9 Germany

Detroit Creamery Co,

Mrs. Clemens, Mich.

*Emb. W. K. Crosson, Jr. 4282
Winter, Detroit Mich*



Above, Radio in a Dairy Barn Which a Detroit Company Claims Has Increased Milk Supply; Left, Milking to Music

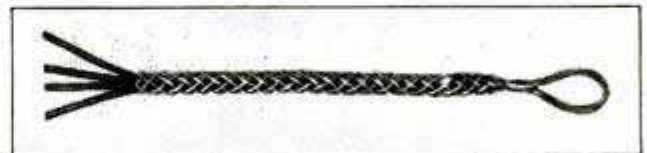
RADIO INSTALLED IN COW BARN INCREASES MILK SUPPLY

As an experiment, a Detroit dairy company recently installed modern radio equipment in the cow barns and found that the milk herd grew to like the music. Since the advent of the radio, dairymen keeping close tabulation found that milk production has increased considerably, the company attributing the increase to the music alone.

GRIP TO PULL ELECTRIC WIRES SAVES TIME AND TROUBLE

Pulling electric wiring through conduits installed in buildings, is simplified with the aid of a cable grip used successfully and saving some 15,000 feet of wire in a large New York skyscraper. It saves stripping off the insulation, bending and twisting the wires and cutting off pieces that usually are wasted. It takes about half a minute to adjust the grip, simply

a net with a loop on the end, and the wires are not twisted, so there is less trouble in testing. The grip can be adjusted to different sizes of wire and various numbers of strands. During the wiring of the Chrysler building in New York, sixteen of the grips were used for the entire 1,500,000 feet of wire, effecting a saving of at least one per cent in the total length, according to engineers. Electricians are also



Cable Grip for Pulling Electric Wires through Conduits, Thus Saving Time and Material

spared the task of cutting the ends of the wires with the attendant danger of slivers and other injuries to the hands.

Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

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*Keller's Products Inc,
6 Warwick St. New York*

*Report you by restriction
James E. Pebles, Manager*

U.S. Bureau of Foreign and Domestic Commerce

**OLD NEWSPAPERS
SOLD TO ORIENT
FOR WRAPPING**

Newspapers which newsboys on the Pacific coast fail to sell are being marketed in the Orient and Central America, to which 48,000,000 pounds of over-issue papers, valued at \$500,000, have been exported in a year. The papers are used for wrapping nuts, foods, seeds, razor blades and other small articles for export.

**FIRE-ALARM UNIT
COMPLETE IN
ITSELF 422**

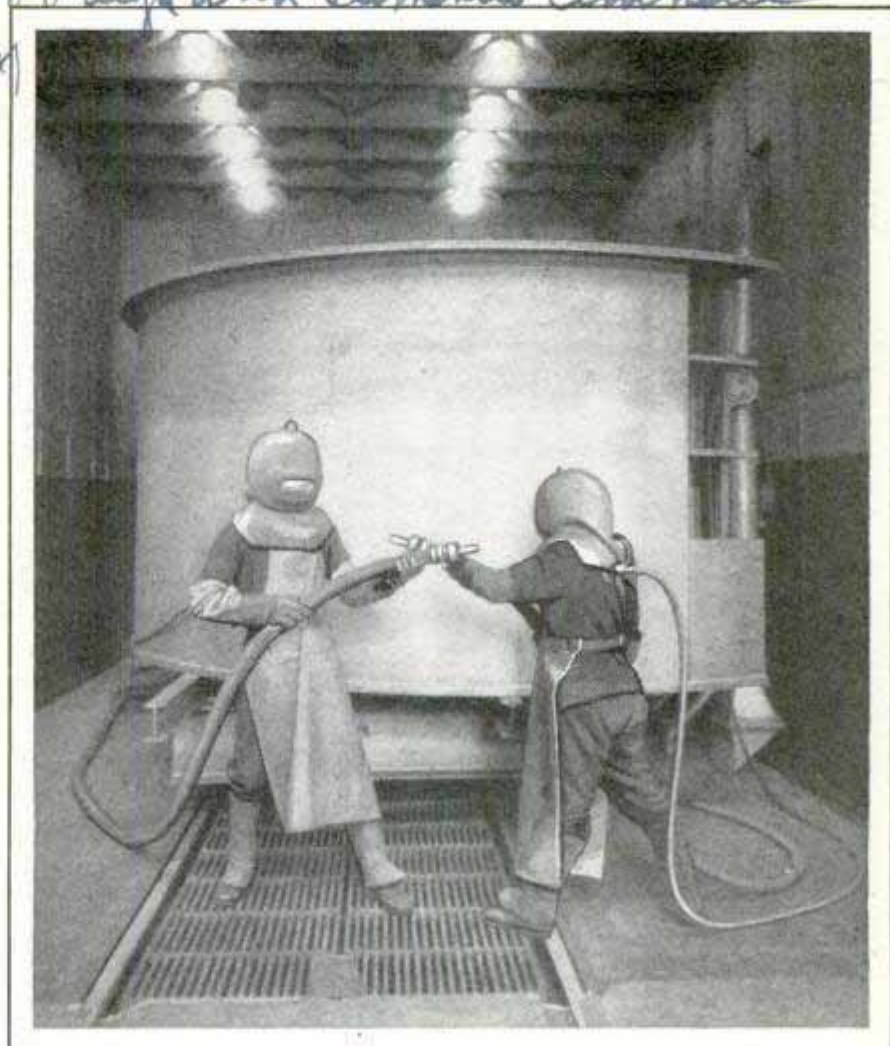
Requiring no wires, batteries or installation cost whatever, a fire-alarm unit, wholly automatic and mechanical in operation, now is on the market. The unit, which is contained in a round metal box with openings about the sides, may be placed on the floor or shelf or hung on a wall. It does not mar or deface furniture as it contains no liquids or acids. The mechanism is so constructed that, at a temperature of 135 degrees, the automatic alarm begins



sounding and continues its warning for a quarter of an hour. This not only alarms the household, but also locates the fire in its early stages.

**STEEL-SHOT SPRAY ON CASTING
CLEANS IT FOR PAINTING 439**

Steel shot, sprayed on castings at the rate of three tons per hour, cleans the surface thoroughly for painting in one of the workshops of the General Electric company. To protect the operators from



Masked Workmen Ready to Spray Steel Shot on Big Casting to Prepare It for Painting; Note Air-Supply Hose

the rebounding shot and to insure a supply of pure air, they wear helmets connected with air hose somewhat like those of divers. Gauntlets and durable aprons are also worn. The steel shot is separated from the dust which it removes from the castings and is used repeatedly.

**TRANSPARENT SLIPPERS SHOW
CORRECT SHOE SIZE 317**

Transparent shoe forms now are being made to insure the correct fitting of shoes, particularly for children. The forms, of various sizes, are of transparent material, and when the feet are slipped into them, it is possible for the wearer or salesman to see where the "Cinderella slipper" pinches or binds the foot.

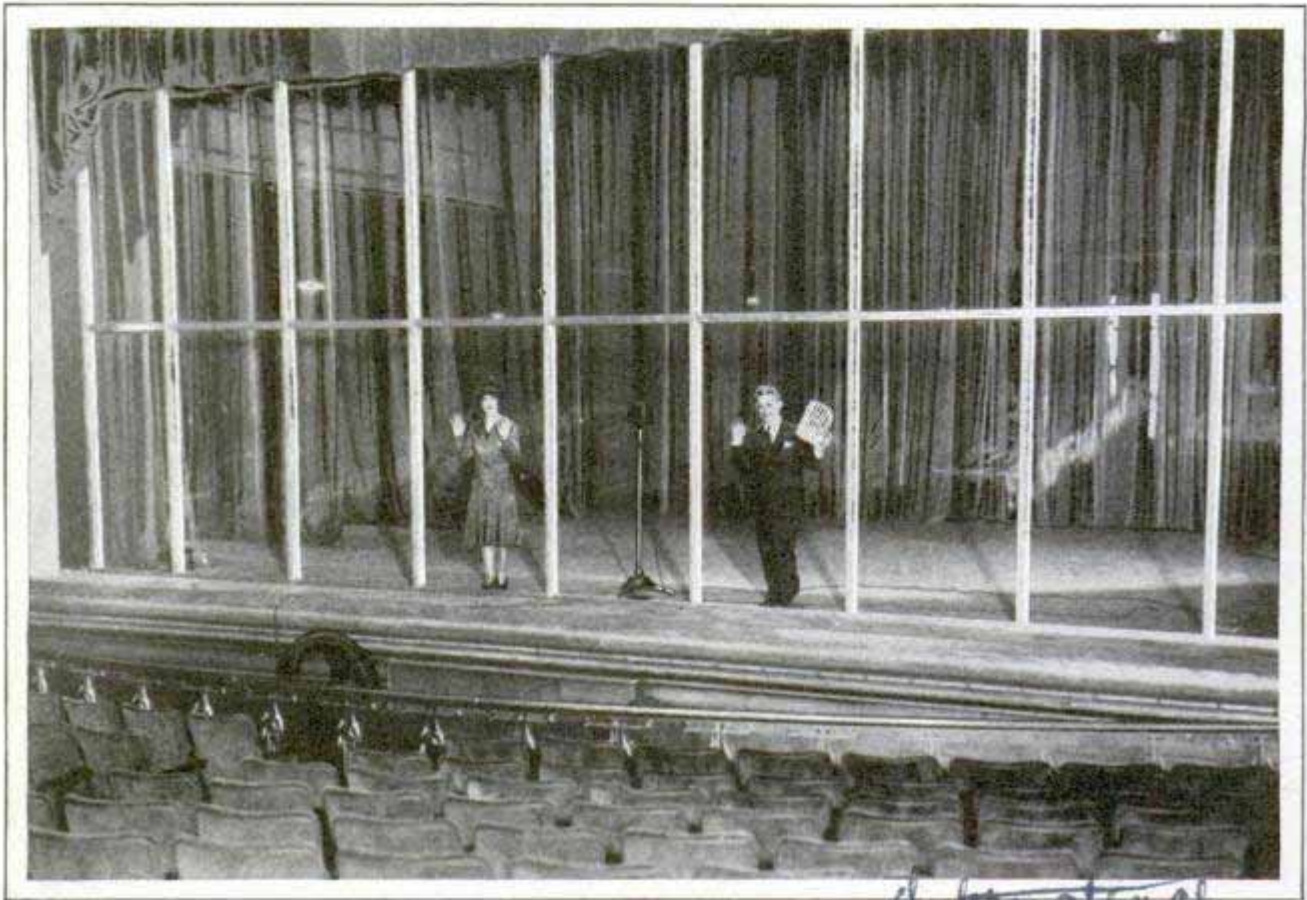


*The Shoe Form
Co., Ambler
N. H.*

*B.S. Harris, News Bureau,
General Electric Co., N.Y.*

*City National Bank Bldg.
Fire Eng. Co.
Automatic Fire Eng. Co.
1000 Broadway*

408 GLASS CURTAIN MAKES RADIO BROADCASTS VISIBLE



Six-Ton Curtain of Steel and Glass through Which Visitors to a New York Radio-Broadcasting Studio Watch the Artists at Work; the Curtain Can Be Raised When More Space Is Needed

To make the work of radio entertainers visible to visitors at the National Broadcasting company's studio in the New Amsterdam theater building in New York, a six-ton curtain of steel and glass has been provided for the front of the stage. In this manner an audience of 600 persons can witness the entire performance through the soundproof glass curtain, or the curtain may be raised to throw both stage and theater auditorium into one vast studio. Loud speakers bring the sound to the visitors beyond the curtain. Twenty-two microphone outlets are provided in the theater, which has been turned into a broadcasting studio to accommodate theatrical talent that otherwise would be unable to leave the footlights for evening radio appearances, and the old projection room, whence the spotlight used to flicker,

has become the control room where engineers, with a view of both stage and auditorium, work the mixing panel to blend the sounds as they go on the air.

321 GASES PASS THROUGH MUFFLER WITHOUT BAFFLE PLATES

Some automobile mufflers now are made with a straight path for the gases, their muffling effect being practically equal to the ordinary kind filled with baffle plates. Instead of being led out by a circuitous route around the plates, thus building up back pressure, the exhaust gases in the latest muffler pass straight



Above, Ordinary Baffle-Type Muffler, and, Below, a Type in Which Exhaust Gases Pass Straight Through

through a perforated steel tube, the perforated section being surrounded by a steel shell which is filled with soft fireproof and sound-absorbing material. This will deaden the noise.

*C. F. Burgess Laboratories,
Inc. Harris Trust Bldg.*

Amnis Square

Germany.

FLEXIBLE GAS PIPE MADE OF ALUMINUM *546*

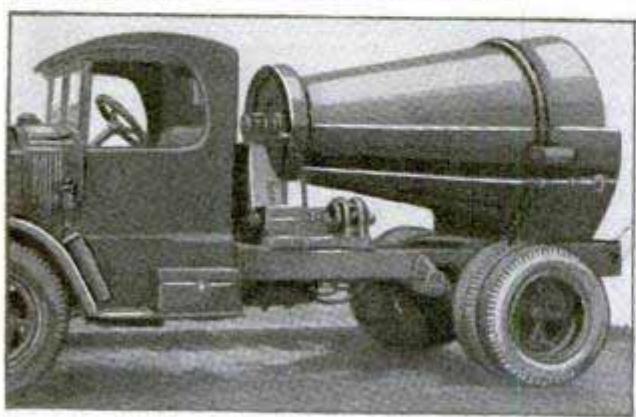
Light, thin-walled drawn aluminum tubing, which can be bent at right angles instead of being cut and screwed into angle fittings, is being used in Germany to replace the heavy iron gas pipes. The tubing can be used in smaller sizes than the latter because of its thinner walls and because it is entirely smooth inside, thus offering less resistance to gas flow. Angles are bent at any point by means of a hand-operated tool employing a clamp and two channeled rollers. Where joints or T-fittings are necessary, self-sealing aluminum castings are used. The tubing is made in sixty-foot coils which may be carried on a man's shoulder.

Science Service Nos. 3/18/30.

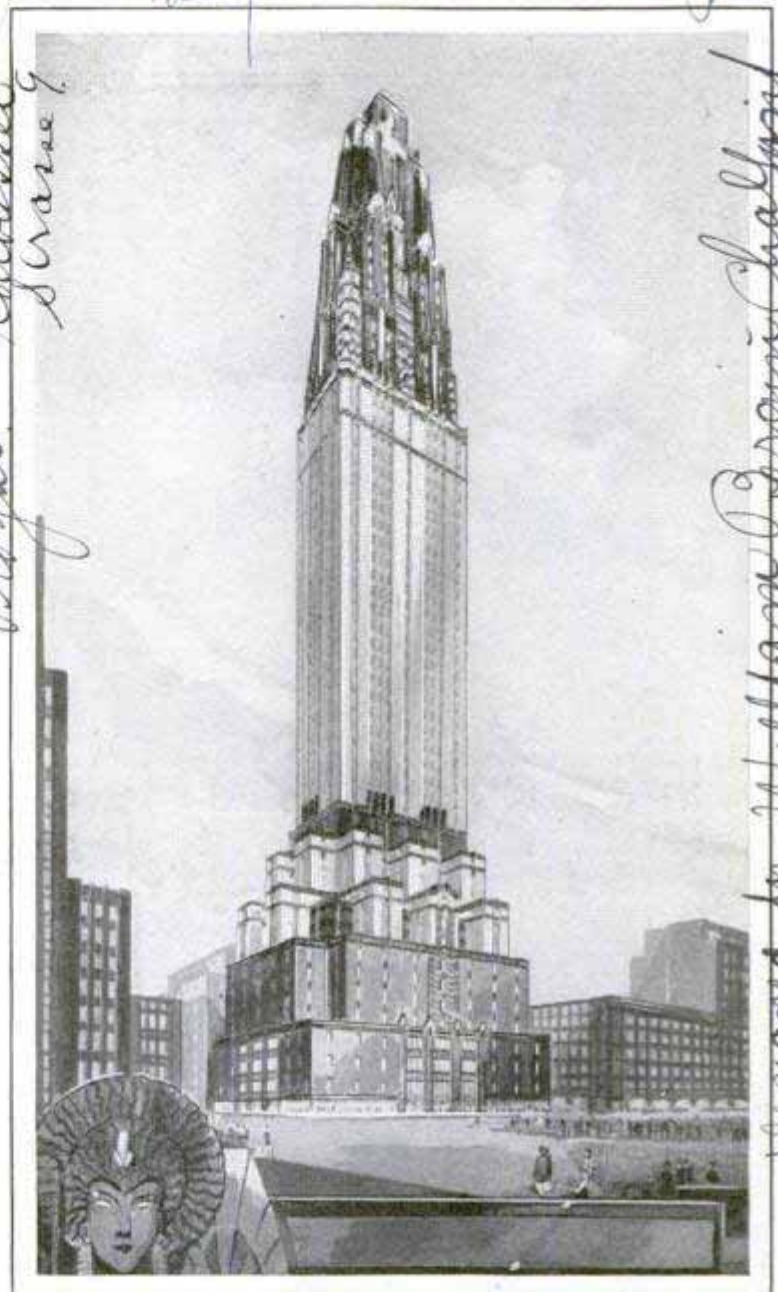
Progressive Science

AUTO CONCRETE CARRIER MIXES AS IT TRAVELS *418*

Intended for mounting on any standard truck chassis, a concrete carrier now is available that mixes the contents as it travels. It consists of a cone which acts as a revolving drum, loading and unloading being done through the same door by revolving the drum to the proper position. When the concrete is in transit, the drum revolves and the contents are not only churned around the axis of the cone but thrown over from back to front as well. It may be operated by electric motor, gas engine or power take-off from the truck.



Concrete Carrier Mounted on a Truck That Mixes Its Contents as They Are Hauled to Destination



Architect's Plan for Sixty-Story Colored Skyscraper; It Is to Be Built of Terra-Cotta Blocks in Various Hues

SKYSCRAPER IN MANY COLORS BUILT OF TERRA COTTA

Colors in all the hues of the rainbow will enter the decorative scheme of a sixty-story fashion building to be constructed in New York. The architect's plans call for walls of polished terra-cotta blocks, so that the structure, when completed, will be the first skyscraper in full color from its base to the tip of its tower.

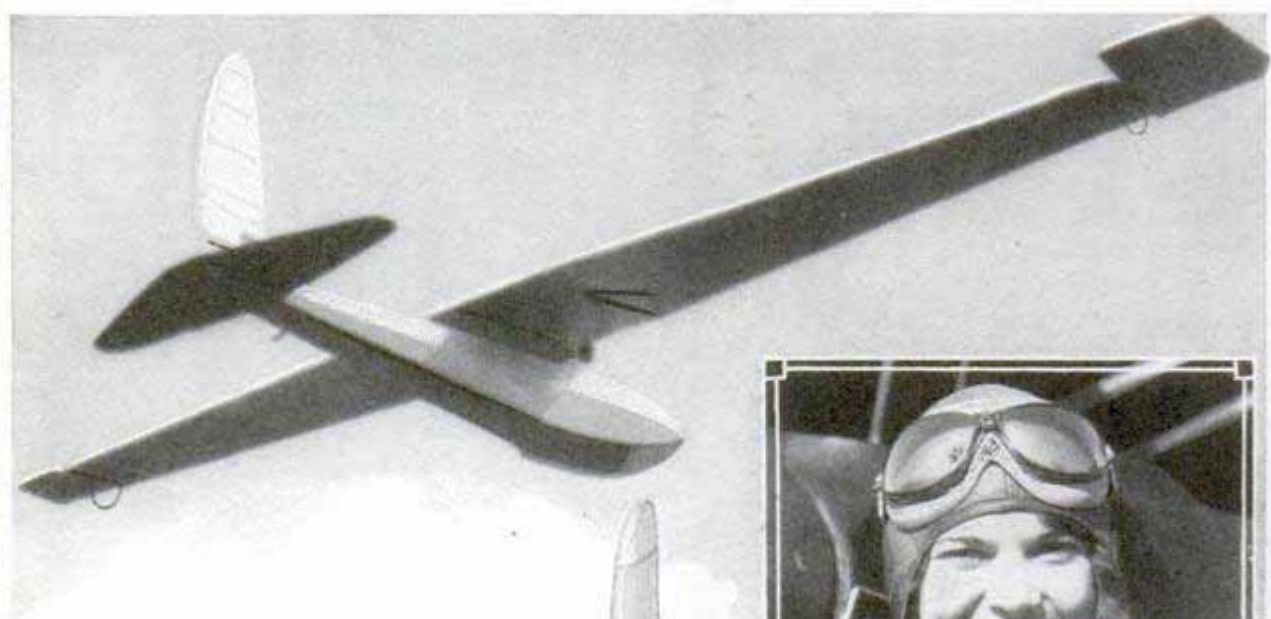
Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information will be furnished free upon application to our Bureau of Information.

Designed by William Darguin Chaffin Pittsburgh, Pa.

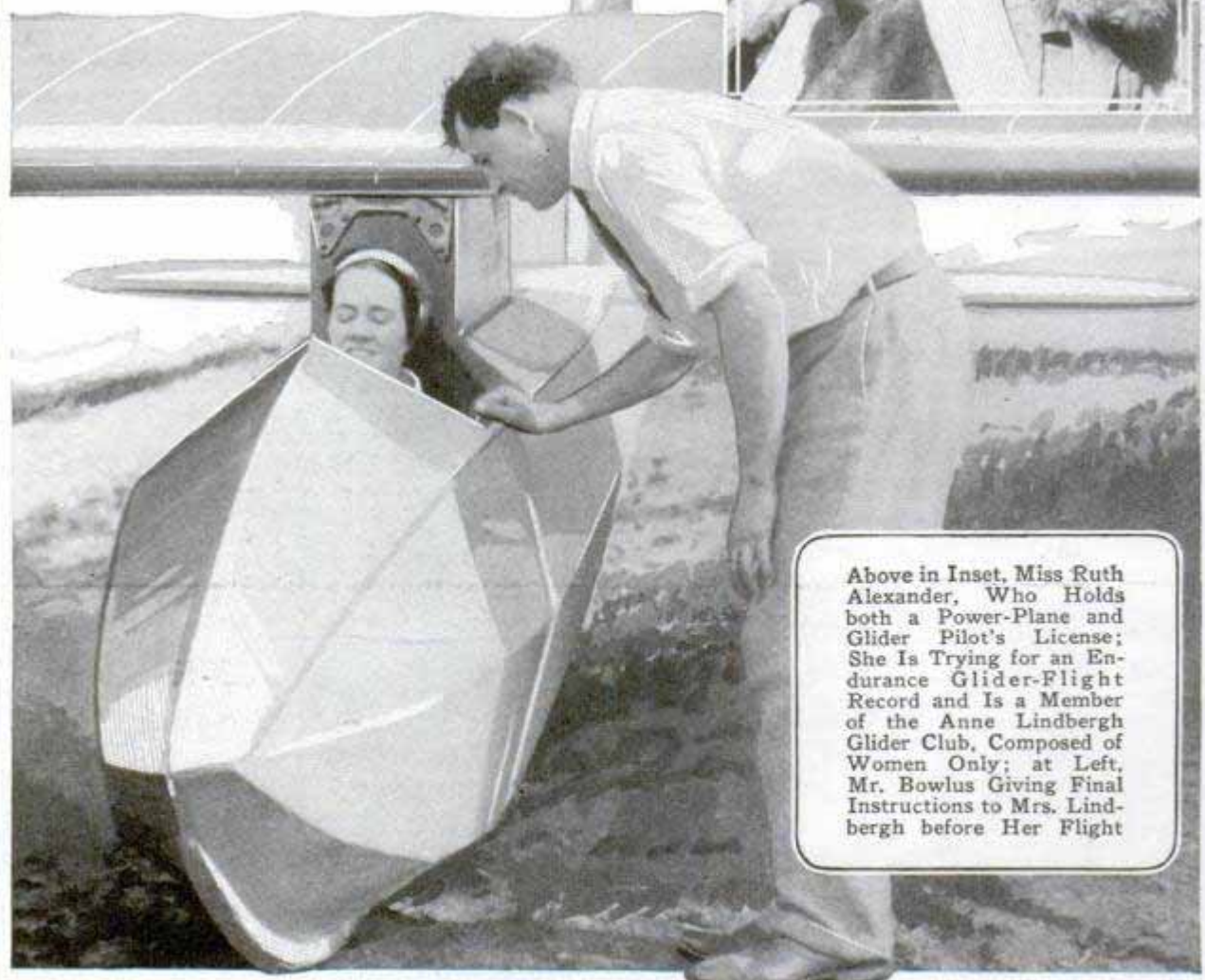
The Park Concrete Carrier Co Domestic Stoker Co

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GIRLS IN TRAINING FOR THEIR GLIDER WINGS



W. H. Bowlus, Flying His Sailplane at an Altitude of Approximately 1,500 Feet above Sea Level; Note the Arrangement of Ailerons at Extreme Ends of Wings and the Large Rudder; the Glider Weighs Only 325 Pounds, Loaded with the Pilot and His Equipment of Instruments

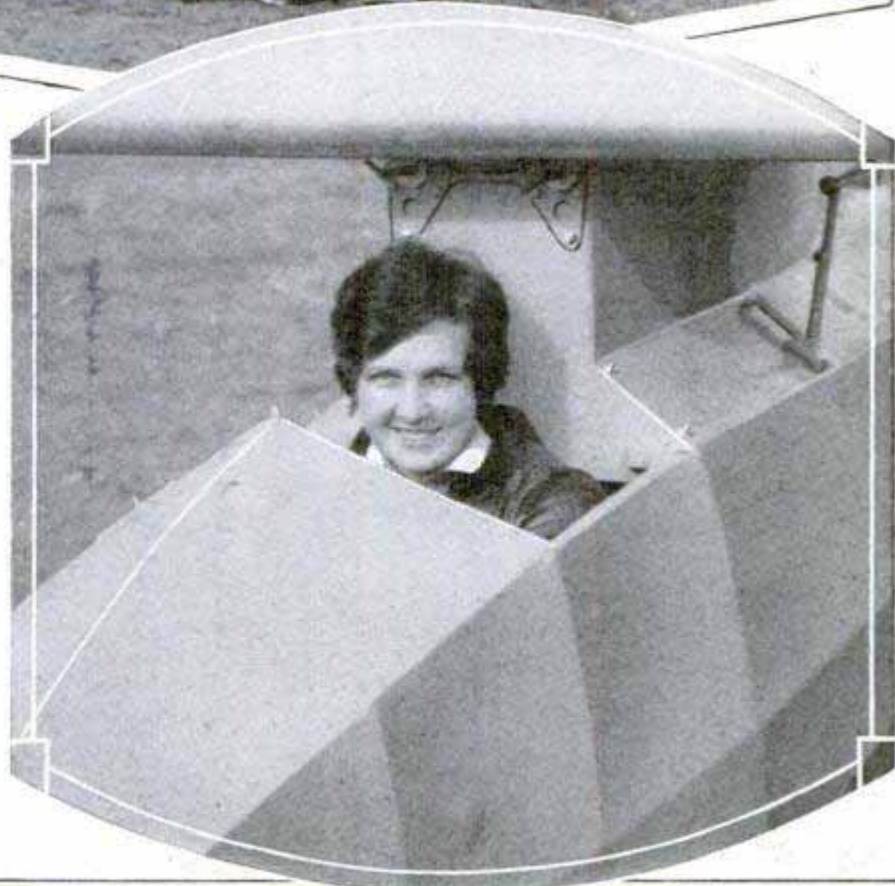


Above in Inset, Miss Ruth Alexander, Who Holds both a Power-Plane and Glider Pilot's License; She Is Trying for an Endurance Glider-Flight Record and Is a Member of the Anne Lindbergh Glider Club, Composed of Women Only; at Left, Mr. Bowlus Giving Final Instructions to Mrs. Lindbergh before Her Flight

FORM ANNE LINDBERGH CLUB ON WEST COAST



Above, Members of the Girls' Glider Organization of San Diego, Preparing to Launch Mrs. Bowlus with the Shock Cord; This Is the Same Glider in Which Colonel and Mrs. Lindbergh Earned Their Licenses as Glider Pilots and in Which Mr. Bowlus Made Record Altitude and Endurance Flights; Center, Members of the Anne Lindbergh Glider Club of San Diego; Mrs. Lindbergh is Honorary President of the Organization; at Right, "Peaches" Wallace, Who Holds First, Second and Third-Class Glider-Pilot Licenses, in the Cockpit of the Bowlus Sailplane; She is Organizer of the Anne Lindbergh Glider Club of San Diego; Due to Wind and Terrain Conditions, Southern California is Well Suited to Glider Flights, and the Success of Many Comparatively Inexperienced Persons Has Caused Many Women and Girls to Seek Licenses as Glider Pilots; Gliding is Encouraged as Splendid Preliminary Training for Flying Powered Planes



Ideal Weighing Machine
 2703 *of Vermont Ave*
 Los Angeles *Calif*
 POPULAR MECHANICS

*Chicago - J. E. Shelby, 552
 W. 63rd Chicago*



New York - Ideal Scales & Weighing Corp. 2703 Vermont Ave

Coin-in-Slot Scale Which Tells Weight on Radio Dial Drum so Only the Patron Can See

SECRET SCALE TELLS WEIGHT ON RADIO DIAL DRUM

Registering the weight on a radio dial drum instead of an open face, so that only the party interested can see the pounds, a coin-in-the-slot weighing machine with several other unusual features now is on the market. It is small and compact, being less than four feet high, and is equipped with screws to level it on an uneven floor. At the top of the front is a space for advertising with detachable cards so that a new one may be inserted daily.

TRANSOCEANIC PHONE SYSTEM LINKS TWENTY NATIONS

Through establishment of transoceanic telephone communication, it is now possible for the phone user to talk to twenty different nations with a population of about 400,000,000 and containing about eighty-five per cent of the world's telephones. These include most of the European continent, Great Britain, Spanish Morocco in Africa, Cuba, Mexico and, very soon, Argentina, Brazil and Uruguay. Three short-wave radio circuits are employed in telephone-radio com-

*Cont. O. H. Loynes
 324 Edgewood Ave*

munication between the United States and Europe, and an average of about fifty calls a day go across the Atlantic, of which nearly half are social conversations. One-half the transatlantic calls are made to England alone. The radio transmitters for the short-wave systems are located at Lawrenceville, N. J., and reflectors are used to concentrate the energy over the great circle route to the distant European receiving station, so that comparatively weak transmitters may be employed. The receiving station for short-wave circuits is at Netcong, N. J., and also uses a reflector system to improve signal strength.

MIRRORS ON GOLF-CLUB HEAD AID TO PERFECT SHOTS

Sir James Henderson, British scientist, faced with the usual troubles of the golfer, invented a club whose head contained two mirrors to aid him in perfecting his form, and the device has proved so successful that it is being placed on the market in England. When the head is placed against the ball, the mirrors reflect the light from a lamp set beside the ball. Unless the club is in correct position, the light is not reflected from both mirrors. The mirror and light arrangement, which also induces the golfer to keep his eye on the ball to watch for the flashes signaling a perfect shot, may be used indoors or outside.

Director of Research to the Admiralty



Golf-Club Mirrors in Head Which Reflect Light from Lamp to Indicate Perfect Stroke

*Sir James Henderson
 38 Blackheath Park*



Turntable for Airplanes at Croydon Airdrome in London; It Is Not Used like the Ordinary Turntable to Wheel the Ships End for End, but as an Aid in Adjusting the Plane's Compass

World

TURNTABLE FOR PLANES AIDS IN ADJUSTING COMPASS

Croydon airdrome in London is equipped with an airplane turntable, but it is not used in the ordinary manner of such a device to turn the ships end for end. It has been found an aid in adjusting the compass in the cockpit of a plane. A machine is wheeled onto the turntable and revolved until its nose points due north, when the compass is checked and set.

of that form of life. The discovery, however, is expected to afford an interesting study for scientists on the manner of origin of life. If life originates spontaneously, some scientists believe that agar, a jellylike substance, would be a proper medium in which it might develop.

ARTIFICIAL BACILLI AID STORY ON ORIGIN OF LIFE

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While examining agar, a substance made from Japanese seaweed and used in bacteria culture, Dr. Charles B. Lipman, of the University of California, saw through his microscope what appeared to be contaminating organisms, which, upon examination, were found to be artificial bacilli. The bodies took the elongated shape of bacilli and absorbed dyes as true bacilli would. While not found in untreated sterile agar, they appeared as soon as the product was mixed with a solution of sterile tap water and salt or sterile sea water, and then subjected to heat. In fact they withstood a steam bath for fourteen hours at 266 degrees. Doctor Lipman expressed the belief that the bodies of the agar which simulate the appearance are not living bacilli, but crystallizations

POCKET DRAWING INSTRUMENT MAKES SKETCHING EASY

Sketching designs and figures is simplified with a pocket drawing instrument now available which accomplishes most of the work for which a set of drawing tools, angles, French curve and T-square ordinarily is required. It is made of transparent celluloid accurately graduated and



Pocket Drawing Instrument Used for Work Ordinarily Requiring Complete Set of Drawing Tools

with the combination set angles, parallel lines, curves, circles and degrees are obtained without any other equipment than a pencil and a thumb tack to hold the set in proper position.

W. J. James 3/20/30

Prof. of Plant Physiology

Universal Designing Instrument Co. 310 V. St. Angeles, Calif.

Angels. Calif

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The Property Man Stars in This Important "Stunt"; with Insurance Rates at High Figures, the Added Risk of Wet Grounds Justifies Postponing the "War" to Another Day

By H. H. DUNN, 4351 Georgia St. San Diego, Calif.

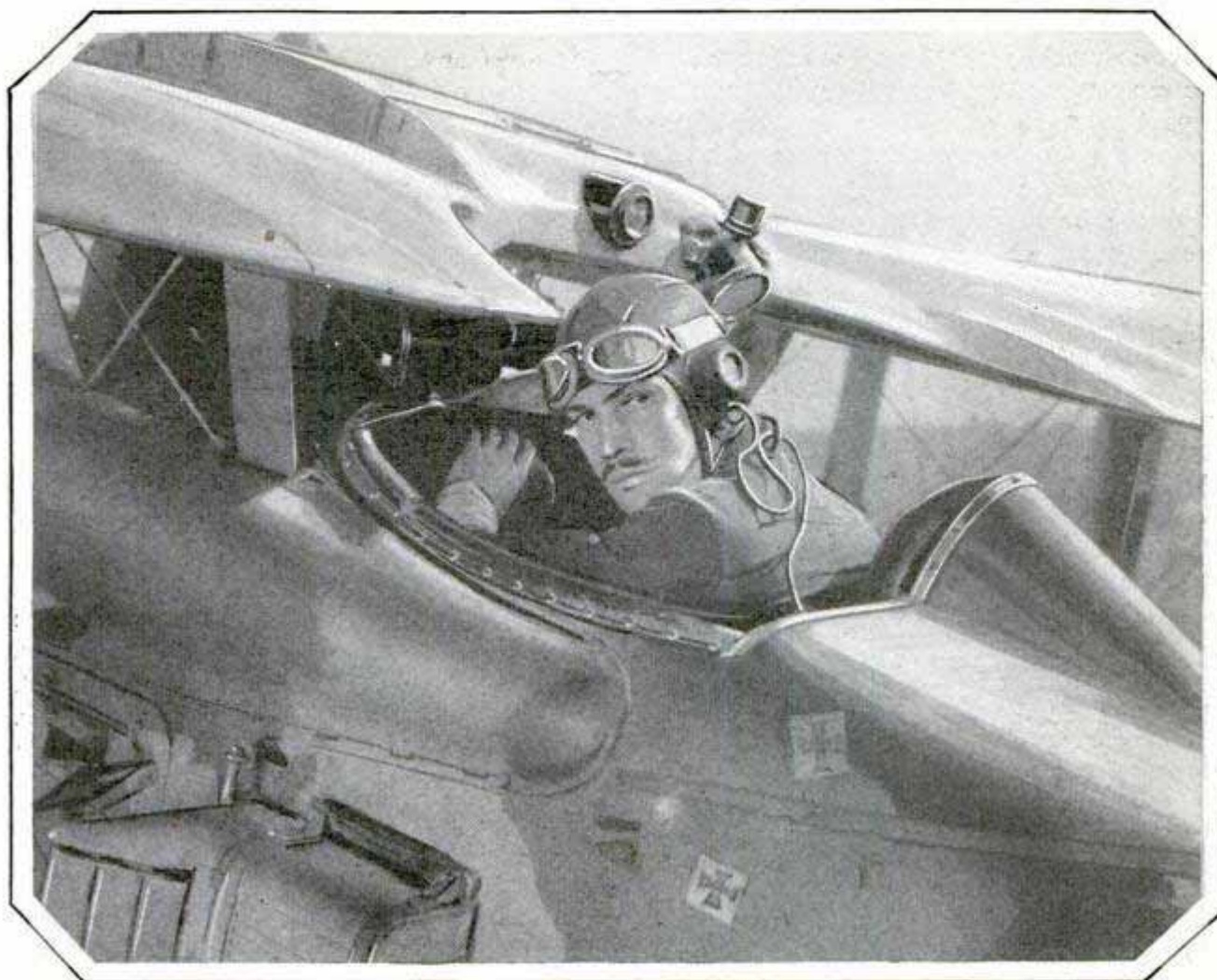
HALF a mile in the air, thirty-five combat planes, each spitting fire from a machine gun, circled and dived, zoomed and rode one another's tails. Still farther above, a giant Gotha bomber, tri-motored, hovered on vast wings, dropping now and again a bomb to explode in a cloud of lampblack. Among the fighting planes flew two others, exactly similar but armed only with automatic cameras. Above, on each side and below, four other camera planes clung to the skies. The rattle of machine guns, beating against the roar of the bombs, rolled in waves to the microphones in the camera planes.

Three pilots, in the midst of the dog fight, glanced at their watches. Two of them, dipping like falcons, turned their machine guns on the third. For a moment he fought back, looping, rolling, falling, standing on his tail, in a vain attempt to escape them. A camera plane, its pilot working his ship and the film at the same time, pictured the two-to-one fight. Sud-

denly the single battler turned in flight. His two enemies dipped upon him. He pulled a cord. A cloud of black smoke burst from his plane. He side-slipped, rolled completely over, fluttered down for a thousand feet, pulled out, went into a nose dive, and, at ninety miles an hour, crashed into the earth, while the ground cameras picked him up where the aerial photographers left off to return to the battle.

The stunt pilot staggered from the wrecked cockpit and the cameras stopped. Meanwhile, back up in the air, another stunt flyer glanced at his watch, flew beneath the bomber, which dropped an "egg" to cover his plane with imitation smoke. The pilot set his controls, crept out on the fuselage, pressed a button and leaped clear of the plane, pulling the cord on his parachute after he had fallen such a distance as to take him out of the range of the cameras.

The button he had pressed fired a fuse,



Close View of Cockpit of Stunt Flyer's Plane; It Is Reinforced with Extra Steel, and Cushion behind Pilot Is Air-Inflated and Holds Strong Spring to Reduce Shock

and, as he cleared the field of the film, the plane was blown to splinters by the explosive in the cockpit. The pilot landed safely in a field two miles from the scene of the aerial battle. The motor of the blasted plane buried itself completely in the earth. Man after man, the stunt pilots in the planes destined for defeat in this largest of all aerial motion-picture battles, either crashed their planes, fluttered to broken and equally dangerous landings, or leaped for life as their ships went down in flames.

Audiences, thrilled by aerial battles and airplane stunts on the screen, speculate audibly on "toy airships," "planes strung on wires," "straw pilots," "dummy flyers," and other so-called fakes. Yet you may be sure that whenever you see a movie airplane falling apparently out of control, crashing against the earth or plunging beneath the sea, there is a man in it. Death rides on both wings and in the cockpit of these planes, yet there never is a lack of competent flyers ready to take up the next

stunt ship. There are, in Hollywood alone, more than one hundred experienced aviators listed as stunt flyers with all the studios.

One aerial battle alone required little more than one minute for presentation on the screen, yet it cost rather better than \$160,000, and more than a month was spent in preparation of planes and training of pilots in the evolutions necessary to make it a success. And this is the most dangerous form of stunt flying.

"I would rather crash half a dozen planes on the ground, in the water, or through buildings, than take my chances in one aerial combat," said Frank Tomick, one of the most experienced of the stunt flyers. "I am that way, too," added Dick Grace, who, at the end of January, 1930, crashed his thirty-third plane in pictures. Grace has the longest and most thrilling record of all the stunt pilots of Hollywood, but, like Tomick, Clarke, Nomis and others, he does not like the dog fight.

165-

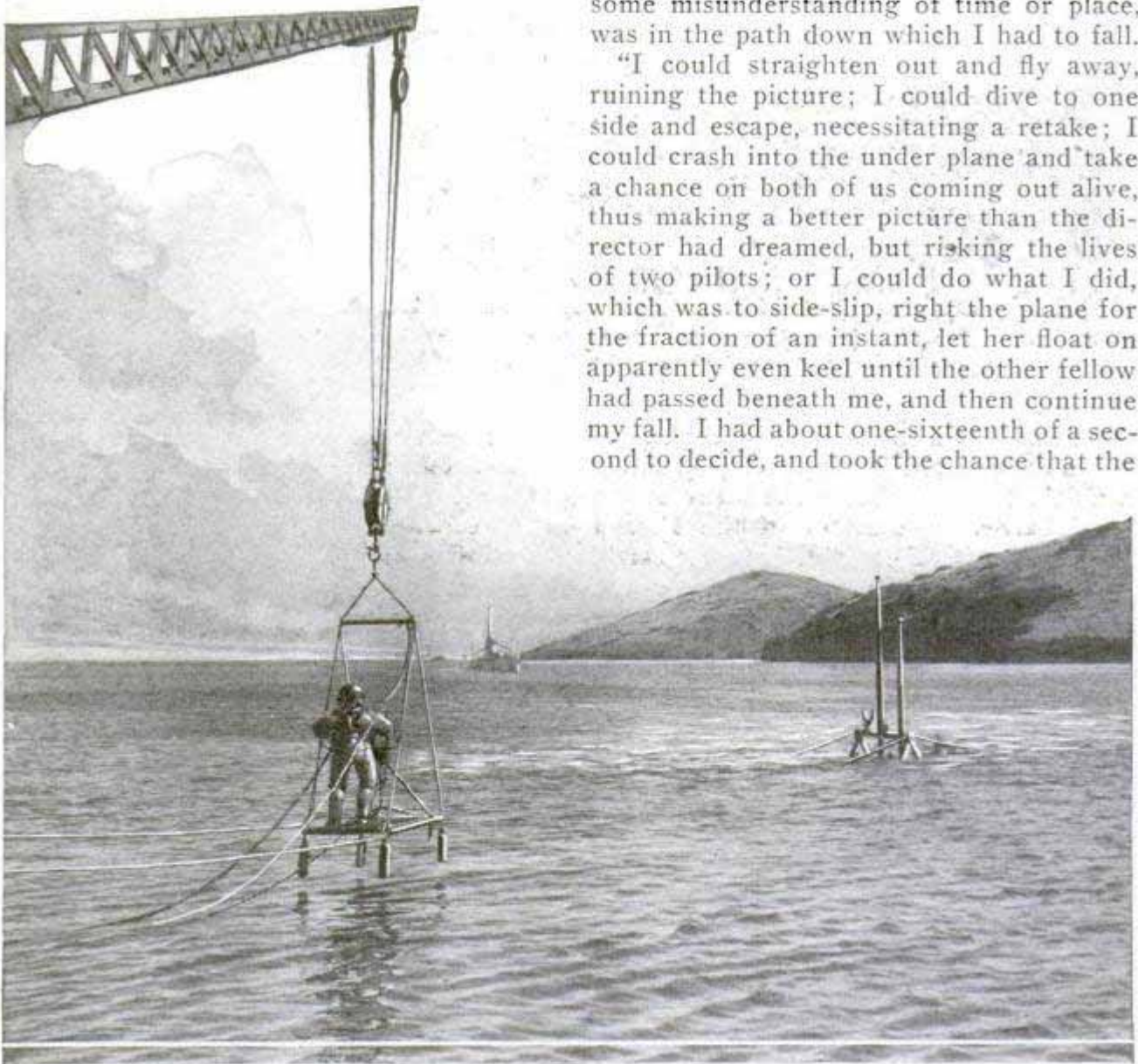
For an aerial-combat picture, every move is worked out on a blackboard, and the exact time set for every pilot to make a particular move. If any pilot fails to remember his program, or misses the time by even a few seconds, there is very likely to be disaster for one or more of the planes. In "Hell's Angels," for example, thirty-seven pilots had to do exactly the right thing at the right time—and they did it. The stunt pilot who crashes a single plane, even though he break his neck, as Grace did in the making of "Wings," has all the responsibility, all the detail, all the direction, in his own hands. He cannot blame the other fellow.

Grace has crashed planes into the earth at sixty to ninety miles an hour. His method is to come down at the speed

at which he plans to smash up, then lift his ship slightly, drop it again, side-slip and take off one wing, slip the other way, crash the other wing, and then throw the plane forward on its nose in the final demolition of the ship. This gives him time to slacken speed before the finishing crash and reduces the force which the cockpit and his body have to meet.

"The greatest thrill I ever got, in the war or in pictures," said one stunt flyer, "was in a comparatively small movie dog fight, when three planes were supposed to shoot me down. I was wavering about, wobbling in the air, my plane under perfect control, but apparently falling to destruction under the machine-gun fire of the 'enemy' planes, when I saw, directly beneath, another plane, which, through some misunderstanding of time or place, was in the path down which I had to fall.

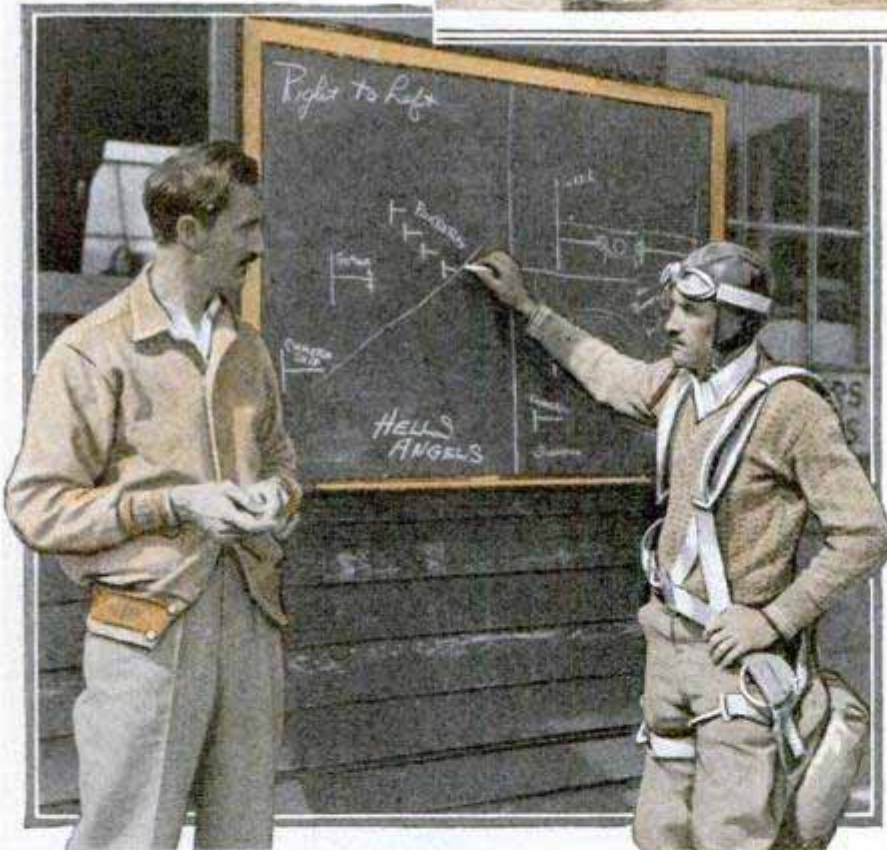
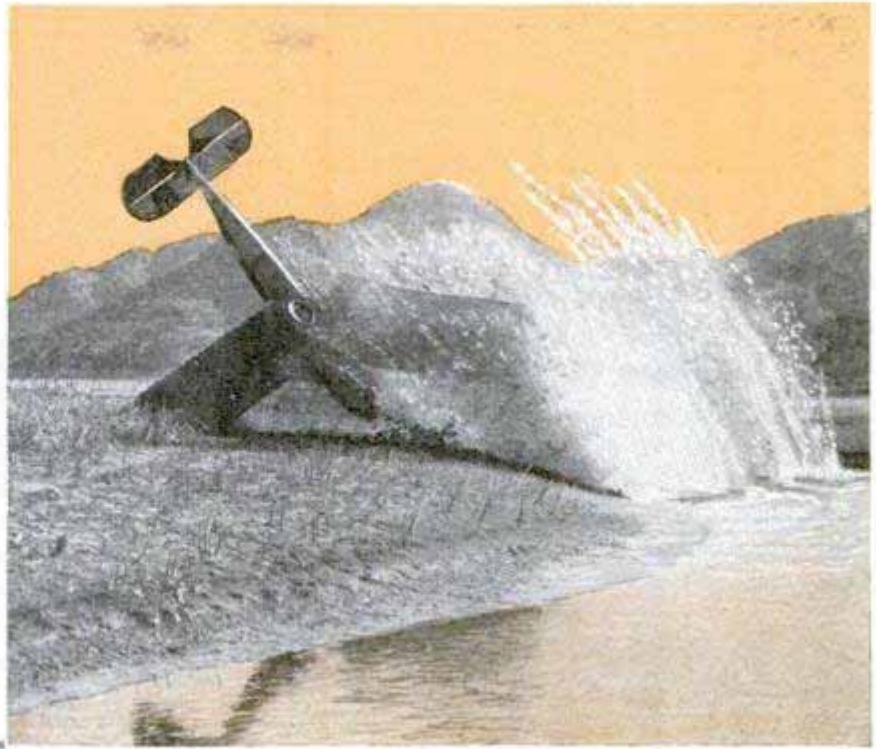
"I could straighten out and fly away, ruining the picture; I could dive to one side and escape, necessitating a retake; I could crash into the under plane and take a chance on both of us coming out alive, thus making a better picture than the director had dreamed, but risking the lives of two pilots; or I could do what I did, which was to side-slip, right the plane for the fraction of an instant, let her float on apparently even keel until the other fellow had passed beneath me, and then continue my fall. I had about one-sixteenth of a second to decide, and took the chance that the



Stunt Cameraman with His Sixty-Five-Pound Camera and Dressed in Diving Equipment, Going Down to Film the Outside of a Submarine beneath the Waves

pilot beneath would continue on his course. He did. I missed his plane with one of my wings not more than a foot, wobbled into a falling leaf just beneath him, and crashed, literally with my heart in my mouth—not because of the solid earth I was going to hit, but because of the flying plane I had missed."

In a recent war play it was ordered that three planes, armed with machine guns, were to "strafe" a small enemy force, which was to flee into a large barn, built for the purpose. Two of the



At Top, Pilot "Bringing Her Down" on One Wing to Save His Life, and Working Out the Sequence for "Hell's Angels"

planes were to zoom away after an adversary plane, while the third was to follow the land force into and through the barn, at the same time raking the infantry with machine-gun fire. When the barn was completed—built of wood, not paper—it was found that the ends through which the plane had to pass were only

about two feet wider than the wingspread of the ship. The pilot realized that he could not watch both wing tips, keep his plane not more than ten feet off the ground, operate his machine gun, and lift the ship into the air again, if and when he had passed through the barn.

He ordered a small white square painted exactly in the center of the end at which he was to enter, precisely fifteen feet from the ground. The three planes strafed the infantry, which fled into the barn and escaped out the doors in the side away from the cameras.

The two planes lifted over the barn as an enemy plane showed for an instant in a corner of the film. The stunt pilot started his machine gun, set the nose of the plane on the white mark, crashed into the barn, his gun roaring into the microphones, smashed through the rear end and rose into the air again as if nothing had happened.

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This pilot's plane, of course, carried steel bars along the front edges of the wings, a sharp-pointed steel shield covering the motor and was closely ribbed along the fuselage with steel tubing. It was, in brief, a winged knife, slashing, at eighty to ninety miles an hour, through everything that stood in its way. The pilot was not even bruised.

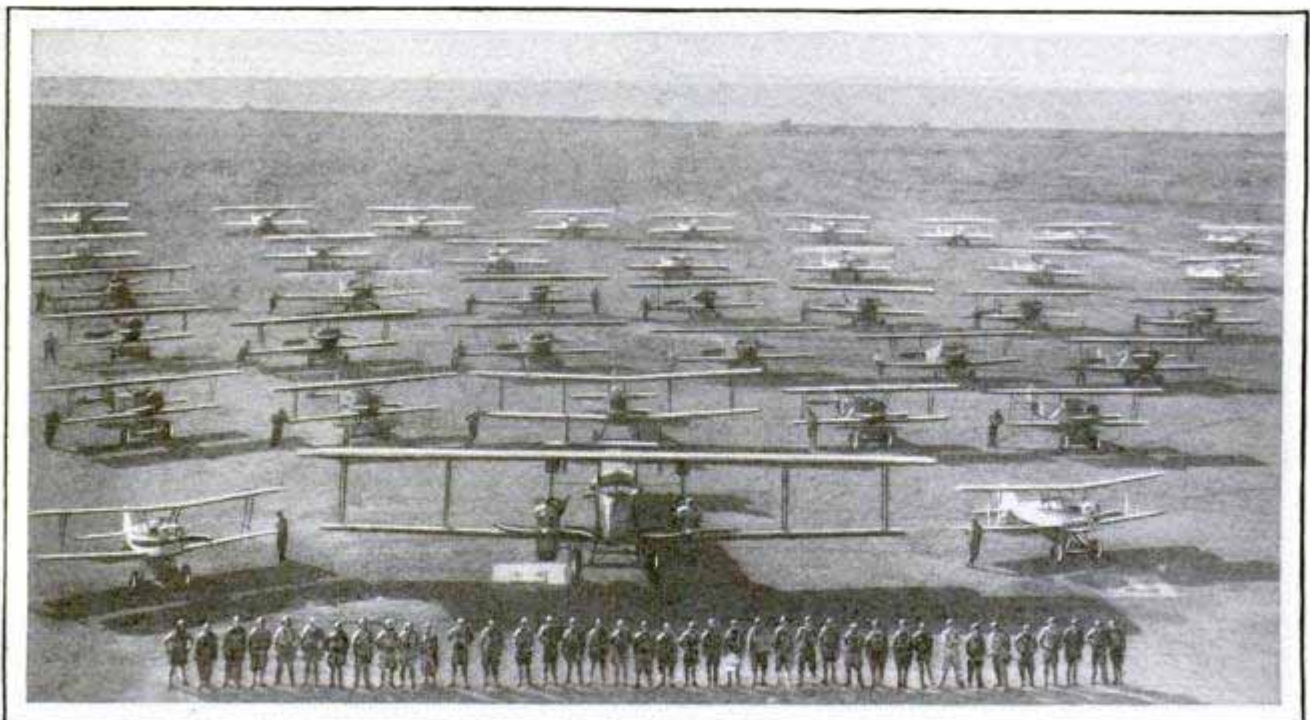
Smoke is a greater terror to the stunt flyer in pictures than fog or any other natural obstacle. Yet he plunges into it and through it with as little hesitation as he would drop through a cloud. In a recent film, the script called for an airplane rescue of a woman and child from a mountain cabin surrounded by a forest fire. The company waited for a still day. The forest fire was started, the ring of flames circled the cabin. The stunt flyer lifted his ship above the blaze, skimming the tops of the flaming trees and dropped into the clearing. He rushed into the cabin, carried the woman and child to the plane and climbed in. Barely had the motor started when a sudden gust of wind, coming out of a quiet sky, swept the flames down on the cabin and on the plane.

In the script, the flyer should have taxied around one side of the cabin, to give the audience a longer thrill, but, in fact, he ran straight at the blazing struc-

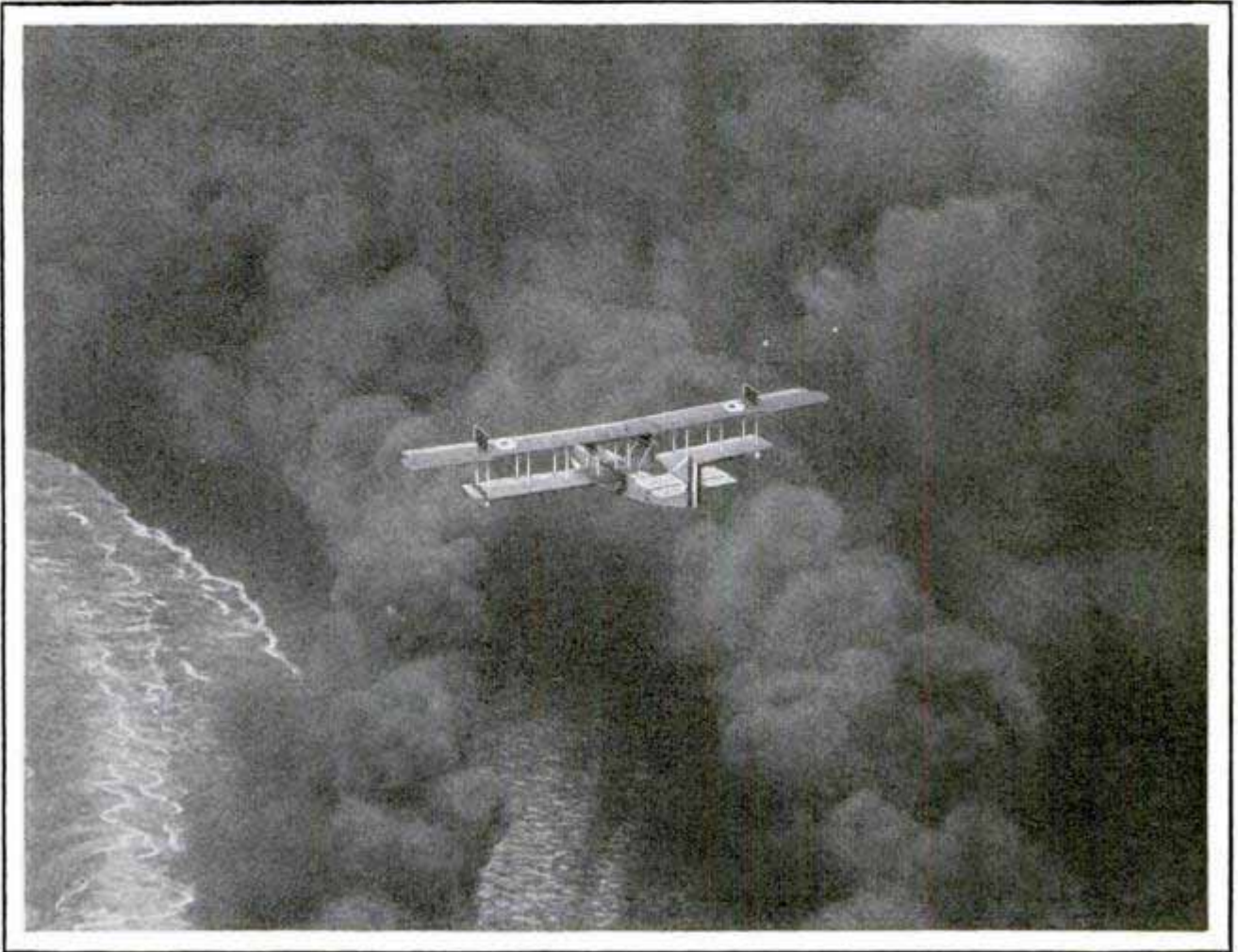
ture, lifted the nose of the plane sharply in the air, and, with his landing gear crashing the top of the cabin, scraped his way into the air and safety. As it was, he made a landing before the cameras with his ailerons ablaze. Complete training, steel nerves, and that flash judgment which amounts to inspiration, are the fundamental qualifications of the stunt flyer in motion pictures. Sometimes, indeed, the stunt pilot does things, under the spur of necessity, which no director would ask him to do, and no writer dare imagine.

Such an incident came and went in the space of a few seconds in the making of a picture filled with automobile, boating, diving, swimming and aerial stunts. In one sequence, the stunt flyer was to rescue a woman thrown from a "crashed" boat, by trailing a rope ladder within arm's length of the heroine as she struggled in the water. To do this, the pilot used a plane with an open-bottom cockpit, so that he could see what went on below. As he released the free end of the rope ladder, he saw that one of the ropes, near the bottom of the ship, was very nearly cut in two, where it had been wearing on an iron bar. Obviously the ladder would not bear the weight of the woman.

Dropping to his knees, and swinging the automatic camera's eye into the cockpit, the flyer pulled up the ladder until he



More Than Thirty Fully Equipped Planes, a Huge Gotha Bomber and Six Additional Camera Planes Staged a \$160,000 Dog Fight That Lasted But One Minute on the Screen



Smoke Is One of the Greatest Dreads of the Stunt Flyer, For It Blinds Him; Here a Plane Is Plunging into a Smoke Screen Laid Down by a Squadron of Destroyers

could thrust his head between the two upper rungs and take the weight on his shoulders. Then, steering and controlling the ship with his hands, he dropped the end of the ladder to the woman in the water and held her safely as she clambered up to the plane, while he zoomed away into the sky. The result was a thrill within the cockpit added to that which the land cameras had recorded on the rescue at water level.

Every time the stunt flyer steps into his plane, he literally and figuratively takes his life in his hands. Yet the percentage of casualties among stunt flyers, in proportion to the number engaged in making aerial motion pictures, is far below that among commercial and mail pilots, according to the motion-picture companies employing these daredevils on wings.

Rewards for stunt flying in the movies are large. It is reported that Dick Grace received \$3,500, and all hospital and medical expenses, for the crash in which he broke his neck. Clarke and Tomick have

been paid as much as \$2,500 each for crashes. Lesser lights among the stunt pilots average from \$250 for picking a woman off a moving train to \$1,500 for crashing a plane into the earth, the sea or a building.

In most instances, the motion-picture companies supply the planes used, having them rebuilt to the specifications of the pilot who is to fly them in the stunt. Such planes, in addition to being pictorially accurate, are reinforced until they are considerably stronger than the planes usually flown commercially or even in war.

In the long run, the great majority of these hundred or more aerial daredevils could earn more and, probably, live longer, at commercial or mail-plane flying, but they are of that temperament which demands excitement, possibly a heritage of the World War, in which a number of them took part.

☐ Outboard motors are now equipped with electric starters.

General & Camera Co., Alliance, Ohio

Science Service 470-C. 3/26/30

968

POPULAR MECHANICS

52 B



Incinerator That Requires No Fuel, the Inflammable Refuse Providing Heat to Burn the Garbage

REFUSE INCINERATOR FOR HOME REQUIRES NO FUEL

For homes using oil or gas for furnace heat, a type of incinerator is available that requires no fuel to operate. The paper and inflammable refuse provides sufficient heat to dry and consume the garbage. The refuse is lighted at the top instead of the bottom, and the flue connecting the chimney has no effect on the draft to other parts of the house. For the average home, the refuse is burned twice a week. Little ash is left, and this may be used for fertilizer.

PLANET FOUND BY MICROSCOPE ON PHOTOGRAPHIC PLATE

The recently discovered planet was first detected with the aid of a microscope and on a photographic plate, instead of being seen in the sky through a telescope, officials of the observatory at Flagstaff, Ariz., explain. This is the way most celestial discoveries are made. The first photograph of the planet was made January 21,

Lowell

but the body was not detected until C. W. Tombaugh, staff assistant, made another plate of the same part of the sky a few nights later and compared the two under what is known as the "blink microscope." In this apparatus, two plates with strong lights behind them are so adjusted that either may be seen through a powerful microscope simply by moving a lever. If the two are exactly similar, there will be no change in the position of the stars, but if one of the bodies is a moving planet or a comet, the change in position will be revealed by an image that seems to dance back and forth as the lever is moved, or as the astronomer says, "as the plates are blinked." The spot of light that later proved to be a planet was thus seen through the "blink microscope." The plates were then used as a guide and the planet actually seen through the telescope.

LUGGAGE CARRIER ON BUMPERS LEAVES SPARE TIRE FREE

Attached to the rear bumpers so that it does not interfere with access to the spare tire, a handy luggage carrier for the auto now is on the market. It is held rigidly in upright closed position by a friction lock, and when pulled down into carrying position, a guard rail automatically adjusts itself about the rack. It will carry up to 300 pounds of baggage, is quickly attached and may be obtained in black enamel or stainless steel.

Par Baggage Master



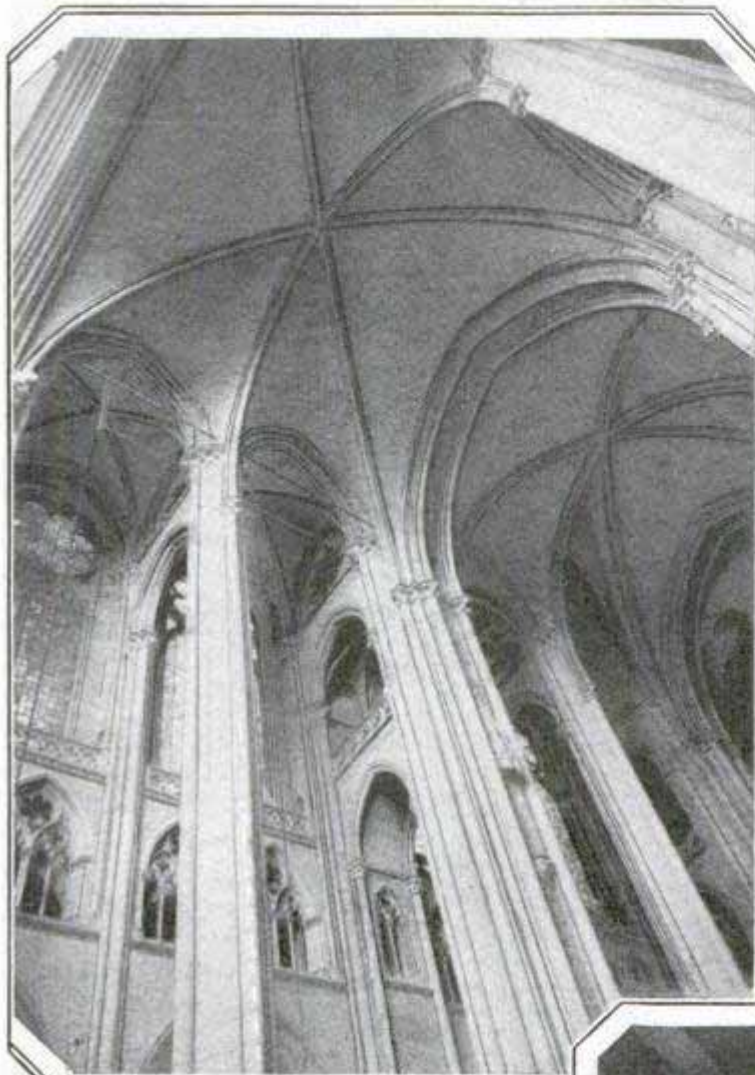
Auto Luggage Carrier Attached to Rear Bumpers, Thus Affording Easy Access to the Spare Tire

Peters & Cuspell Inc.

595

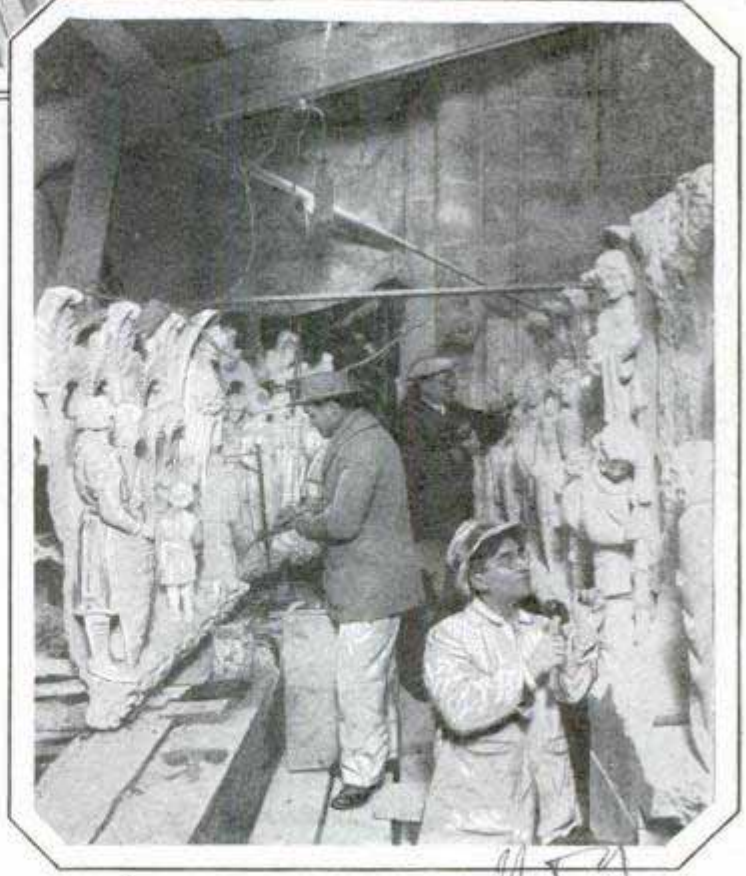
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FINEST NEW WORLD CATHEDRAL REVIVES OLD ART



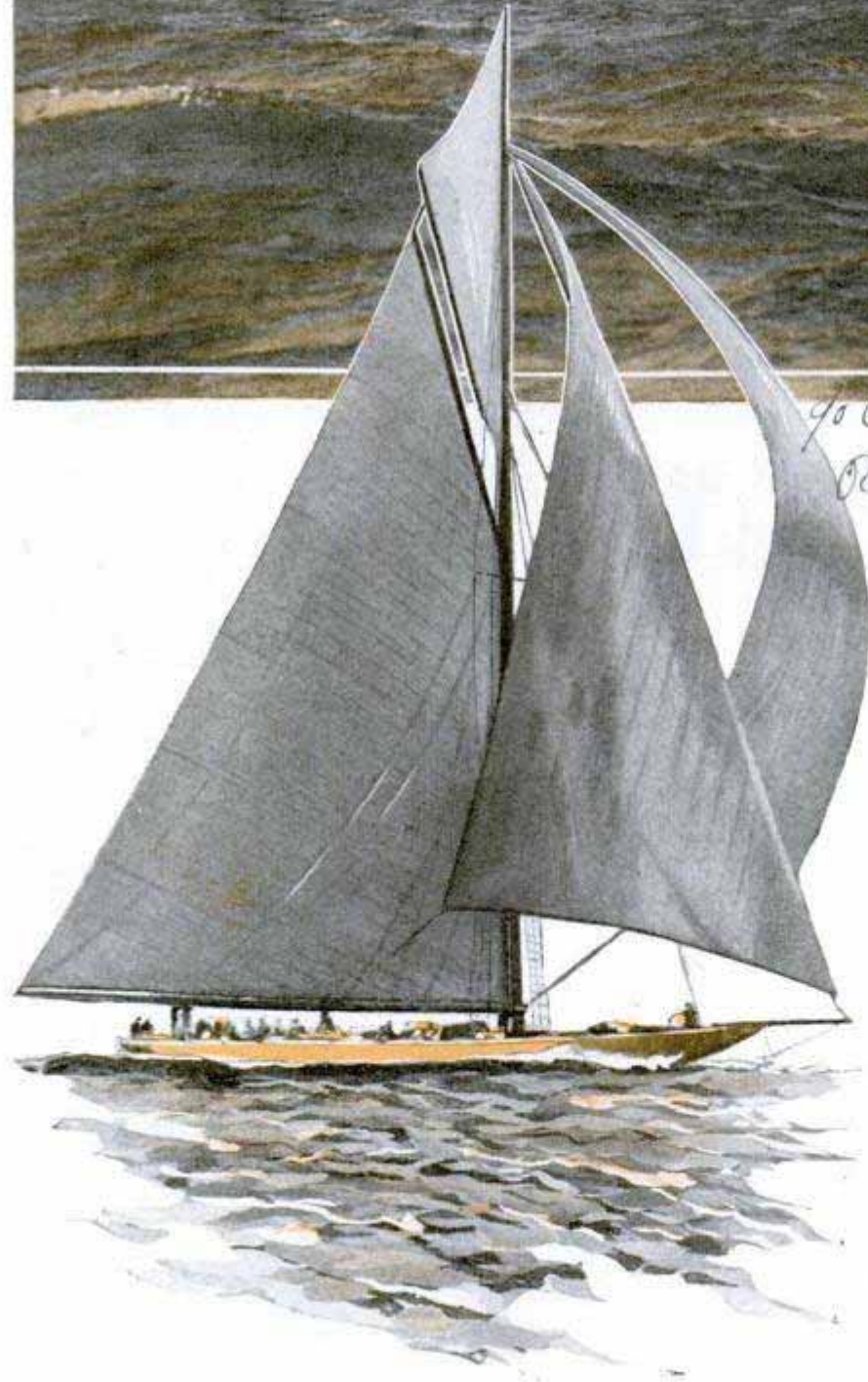
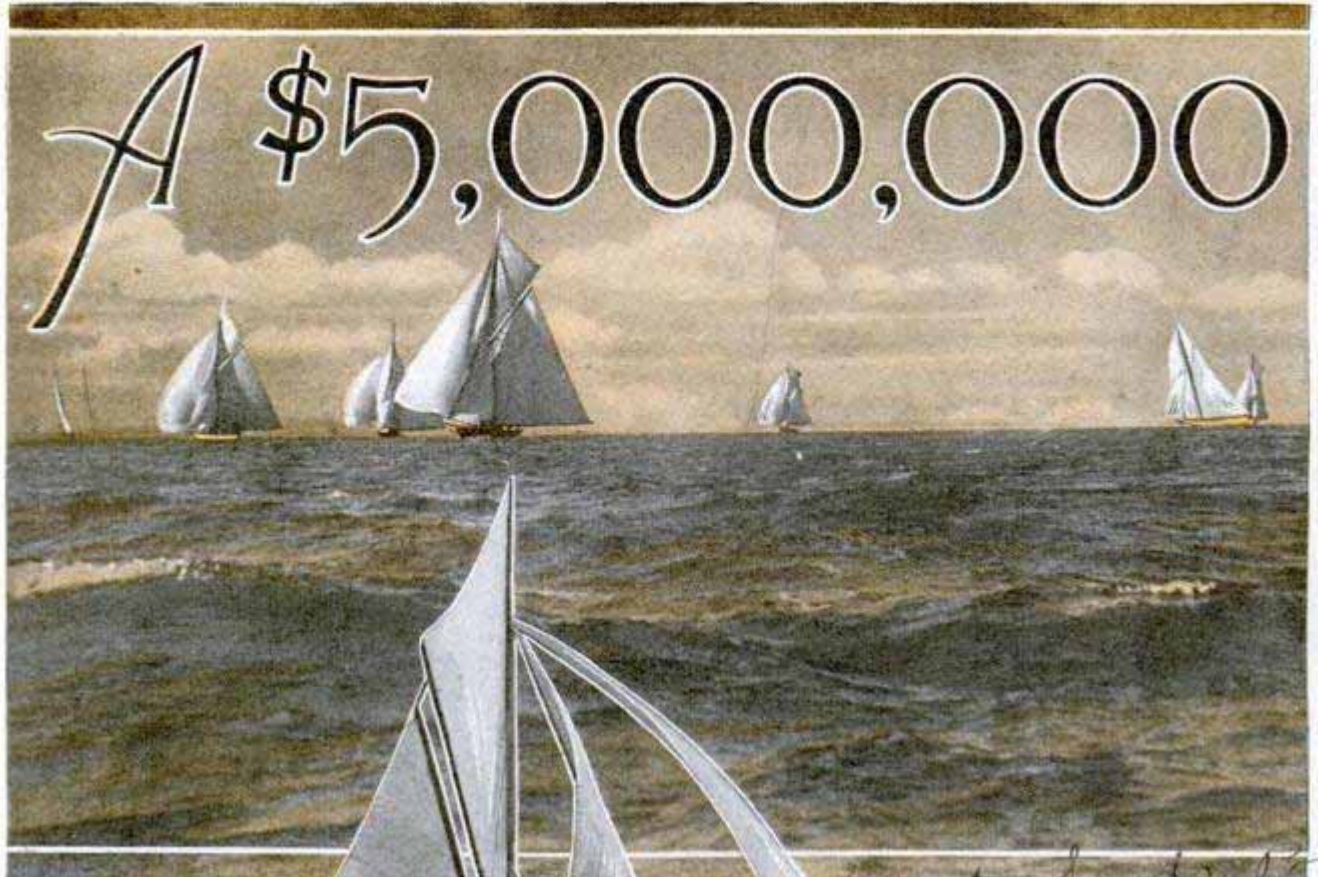
View of Nave; Right, Laying Granite Blocks; Below, Sculptors Working on Door Group

America will boast a place of worship third in size among the great churches of the world when the Cathedral of St. John the Divine is completed in New York city. It will have a total ground area of more than 109,000 square feet and will be second in length, being surpassed only by St. Peter's in Rome. One of its architectural marvels is the nave, which is over ninety feet wide, considerably wider than that of St. Peter's. The builders are especially interested in constructing a cathedral that will endure throughout the ages and, for that reason, selected granite for the exterior. The interior is of Indiana limestone which hardens under the effects of the air.



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A \$5,000,000



to Boston Sunday
Boston Mass

By JOHN T. BRADY
FIVE million dollars for a cup with an intrinsic value of only about \$2,500.

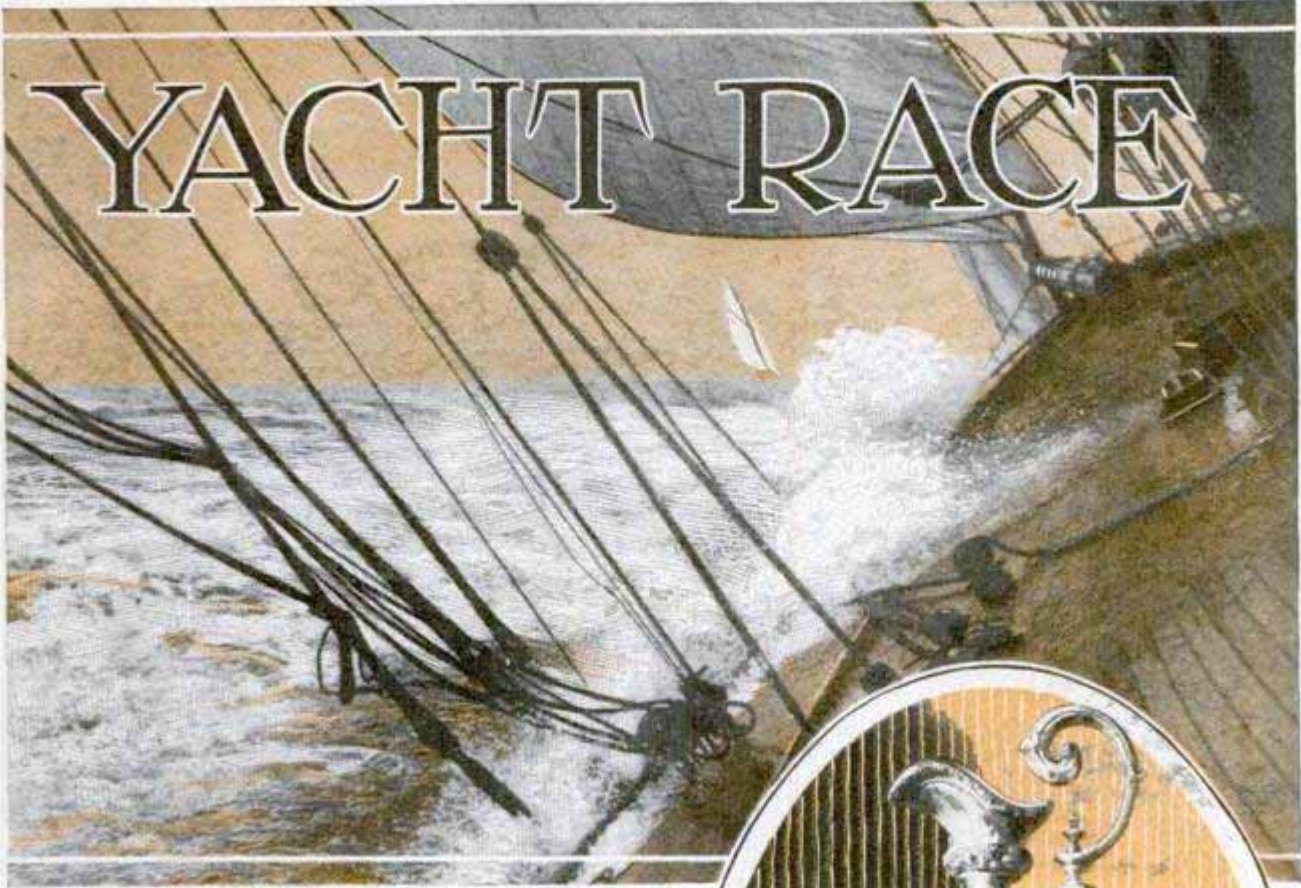
That huge amount of money will be poured into the America cup—the world's most famous yachting trophy—this year. It will be the most expensive sporting event the world has ever known.

Sir Thomas Lipton desires it so much that he is smilingly spending between \$800,000 and \$1,000,000 in a fifth attempt to lift it, and American yachtsmen are so eager to hold it that they are enthusiastically paying out about \$4,000,000 to defend it.

Four boats have been built on this side of the Atlantic by three syndicates of New York

One of the Races in the Cowes Regatta off the Isle of Wight, and the "Resolute," the Last Defender of the America Cup

YACHT RACE



yachtsmen and one group of New England yachtsmen, to contend for the honor of defending the trophy, and the construction, equipment and maintenance of each will cost at least \$600,000 in the case of the "Yankee" and "Whirlwind" and \$1,000,000 for the "Weetamoe" and "Enterprise."

Including this year's race, there have been fourteen matches for the America cup, and they represent an expenditure of more than \$15,000,000, of which Sir Thomas Lipton's share is about \$5,000,000.

This gives you some idea of the sentimental value attached to the cup, originally a Royal Yacht Squadron trophy, open to all yachts, and first won when the schooner "America" crossed the Atlantic in the summer of 1851, and beat the "Aurora," in that memorable race around the Isle of Wight.

Incidentally, only one of the four new American sloops will race the challenger, "Shamrock V," off Newport, R. I., in September, which means that the owners of the three that are eliminated in the trial races to determine the cup defender, will be lucky if they get back from sale of the boats, fifteen cents for each dollar spent on them. They realize this, of course, and

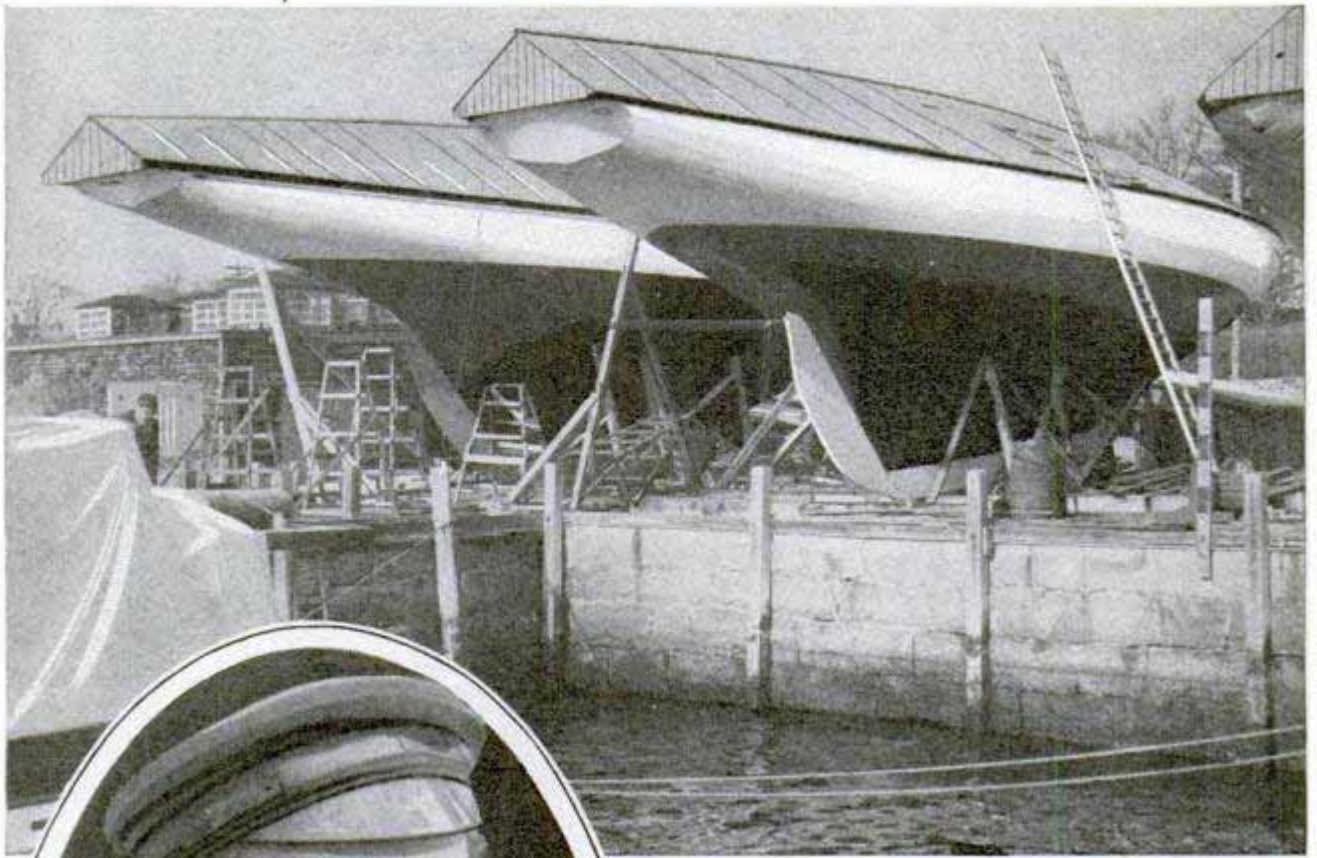


The Deck of Sir Thomas Lipton's "Shamrock," Awash in One of the Cowes Races, and the America Cup

there you have a wealth of evidence that sport for sport's sake still survives, at least in the yachting game.

Lest the astonishing figures as to the cost of these boats may seem incredible to you, and you may be saying to yourself, "the keel must be made of platinum instead of lead to make them so costly," consider a single item of expense, given by L. Francis Herreshoff, designer of one of them. "A full suit of sails for each

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The "Resolute" and the "Thistle" Being Prepared for Sir Thomas Lipton's Fifth Threat, and the Jovial Sportsman Himself

one of these boats may cost as much as \$60,000," he declared.

The sails for the four American sloops include twelve huge mainsails, some fifty to sixty different jibs, and at least ten spinnakers, for each boat has to be equipped with sails especially adapted for different weather conditions. All are high, narrow and triangular in shape, really the familiar old leg-of-mutton sails now given the fancy names "Bermudian" or "Marconi" rig. The gaff and club top-sail have gone out of fashion, it seems,

and what yachtsmen call a "jib-headed mainsail" has taken their place.

Sails are made of the finest long-fiber Egyptian cotton obtainable, specially woven; in fact, the whole world was combed to get the very best available materials for these boats. Mahogany from Honduras was used for planking on the hull of one, the deck planks of another are of white pine from Michigan, all the masts are made of spruce from Sitka, Alaska, and the ropes are of Manila hemp or Irish flax twisted in Germany.

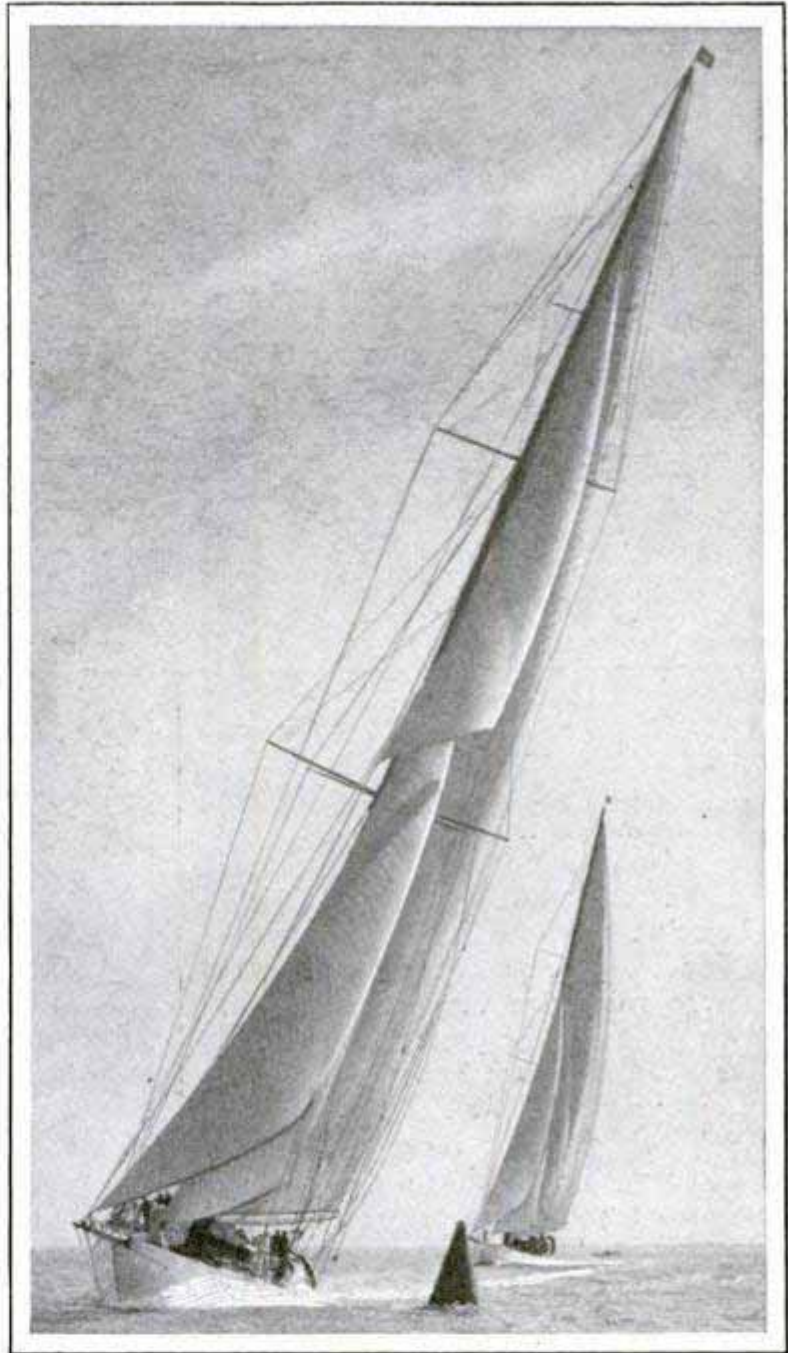
Masts on these American boats will rise more than 150 feet above the decks, which makes them the highest masts, without topmasts, ever carried by any vessel in the world. More than 500 separate pieces of wood, from twenty to forty feet in length and from seven-eighths to two and one-quarter inches in thickness, held together by casein glue, were used in their construction, and each boat has a spare in case of accident. They are not round, but rather oblong with rounded corners, and are from twenty to twenty-eight inches in diameter. Perhaps the most curious feature of their construction, in view of the fact that the strain on each will be tremendous (about 300 tons), is

that they are hollow in the center from end to end. They were so made for greater strength and rigidity, to save weight, and to permit the halyard, or rope, which is used for hoisting and lowering the mainsail, to run through them, and be worked by means of a winch or windlass below the deck.

A striking feature of the races for the cup this year, as compared with previous ones, will be the few men that will be seen on the decks of the competing vessels. Although each boat will have a crew of thirty or thirty-one men all told, the skipper and other officers will be about the only ones the observer will see moving about on deck, since most of the foremast hands will be down below most of the time operating the battery of winches and windlasses on which the ropes for setting and trimming the sails are wound.

Another notable device employed for handling the sails reminds one of the fasteners which work with a zip, now seen on many articles of wearing apparel in place of buckles and buttons. Running up the mast, there is a sort of track to which the luff, or foremost edge, of the mainsail is attached by means of sliding clamps, allowing it to slip up and down the mast quickly. This arrangement causes the sail to hug the mast tightly, thus preventing any loss of wind between them, and making reefing easier and quicker. It eliminates the wooden hoops on the mast. None of the boats have any bowsprit, but all have peculiar-shaped booms, which may be likened to a plank standing on edge in the middle of one lying flat. These booms are the result of a series of scientific tests, which determined that they are stronger and more rigid than the round and heavier type.

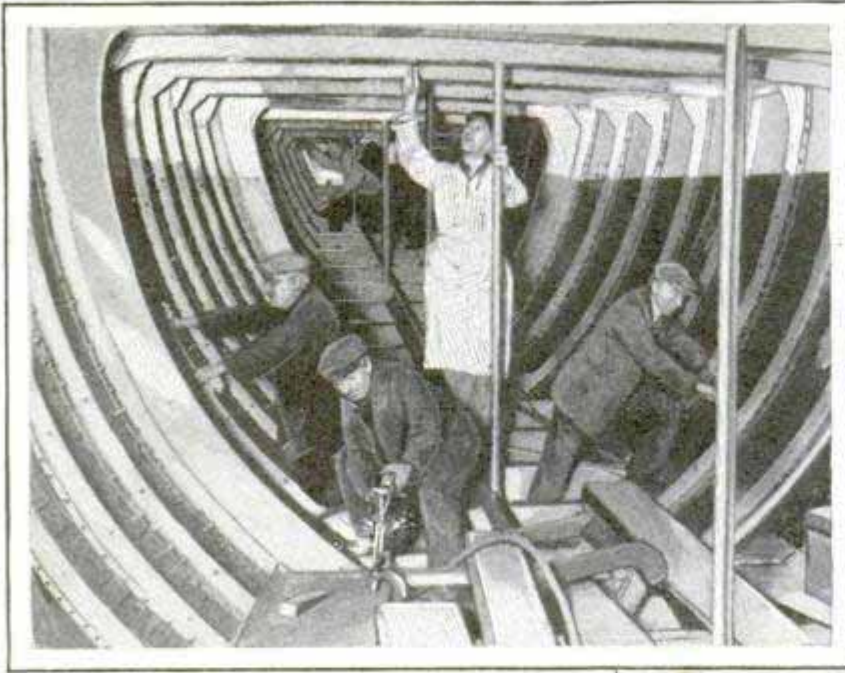
The outstanding new thing about these boats is the construction of the hulls, which are very strong and heavy in con-



Rounding the Buoy Just after the Start of One of the Races of the Royal London Yacht Club at Cowes

trast to some of the light, freaky hulls of previous racers. All of the five hulls have steel framework, and three of them, "Enterprise," "Weetamoe" and "Yankee," are sheathed with bronze plates. The "Whirlwind" has mahogany planking over her steel ribs, and the challenger is also sheathed with Honduras mahogany. All of the hulls show the influence of the vogue for streamlining. They seem to have practically level rails which give the low-crowned decks a very flat appearance. They are also higher from waterline to deck than the old defenders.

There are several reasons why the race



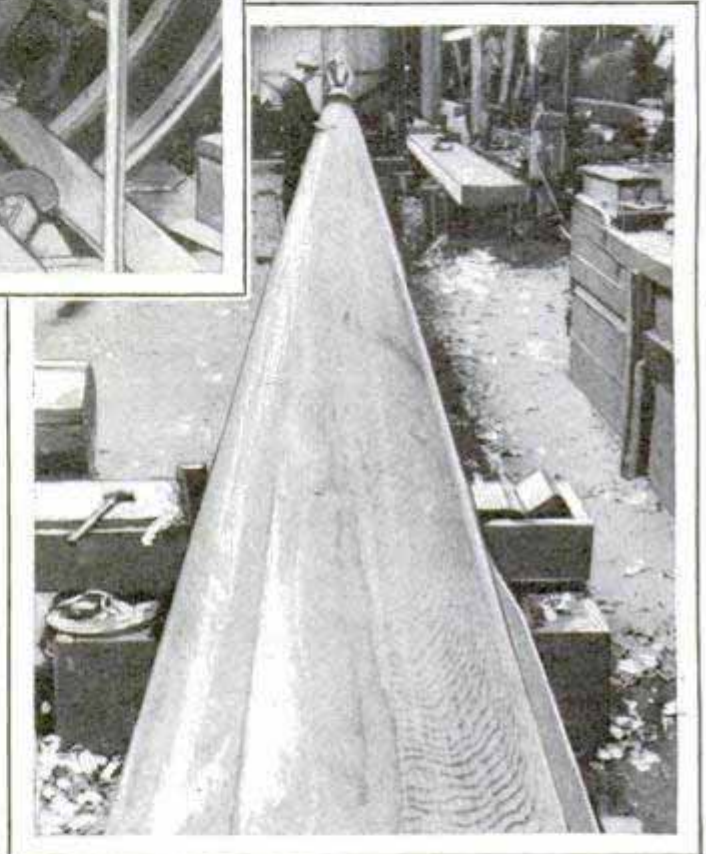
Christensen of the "Weetamoe," and "Ole" Olsen of the "Yankee," have the blood of the Norsemen in their veins, while Muir of the "Whirlwind" is Scotch. So Monsell, of the "Enterprise," appears to be the only American.

All the skippers on the

this year should be the most closely contested and most thrilling in the entire history of the classic, and the chief one is that they will be so evenly matched as to length and weight of hulls, and the amount of sail they can carry, due to the measurement rules for boats of their class.

These rules are very complicated, but in general they prescribe that the largest and heaviest boat must carry the smallest sails, and they have resulted in boats that vary only a few feet in length, all being between seventy-seven and eighty-six feet on the waterline and all having about the same sail area, which is practically fixed at 7,550 square feet.

Realizing that fast sail handling will play a more vital part in winning this race than it ever has before, and knowing that the "Shamrock V," will be sailed by Captain Heard, England's best racing skipper, the sailing masters of the American boats have been training their crews in teamwork as intensively as a big college football team. Incidentally, it was a great problem to round up enough capable foremast hands to man the four boats. The whole Atlantic seaboard was scoured, and finally the sailing masters had to seek in foreign fields to fill their crews. There are very few native Americans among the working crews of the boats, which are made up largely of Scandinavians. At least two of the sailing masters, John



Workmen in the Bows of the New "Shamrock V," and Mast of the Yacht That Will Try Again for the America Cup

American boats, however, will be Americans, and all will be wealthy amateur yachtsmen, who have had wide experience in sailing and racing their own boats. Harold Vanderbilt will sail the "Enterprise," Paul Hammond, the "Whirlwind," George Nichols, son-in-law of J. P. Morgan, the "Weetamoe," and John S. Lawrence will be at the helm of the "Yankee."

The official trial races for the American boats are scheduled to be held from August 20 to 30, and the one chosen to defend the cup will clash with the "Shamrock V," for the first time on September 13. For the second time in the history of the classic, and the first time since 1871, the match will be decided by the best four out of seven races.

at Fort Collins

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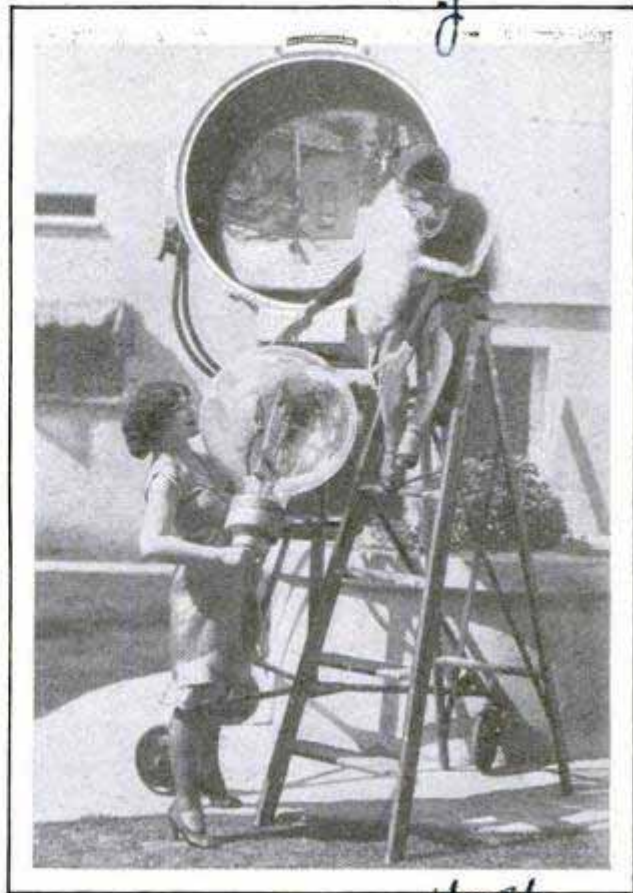
General Office
Mel
975

OVEN FOR HIGH ALTITUDES AIDS MOUNTAIN COOKS

Housewives who live in the mountains will welcome a special oven being devised by the Colorado agricultural college for cooking in high altitudes. Most recipes make no provision for the fact that changes in atmospheric pressure in mountain districts affect the chemical and physical factors involved in baking of flour mixtures and other preparations. The new oven, which is expected to be on the market in a year or so, compensates for the atmospheric conditions in high altitudes. With it, will be furnished special rules and recipes to guide the cook.

GAS-TANK LOCK WITHOUT KEY CEMENTED IN PLACE 528

Offering no interference to filling the automobile gasoline tank, but preventing withdrawal of the contents, a gas-tank lock with self-closing cap now is available for motorists. The lock consists of a hollow metal cylinder with perforations in sides and bottom. At the opening is a hinged cap, which drops down automatically when the hose is removed. The appliance, requiring neither padlock nor key, is pushed into the gas tank opening until locking springs snap into position, and a gasket cements the cap in place when the gasoline comes in contact with it.



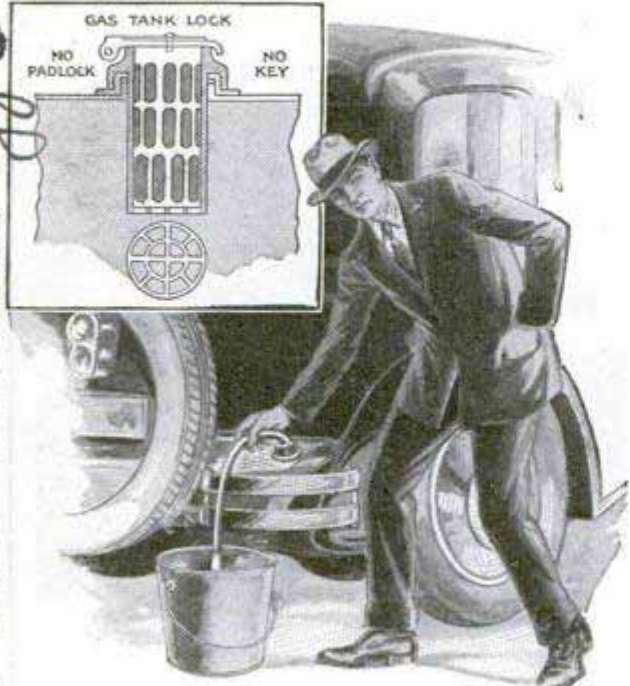
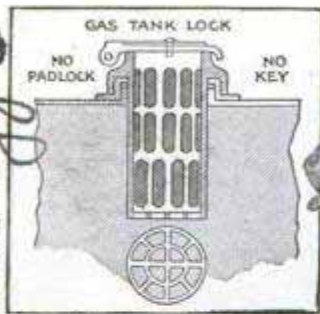
Electric-Light Bulb, Three Feet in Diameter, Which Contains a Three-Pound Tungsten Filament

BIGGEST ELECTRIC-LIGHT BULB THREE FEET IN DIAMETER

Three feet in diameter and containing a three-pound tungsten filament, the world's largest electric-light bulb and a giant reflector to contain it have been made for a motion-picture studio. The light is rated at 50,000 watts and develops 6,000,000 candlepower.

PLAN TO DRAIN NORTH SEA FOR MORE LAND 594

German engineers are reported to be considering plans for the draining of the North sea in order to add more land to their country and obtain deposits of coal and other minerals. The idea will have to be approved by all the nations involved and will require enormous sums of money but is considered technically possible. The North sea is shallow, its average depth being between forty and forty-five feet. Two dams would have to be constructed, one across the Straits of Dover and the other from Denmark to Scotland. Rivers now emptying into the North sea would have to be diverted.



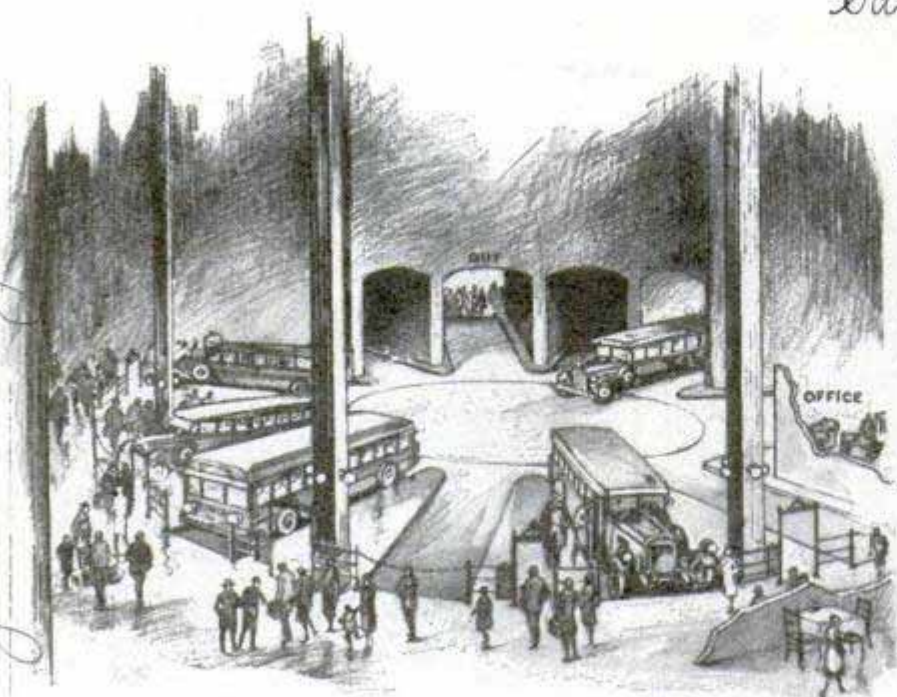
Stealing Gasoline Is Prevented by the Lock Shown in Insert. Which Is Cemented in Position

Motor Products Mfg Co
E. W. Taylor, 378
W. Mandel

Espresso 3/18/30

Examined by Max
John Mines Co,
San Francisco

operated by Bell at 42nd St
Lexington Ave New York



Courtesy Railway Age
Sketch of the Interior of the Big Bus Terminal in New York Hotel, Showing How the Cars Are Grouped about Turntable

BUSSES RUN INSIDE BIG HOTEL AT NEW YORK TERMINAL

One of the busiest motor-bus terminals in the world is housed inside the Dixie hotel in New York City, where several features of railway transportation have been adapted to the successful handling of motor-coach traffic. The busses enter and leave by ramps that lead to the loading platform, five feet below the level of the street. They are turned to the proper position for leaving by means of an electrically controlled turntable which is operated from the dispatcher's room. The dispatcher also regulates the movement of coaches by means of an electric signaling device installed in each bus stall, and the time of departure of the various busses is announced through loud speakers. The loading platform is built about the circular coachstand area in such a way that passengers need not walk more than 100 feet to reach the farthest bus. The platform and waiting rooms are conveniently accessible from the main part of the hotel and, being always under cover, eliminate the usual unpleasantness of taking a bus in stormy weather. The turntable is covered with slip-proof steel flooring.

CHEAPER RADIUM SEEN IN NEW PROCESS

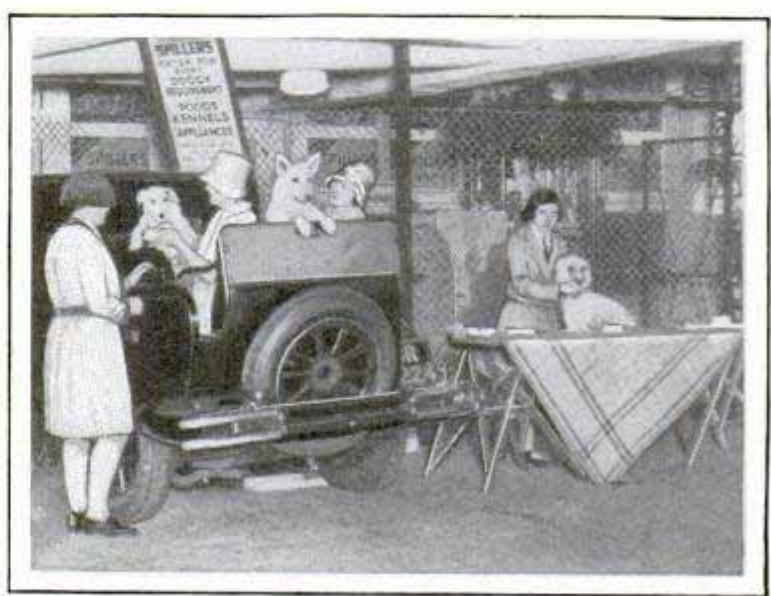
586

Cheaper radium and larger quantities of it are regarded as possibilities from an extraction process which makes use of radioactive ores that are found in almost unlimited quantities in California. Laboratory experiments with the process hint the possibility of large-scale production of radium, now valued at about \$65,000 a gram, according to a mining-company official who announced the new method.

An electrical process is employed. The chief drawback to it at present, is the long time required to treat the ore, but this is expected to be shortened to a few days. The ore was considered worthless by miners of '49.

BEAUTY SHOP FOR PET DOGS 576 ADDED TO GARAGE

Proprietors of a London garage have installed a beauty shop for the pet dogs of their customers. The animals are clipped, washed and otherwise tended to when necessary, and are fed and quartered in separate compartments.

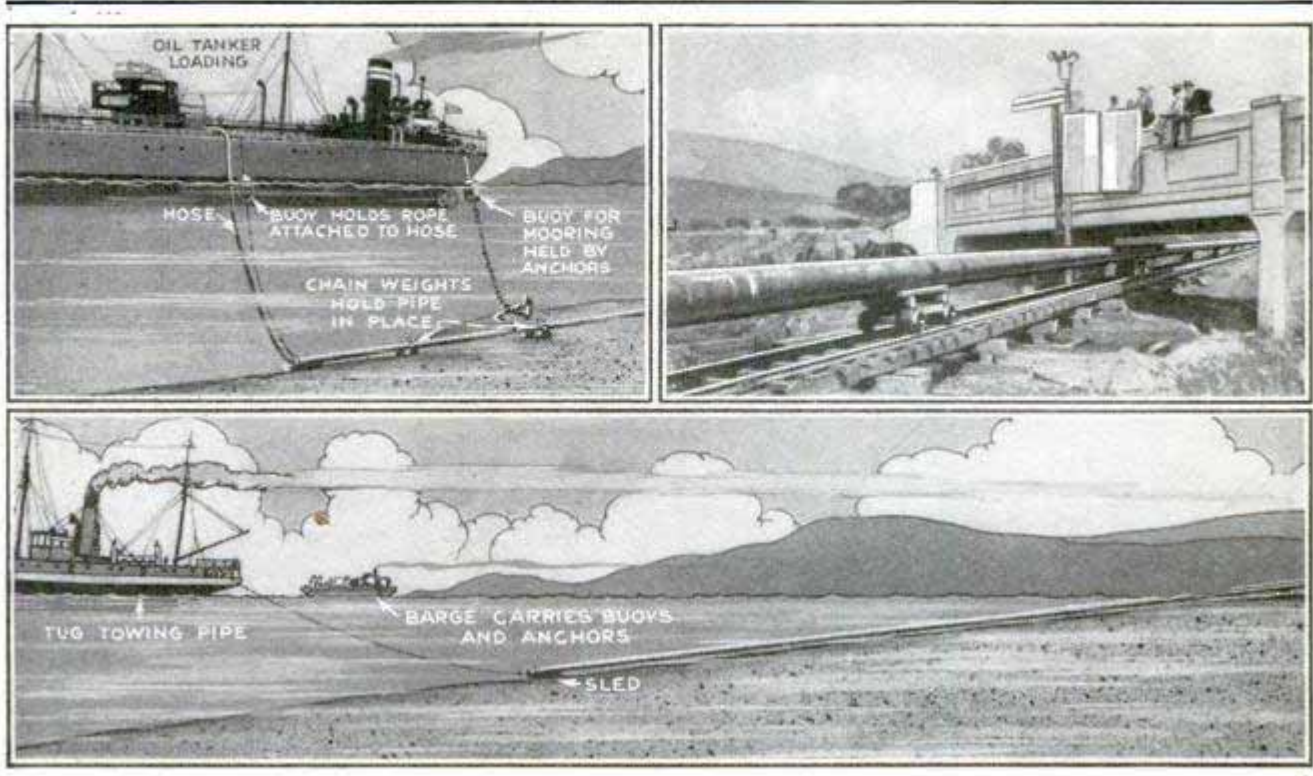


Introducing an Interesting Side Line for the Garage Man; a Beauty Shop and Kennel for the Dogs of Customers

Ant. Stuart A. Anthony Esq
44 Walden Lane, New York

5/24/30
Kansas City

PIPELINE ON WHEELS IS TOWED TO SEA BY TUG

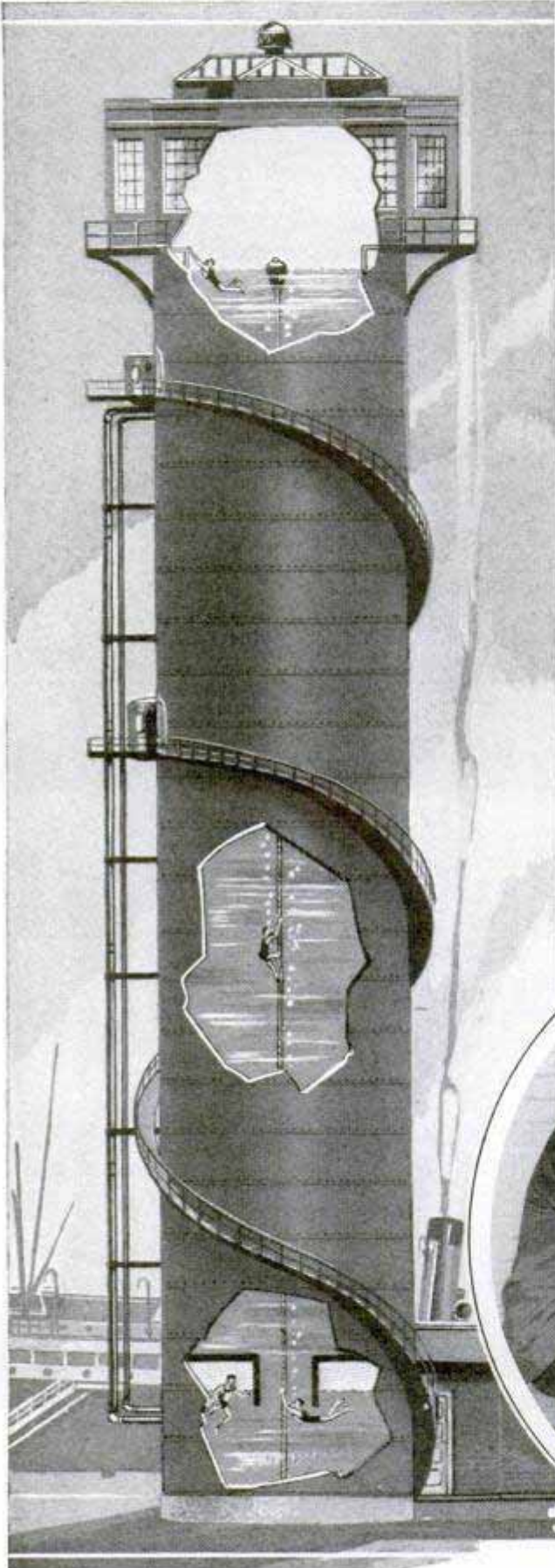


Upper Left, Oil Tanker Loading from Pipeline Laid in Ocean; Right, Welded Line on Trucks Being Pulled to Sea by a Tug Half a Mile off Shore; Below, the Line as It Reached the Water

From the Kettleman Hills oil fields of California a big pipeline has just been completed that runs straight across country seventy miles and stops at nothing—not even the Pacific ocean. After passing through rectifiers to remove all dissolved gases, the oil starts on its long journey from the fields. This is accomplished in one pumping operation. Heavy-duty steam pumps, working at a pressure of 1,000 pounds per square inch, get behind the seventy-mile stream and force it through the ten-inch line, over hills and through valleys to the shores of the Pacific. This long “push” is made possible through the use of seamless welded pipe which reduces friction almost to the vanishing point. The western terminus of the line is at Estero bay, where the oil passes into storage tanks from which it is drawn off by gravity, through a submarine line, into tank steamers anchored nearly three-quarters of a mile at sea. Laying a pipeline along the floor of the ocean was something of an undertaking. The submarine line consists of a sixteen-inch welded steel pipe extending from the beach to a point 3,000 feet out in the ocean where the water is deep enough to pro-

vide safe anchorage for the largest tankers. A flexible rubber hose is connected to its sea end. When not discharging, this line lies on the bottom, but is arranged so that it can be readily picked up by tankers for loading. Preparatory to the launching of the submarine line, the entire 3,000 feet of pipe was welded into one long tube weighing 300,000 pounds. This was placed on low cars running on a small railway laid on the floor of a valley which slopes gently to the edge of the bay. When everything was ready, a steel towing cable was brought ashore from a tug. The cable was attached to a pulling bridle secured to the end of the pipeline. A sled to guide the line over any obstacle such as rocks was also firmly lashed under the end of the pipeline. At a given signal the tug pulled the pipeline out along the ocean bottom. When the line was in position, it was anchored with chain weights. A bell buoy was installed near the mooring site by special permission of the lighthouse service. The sound of the bell will warn other craft that they are approaching the submarine line and also act as a guide for incoming tankers in foggy weather.

SUBMARINE SEAMEN TO FLOAT TO TOP OF TOWER



Esrotin
 About the middle of July, an extraordinary thing will happen at the navy submarine base, near New London, Conn., on the Thames river. A seaman will leave a submarine compartment through an escape hatch and, breathing by aid of the well-known navy lung, will rise through 100 feet of water to the surface and find himself in a glass-encased room on top of a tower. This 130-foot tower, now in the course of construction, is the latest device for training men who operate the undersea boats in escaping from the vessels in case of accident and sinking. Hitherto, the final training in escape methods was given by use of an obsolete submarine, equipped with an escape hatch, submerged beside a pier in the river. The method never did prove satisfactory, as the depth of submergence was limited to the bed of the river, which was closed during the winter. So the navy instructors, to meet the need of a desired depth of water of uniform temperature throughout the year, decided to place the water over

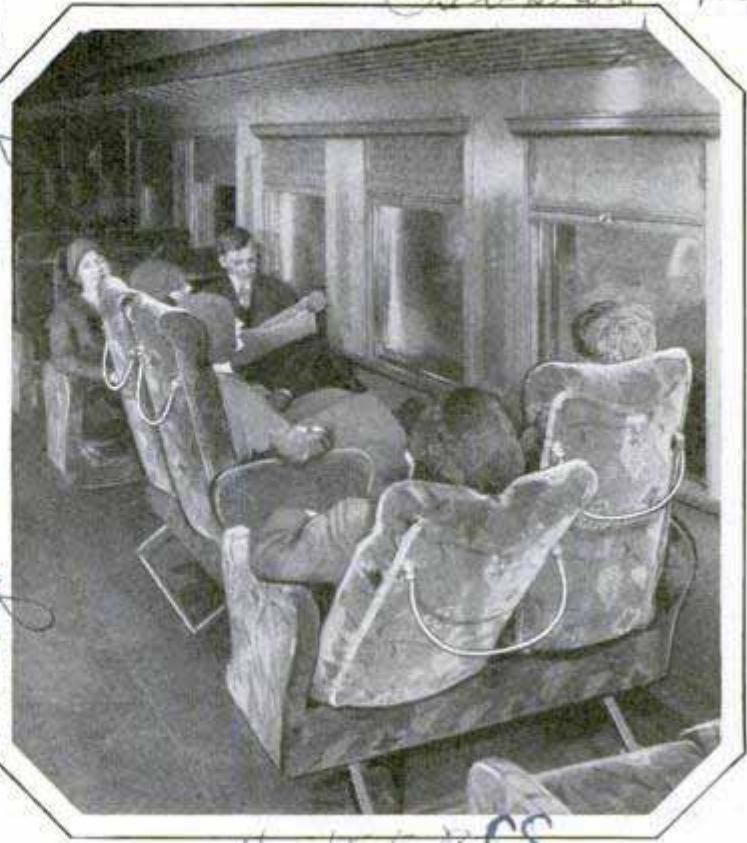


Left, 130-Foot Water Tower for Training Submarine Crews to Escape from Disabled Craft; They Enter the Tank through a Regulation Submarine Hatch at the Bottom and Float to the Top; Right, an Artificial Lung for Breathing during the Rise through 100 Feet of Water

471 209 Washington St
Boston Mass
979

the submarine. This is exactly what has been done in the new training tower. In the base of the structure is located a replica of a compartment of a submarine, equipped with the latest escape hatch. To bear the enormous weight of the structure and contents—it will hold over 190,000 gallons of water—a foundation of twelve feet of concrete has been poured on the top of piling sunk forty-two feet into the clay subsoil.

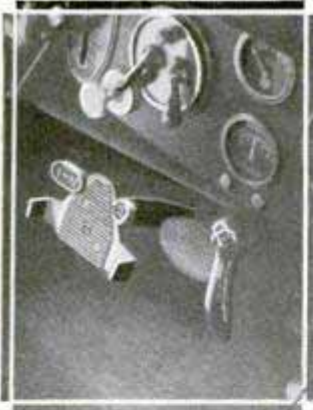
Chicago-2653 Washington



More Luxury for the Day-Coach Passenger; the New Chairs That Revolve or Recline like Those in Parlor Cars

AUTO PEDAL GEARSHIFT REPLACES HAND LEVER

Shifting the automobile gears is done entirely with a pedal instead of in the usual manner, through a control that leaves the hands free, gives more space in the driver's compartment and promotes safety. Pushing the pedal all the way in disengages the clutch, and the different speeds are selected simply by placing the foot toward the left side of the pedal for low speed, on the center for second and toward the right for high. A pull button on the dash selects the reverse. The clutch is released at any time merely by pressing the pedal part way down. Complete depression is done in shifting.



REVOLVING CHAIRS INCREASE DAY-COACH COMFORT

Day-coach passengers now enjoy some of the luxury of a railroad parlor car in seats that both recline and revolve so that they can be set at a comfortable angle or turned to the window. The chairs are the result of a long series of experiments and involved the lowering of the steam pipes along the side of the car, so that they could be adjusted. By means of levers located at the side of the chair, the

backs can be reclined separately to four restful positions and the same levers are employed to return the backs to their original position by means of a spring arrangement. The chairs, as first introduced on the "Aristocrat," a fast Chicago, Burlington and Quincy railroad train running between Chicago and Denver, are upholstered in mohair of a figured pattern, another departure from the usual solid color of the ordinary day coach.

HAND-OPERATED METAL SHEAR FOR HEAVY-DUTY WORK

For cutting heavy metal, a hand-operated shear with double crank construction now is on the market. It can be mounted in a vise or on a bench, and will nibble or shear sheet metal up to three-sixteenths of an inch in thickness and cut rods one-half inch in diameter or less. It can be used for inside or outside work.

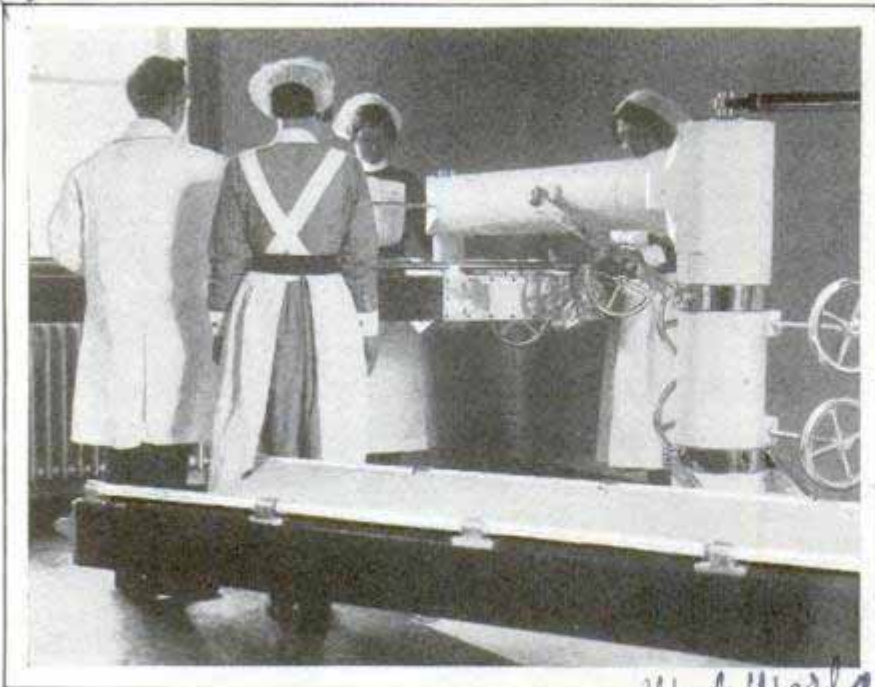


3 39
#37.50
#49.50
#62.50

Progressive Motor Slaves Corp. 2450 Michigan Blvd

National Machine Tool Co. 1539 11

Carnegie Distribution of Washington, D.C. Westminster Hospital Annex



Apparatus for Administering Radium Treatments to Two Persons Simultaneously; It Is Contained in a "Bomb Room" Lined with Barium

"BOMB ROOM" FOR RADIUM GUN HAS ARMORED WALLS

Apparatus for administering radium treatments in a London hospital is contained in a special "bomb room" whose walls are lined with barium for the protection of persons in adjacent rooms. Four grams of radium is being used by the hospital to ascertain the precise value of the mass irradiation of deep-seated growths. The apparatus permits directing the rays on two patients simultaneously.

MICROSCOPIC FOSSIL PLANTS FURNISH ART DESIGNS 390

Diatoms, the microscopic single-celled plants that occur wherever fresh or salt water is found, have been used in enlarged forms as models for art designs. This is possible because the plants, which live only a short time, retain their shape in fossil form. Under the microscope, these plants, so small that 100 or more could rest on the head of a pin, reveal an endless variety of symmetrically shaped patterns of beautiful design, some of delicate lacework tracery, others like honey-combed beadwork, and still others resembling the disk of a spider's web separated into segments. They are composed of transparent silica or crystal and have a luminous beauty in themselves, aside from

the regular design. Diatoms constitute the fundamental food supply of the marine world and are often referred to as "the pasturage of the sea."

NOISELESS TRACK FOR STREET CARS IS ECONOMICAL

Four miles of street-car track that is virtually noiseless has been laid in one of the busiest thoroughfares of New Orleans. The traction company found the cost to be \$75,000 per mile as compared with \$80,000 for the ordinary kind, and maintenance was reduced by

about seventy-five per cent. The method makes use of a rail anchorage in the form of an oval disk in three sections, the upper and lower of steel and the center a combination of mastoid-asbestos cement. The upper plate carries clamps for the rails, and the bottom is welded to steel bars paralleling the rails and set beneath them in concrete. The rail anchorage takes up vertical vibrations created by the wheels, and the mastoid filler expands and contracts, but does not pass the movements of the upper plates to the lower and thus to the concrete. To take up lateral vibration and permit lateral contraction, the



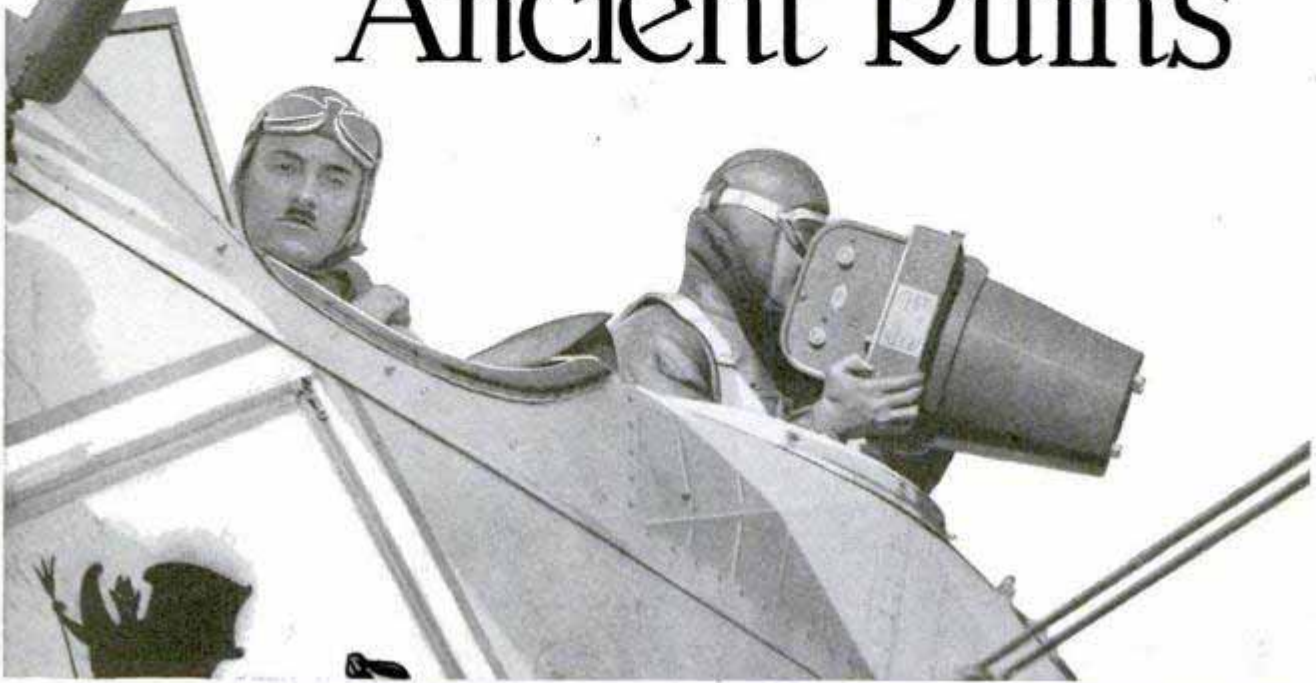
Coating the Sides of Rails of a Noiseless Street-Car Track with Asphalt and Asbestos

rails are coated on their sides with layers of asphalt and asbestos applied over cheesecloth.

Elm. I. O. Mall, East
Supt. New Orleans
P. O. Service New Orleans

Web World
323
Journal March 1908
Article in Arthur Stanley

Air Survey Reveals Ancient Ruins



"Shooting" an Oblique Picture with Special Aerial Camera; Photographs Taken from Airplanes Are Proving of Great Aid to Explorers Since They Reveal Clues to Lost Ruins

By ODD S. HALSETH
Arizona Archaeological Commission

*Archaeologist,
Box 479, Phoenix, Ariz*

THE MODERN archæologist takes to the air and looks backward into the centuries gone by and thus recovers history that otherwise would remain unrecorded.

Through the eyepiece of a modern Fairchild aerial camera, focused on old Mother Earth from a United States army observation plane 10,000 feet up in the air, hundreds of miles of prehistoric irrigation canals have recently been mapped in the fertile valleys near Phoenix, Ariz.

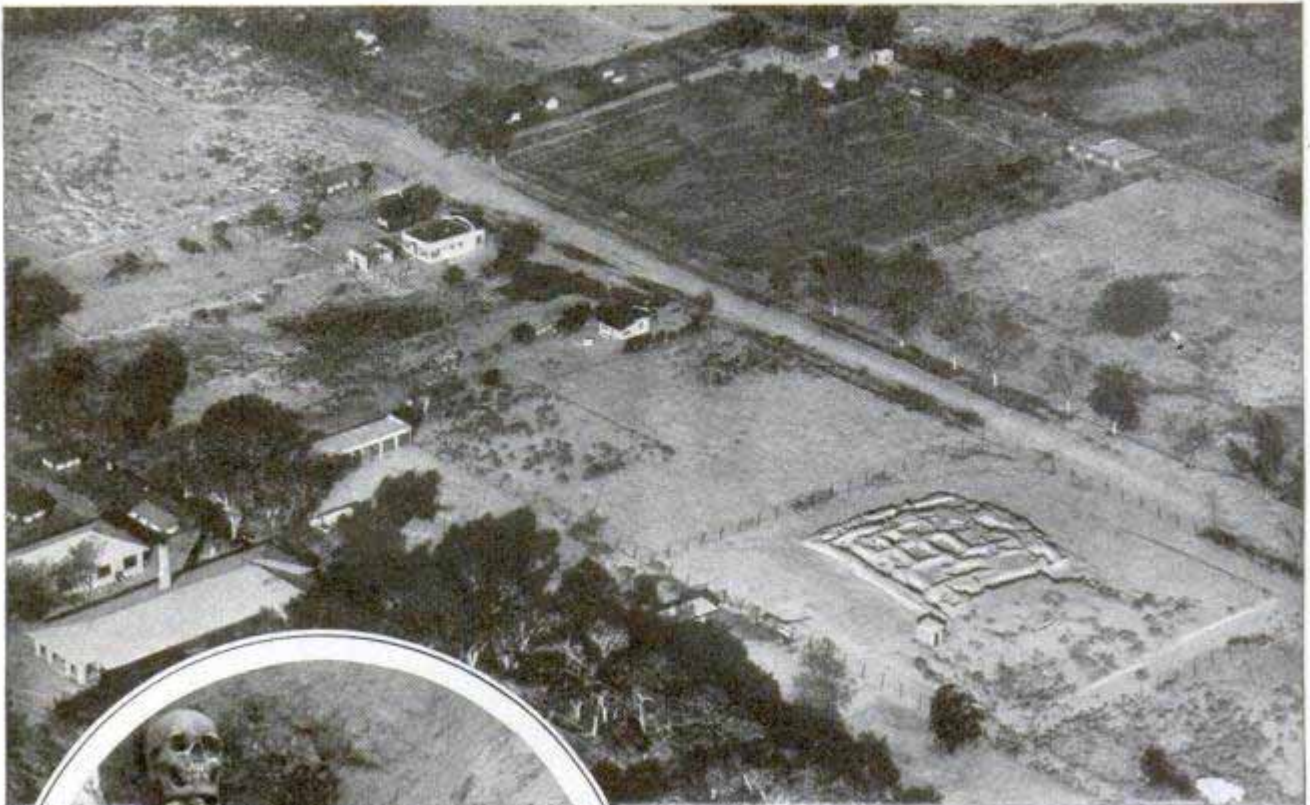
The modern canals which are supplied with water from a series of enormous lakes formed by huge dams built in the mountains, excite the wonder of thousands of visitors to Arizona. Few, however, realize that, perhaps a thousand years ago, this part of Arizona was the scene of a similar marvel. From parts unknown, ancients wandered into the valleys of the Rio Salado and the Rio Gila when our European ancestors still

were savages, and they saw there the object of their search. During a period of time, the span of which has not been determined, these prehistoric farmers built towns, developed an irrigation system comparable only to the present one and not duplicated anywhere else in prehistoric America, and long before Columbus sailed westward, they had again left and gone to parts as unknown as those from which they had come.

The crumbling walls of their houses and huge communal buildings, remnants of their canals, and remains of the people themselves, either buried within the compound buildings or cremated and placed in the fields in beautifully decorated burial urns, bear mute evidence of their existence, but the history of their lives, their struggles with man and nature, and the reason for their failure to survive are still to be found.

The airplane and the aerial camera have

451



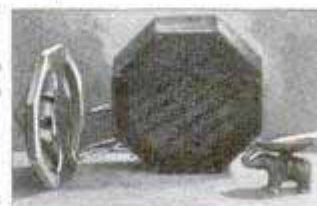
Prehistoric Ruins in the City of Phoenix and Skeleton of Ancient Canal Builder at Pueblo Grande

already proved their worth in tracing lost civilizations. Where it would have taken years to penetrate the jungles to the ruins discovered from the air, and without assurance of discovery even then, a few days' flying has made it possible to map the entire area and locate every large ruin. Similar work in England has shown that the camera can pick up the slightest traces of old buildings where ground work has failed to record them, but this was the first experiment conducted to retrace canals that had been unused for centuries. The first test-flight pictures showed one of the ancient canals directly east of Phoenix, a slight discoloration of the soil marking its original contour plainly enough for map making.

Flying from one to four hours each day

for a week, the airmen surveyed approximately 250 square miles of ground and made 700 exposures. The canals covered originally an estimated area of 240 miles in the Phoenix district alone, and an unknown number of miles in the region around Rio Gila. Sections still visible are from six to twelve feet deep and measure up to seventy-five feet from bank to bank. They were dug by hand, no beast of burden being used in olden times, and the only tools found along the canal banks are flat pieces of stone shaped like hoes, with which the dirt presumably was scraped into baskets to be carried away on the heads of long lines of Indians.

LOUD SPEAKER FOR AUTO RADIO GIVES VOLUME



Developed particularly for use with automobile radio sets, a loud speaker of the cone type also can be utilized with

any portable receiver. It is very powerful, and at the same time compact and light.

The Amphion Corporation of America, 139 W. 21st St. Chicago - 27 Ill.

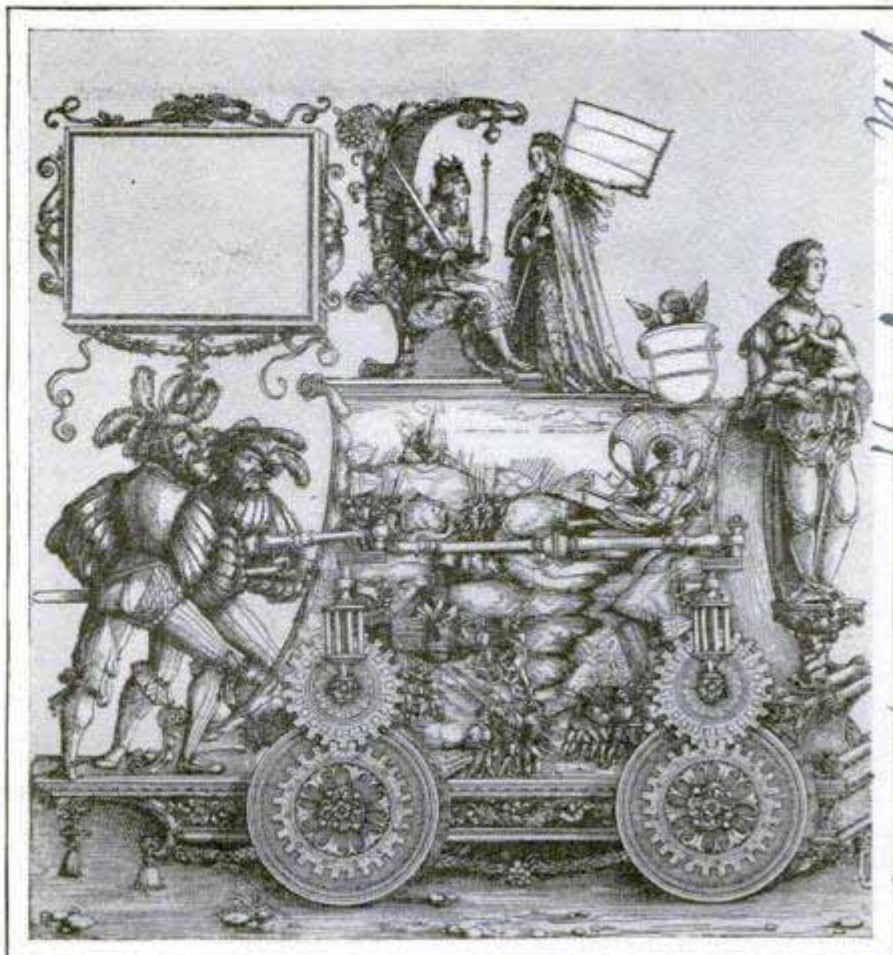
Auto Charrier speaker

Morgan

using a small, but high-powered magnetic unit of the balanced-armature type. The cone is about seven inches in diameter, and the speaker chassis is a little more than three inches thick, the entire unit weighing only fifteen ounces. While it may be mounted in any desired position, it generally is placed behind the instrument board.

**WINDMILL SERIES
WATERS HIGH
RANGE 494**

Water is supplied to an elevated area on a Texas range by a system of windmills that save drilling numerous wells. The accompanying illustration shows how the plan operates. Water, originally pumped by the mills from only two wells, is forced into tanks at different levels, then pumped up into other tanks until finally it arrives at its destination, a point nearly four miles from the wells and at a total elevation of 1,335 feet. The windmill wheels range from ten to sixteen feet in diameter, four being required in all. From the final storage tank, the water flows by gravity into the stock tanks.



Ancient Wood Cut That May Have Prophesied the "Horseless Carriage"; the Artist Depicted a Vehicle Propelled by Gears and Wheels

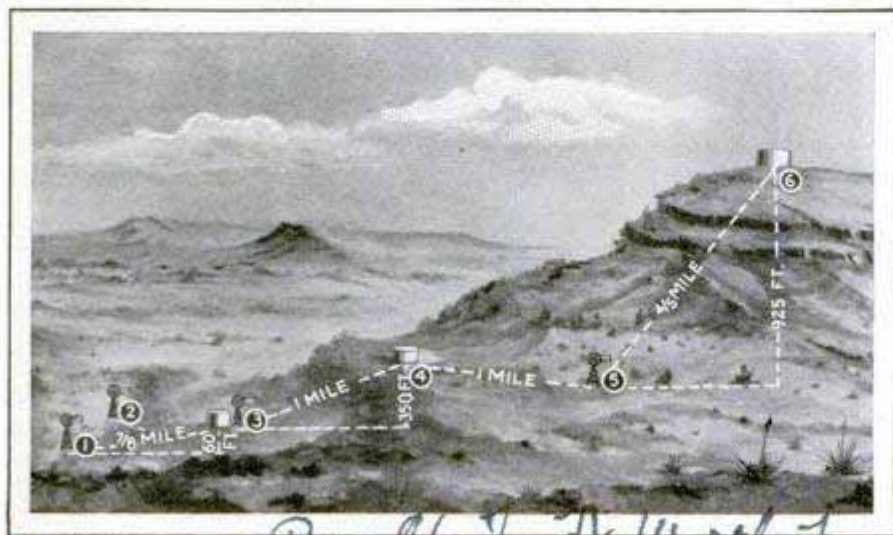
**AUTO PROPHESED IN WOOD CUT
FOUR HUNDRED YEARS AGO**

Four hundred years ago Emperor Maximilian I entrusted to the famous artist Durer the task of designing a comprehensive set of wood cuts intended to represent a great triumphal procession of the emperor, and among these cuts has been found one which might have been a prophecy of the coming of the automobile. It shows a vehicle propelled, not by horses, but through a very complicated system of wheels, gears and cranks actuated by the persons driving the carriage. So far as known, the "horseless carriage" of the artist was entirely imaginative, because nothing even faintly resembling it was in actual existence until long afterward.

Malden. n. - Hudson. N.Y.

Cont. Wm. Thompson.

and ranch near Marathon, Texas



© H. S. Hutchins, Jr. Artist's Sketch, Showing How Windmills Are Used to Raise Water to High Level for Supplying Stock on Cattle Range

*Box 96 1/2 N. Worth, Texas
on Renderbrook Ranch
and C. Road, Texas*

*photo secured by
correspondent in
Mexico*

made by Dr. Edmund Jacobson.
 40 p. article in American Journal of Psychology



Subject Undergoing Test with Galvanometer, so Sensitive It Records One-Millionth Volt of Electricity

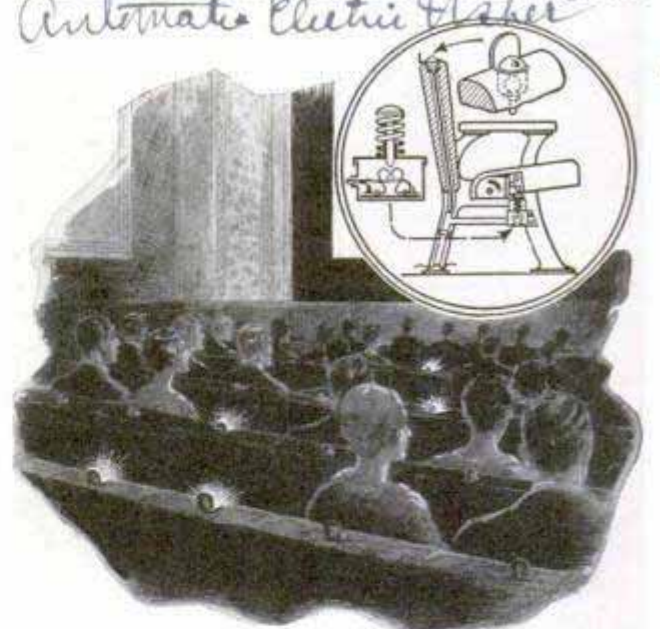
THINKING INVOLVES MUSCLES RATHER THAN BRAIN ALONE

Mental activity and imagination are functions involving the whole body, rather than the brain alone, experiments at the University of Chicago indicate. The conclusions were reached after tests with an extremely delicate instrument, a string galvanometer, so sensitive that it detects one-millionth of a volt of electricity. By means of it, evidence of muscular activity associated with the simple act of imagination was recorded. Subjects trained in relaxation were asked to imagine, at certain signals, that they were flexing an arm, turning a coffee grinder, or performing other muscular motions, and to cease the imagining at a second signal. Electrodes capable of detecting the slightest change in electric potential were sealed about the arm of the person undergoing the tests, and a motion-picture machine recorded the movements of the shadow of a tiny quartz string of the galvanometer. Two-fifths of a second after imagining was started, the string in each case began to vibrate, and a moment after the signal to cease was given, the string became quiet. One subject was able to see and hear herself think simultaneously by watching

the shadow of the string, and listening through a stethoscope connected with an amplifier. Her excitement, however, caused her to lose the required relaxation and end the experiment. The galvanometer records a change in electric potential so slight that it is estimated that two million persons thinking in phase would be required to generate enough such current to light an ordinary lamp.

273 LIGHT ON THEATER CHAIR BACK SHOWS VACANT SEAT

Movie patrons entering a darkened house may readily find vacant seats without the aid of ushers by observing small blue lights appearing on the backs of unoccupied chairs, the lighting system being known as the automatic electric usher. The light bulb, attached to the top of the backrest, is turned out by the weight of a patron as he sits down, but when the seat is vacant, it rises sufficiently to make a connection and turn on the light, which is equipped with a small shield so that the person seated back of the vacant chair is not bothered. The seat is arranged so that a weight of fifty pounds, including that of the seat itself and of a coat and hat, will not extinguish



Theater Chairs Equipped with Lights on the Backs Which Show When the Seat Is Unoccupied

the light. Chairs equipped with the signal lights are available for new houses, while the lighting system alone may be installed in theaters already having seating accommodations.

*Wm. Jean A. Corbin
Hotel Windemere*

At a Palm Beach, Fla. suggest Fla. State course.
POPULAR MECHANICS
Carnie Esoude hfg Co 26th & Penn

985

Kansas City Mo



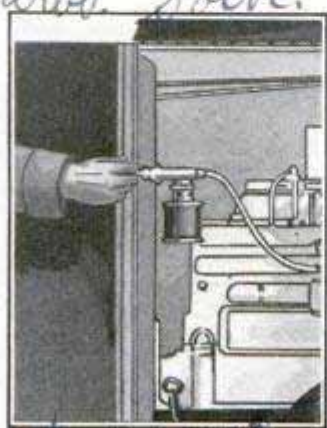
Miniature Golf Course Complete in Every Detail, Including the Regulation Eighteen Holes and Every Hazard to Be Found on a Full-Size Course, Yet Occupying Less Than One City Block

SMALL GOLF COURSE PROVIDES CONCENTRATED SPORT

Miniature golf courses, some of them containing the full complement of eighteen holes in a space less than an ordinary city block, have found favor at winter resorts and also in sections where weather conditions prohibit the year-round use of full-size courses. The putter is the only club allowed on the tiny courses, which contain every hazard of the large links, players being required to shoot from every conceivable position in the course of a game.

MOTOR CARBON IS ELIMINATED BY SOLVENT FLUID

To eliminate carbon from the automobile motor, a liquid product now is on the market which dissolves this deposit while the car stands idle. The solvent is contained in an injector attached to the intake manifold, a button on the dash being pulled to spray the combustion chamber while the car stands. The dissolved carbon is eliminated



Alomite Corp., 2650 N. Crawford, Chicago

through the exhaust when the engine is started. The solvent also may be applied with a pressure gun if the car is not equipped with the injector.

LOST ART OF COLORING GLASS SOUGHT IN SUN'S RAYS

Seeking the lost chemical formula of the Venetians, whereby they were able to stain glass in beautiful colors, engineers are experimenting with the natural rays of the sunshine as they pour down in Death valley, California. Whether the effects produced are due to the ultraviolet rays or other emanations peculiar to the sun's light in this locality, is not positively known, but unusual colors are formed in glass here, and prospectors are said to be making a profit on old bottles and other bits of glass exposed to the sun by selling them for their beautiful tints. Various types of glass are numbered, catalogued and placed on the roof of a hotel where they are exposed to the full light of the sun. Some of the samples turn a deep purple while others acquire an amber cast. Bottles and other fragments are sometimes sold to jewelers, who cut them up into beads for necklaces, while others are used for vases and lamp stands. At Riolite, "ghost city" of Death valley, bottles are found that bring higher prices than they did when full, many of them selling for two to five dollars.

481
Harold Coker Place, Hollywood Calif
110 1/2 N. McCadden

Curtis and Tompkins Chemical Engineers

360 NEW METHODS KEEP FISH FRESH OVER TEN DAYS



Copyright, Popular Mechanics Magazine

Artist's Drawing of Improved Fishing Boat Developed in England Showing How Catch Is Unloaded from Net, Cleaned, Sterilized with Hot Water, Sorted and Packed in Ice

Cont. S. W. Clatworthy, Esq. 54, Ribblesdale Road, Streatham, London. S. W. 16

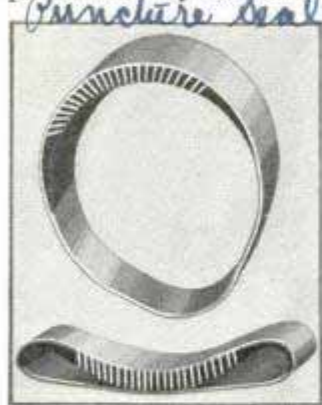
*Am. George H. Michaels
Carnal locate
Boston Mass
7/1/30*

FISH KEPT FRESH SEVERAL DAYS ON IMPROVED TRAWLER

Sanitary methods of cleaning and packing fish on an English trawler, keep the catch fresh for ten days or more and save much rehandling. After the fish are dumped from the net and cleaned, they receive a more thorough cleansing under hot-water jets and are sorted into galvanized-steel baskets instead of the usual wicker containers. Non-returnable wooden boxes are used for packing, ice and a lining of vegetable-parchment paper being placed between the layers of fish. The boxes, each with a drain hole for the melting ice, are stored on shelves of corrugated galvanized steel, so that the drainage from the upper fish cannot pollute the lower. A normal fish-room temperature was found to give better results than refrigeration. One of the most important features of the new trawler's operation is the thorough sterilization of all equipment on each journey to the fishing grounds. Fish packed on the boat have been sent 400 miles by rail in the summer without the need of repacking at the wharves and markets.

PUNCTURE-PROOF INNER TUBES ADD TO LIFE OF TIRES

Inner tubes that are puncture-proof under ordinary conditions now are being produced by several manufacturers. The



tubes are made with the inside out, a thick layer of rubber being placed along the surface that will be next the casing tread. The tube then is reversed with the elastic rubber lining inside. When de-

flated, it is flat, the curved rubber causing a slight concavity, but when inflated, the layer is forced to curve in the opposite direction, and the rubber along the inner surface is compressed. When a nail is forced through the tube and withdrawn, the rubber, being under tension, effectively seals the hole.

*Goodyear Tire & Rubber Co.
B. F. Goodrich Co.*

259
Extra Covers for the Umbrella Which Convert It into a Smart Parasol to Match Any Frock



UMBRELLA WITH TWO COVERS TO MATCH DRESSES

Women who desire an umbrella harmonizing with their frock, yet capable of turning a sudden shower, now may obtain a combination parasol and umbrella. It has two covers, the outer one detachable. The under cover is of regulation water-resisting material, while the outer one may be made of bright colors to match a dress, as it is quickly detached in case of a shower.

LETTER OPENER SLITS ONE SIDE OF ENVELOPE ONLY

Envelope openers that slit only one side at the top of a letter now are available. They do not mutilate the contents and the ends of the envelopes remain attached.

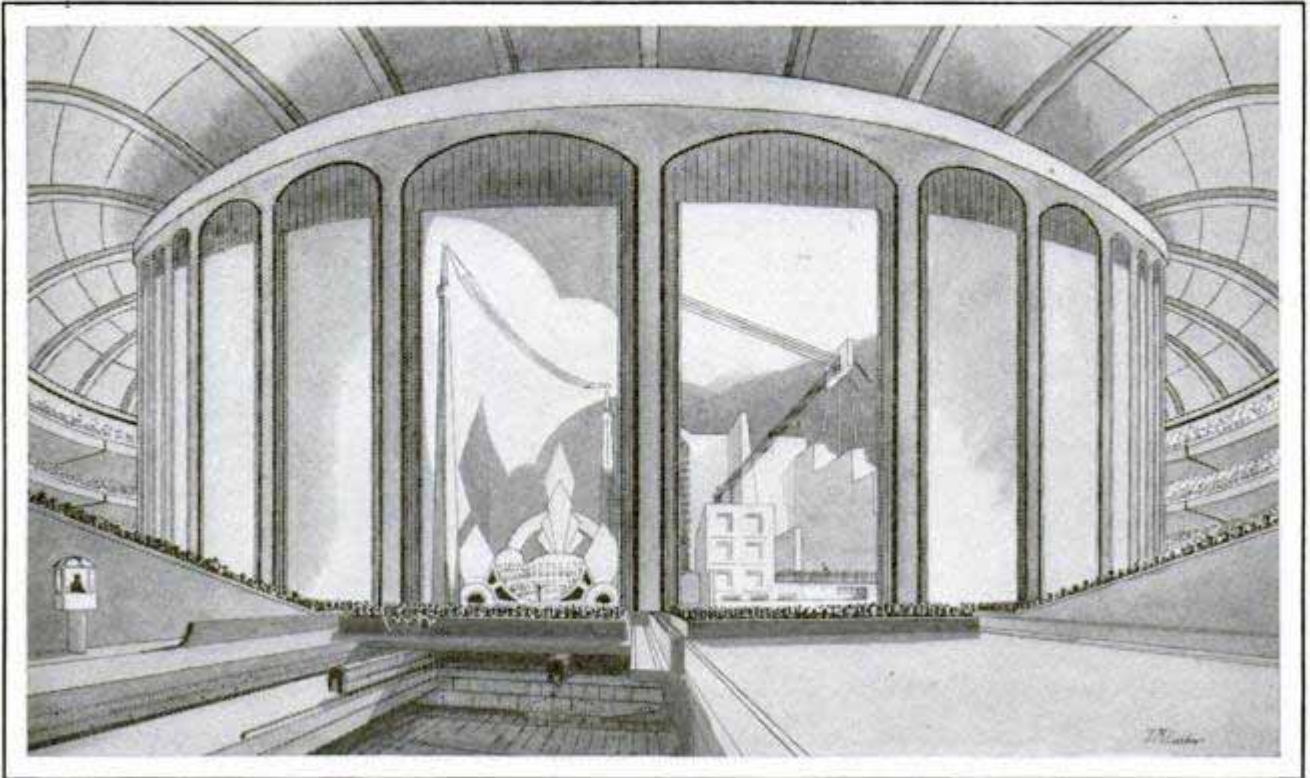
The opener consists of a metal case with slotted edge above which is set a blade at an angle. The letter is placed in the opening and the blade passed along the edge, opening the envelope with one quick motion.



*Envelope
506
Retaining flap.
2021 Greenleaf Ave*

*Cent. Board of Trade Bldg
200 Woods Theatre Bldg
Chicago*

475 AUDIENCE TO REVOLVE AROUND CIRCULAR STAGES



Artist's Drawing of Proposed Theater to Depict Electrical Progress; There Are Thirty-Two Stages in the Central Area and the Audience Revolves about Them on Movable Platforms

In a proposed thirty-two-stage theater, intended to depict development in electrical progress, engineers are faced with a difficulty in handling the scenery, as much of it is to be massive and must be permanently installed, making a shift of scenes practically impossible. The problem is solved theoretically, at least, by having the audience move about the stages. It is planned to construct the auditorium as a series of movable platforms or sections which can be rotated about the stages grouped in the center. At the end of an act, the floor would be turned opposite another stage.

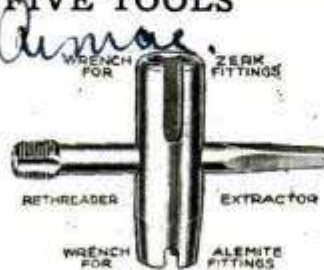
and extractor. One wrench fits the cross-bar type while the other end attaches to either ball joint or straight hexagonal-head fittings. It may be employed to tighten or remove any fittings, while the extractor is punched into a broken fitting to remove it, and the rethreader is used to repair crossed or mashed threads.

**SUGAR BEETS DRIED BY HOT AIR
449 REDUCE SUGAR LOSS**

Hot air is employed for drying sugar beets under an improved system for the production of sugar known as the Oxford process, to distinguish it from the diffusion process which has been used. Because the beets contain about seventy-five per cent water, they are subject to rapid decomposition, so that factories are limited to about ninety days for treatment under ordinary methods, thus requiring an excessively large plant and irregular labor needs. Under the Oxford process, sugar extraction can be carried on throughout the year, thus reducing labor, capital and operating costs. The improved process follows the old method up to slicing the beets. The cosettes are

**WRENCH FOR GREASE FITTINGS
INCLUDES FIVE TOOLS**

Five tools in one are contained in a grease fittings wrench for the auto now on the market. The tool consists of two wrenches on opposite ends of a crossbar, while the other extremities of the bar contain a rethreader



\$1.50

353
*Penick - McI Kwanie, Inc
11 Hudson St.*

*facts about sugar
2/22/30*

and staff of Institute of Agricultural
POPULAR MECHANICS
 Engineering University of Oxford, under

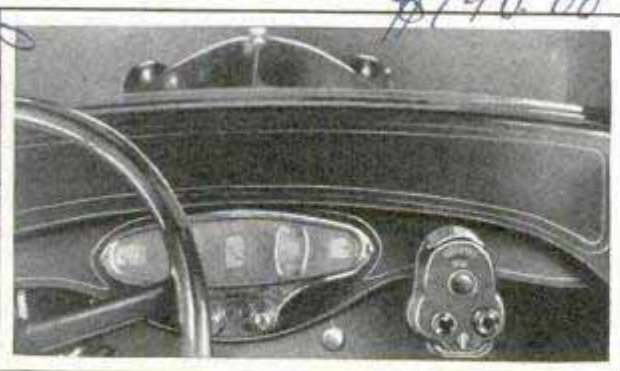
then dried by hot air and completely sterilized, maintaining their sterility for long periods without loss of sugar. The drying also makes possible establishment of local treatment stations and the shipment of the dried product. Transportation has been a problem before because of the bulk and weight, resulting in large freight charges. Previous attempts to dry beets have failed, due to inability to procure uniformity with resulting loss of sugar. In the Oxford process, the beets are passed on moving belts through three chambers, each heated to different temperatures, the air being circulated by fans. This method provides for the elimination of six steps now necessary under the diffusion process, all of them involving waste and expense.

ministry of Agriculture

RADIO FOR AUTO IS SHIELDED FROM CAR NOISES 379

Fully shielded from car noise and interference, a radio for the automobile that operates as simply as the radio in the home now is available. All the units are constructed on a heavy steel chassis frame and the chassis is mounted on the dash, where it is easily accessible, yet well out of sight, while the tuning-control unit attaches to the instrument panel, and embodies a volume control and station selector with a single electrically lighted dial and simplified tuning arrangement. No drilling or mutilation of the instrument panel is required to install the tun-

Chicago 3737 Michigan



At Right Is Tuning Control for a Radio for the Auto, Which Is Mounted under Dash Out of Sight

ing-control unit. A single key lock controls the entire power supply. A six-inch cone-type magnetic speaker is used and is mounted on the receiver chassis, the speaker housing acting as a baffle, while the antenna fastens to the car chassis.

American Bosch Magneto Corp.



Combination Electric Food Mixer and Fruit-Juice Extractor Installed in Wall Brackets

COMBINATION ELECTRIC MIXER AND JUICE EXTRACTOR

Electric mixer and fruit-juice extractor are combined in one handy kitchen appliance now on the market. It may be used to squeeze the juices of oranges and lemons, but also mixes malted milk and salad dressings, whips cream and beats eggs. The beating attachment spins at 10,000 revolutions per minute, while the extractor operates at 350 revolutions per minute. It weighs only six pounds and fits in a small bracket attached to the wall.

PENNY-IN-THE-SLOT DOORBELL USED IN HOLLAND 468

To outwit unwanted callers, Dutch householders have installed penny-in-the-slot electric doorbells which ring only after a coin has been deposited. Should the caller be a welcome one, the penny is returned, but if the visitor is not desired, the coin is retained. Mail carriers have disks which operate the slot device and these are returned to them when the door is opened.

Ⓜ A man's beard grows about five inches a year.

Genl. S. Leonard Bastin, Esq., 46 Arnewood Road

Robbins + Myers, Inc., Springfield Ohio

Chicago 567 22 11th Ave

Biddy \$14.95

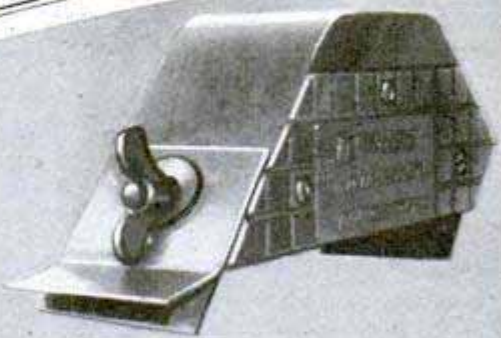
\$140.00

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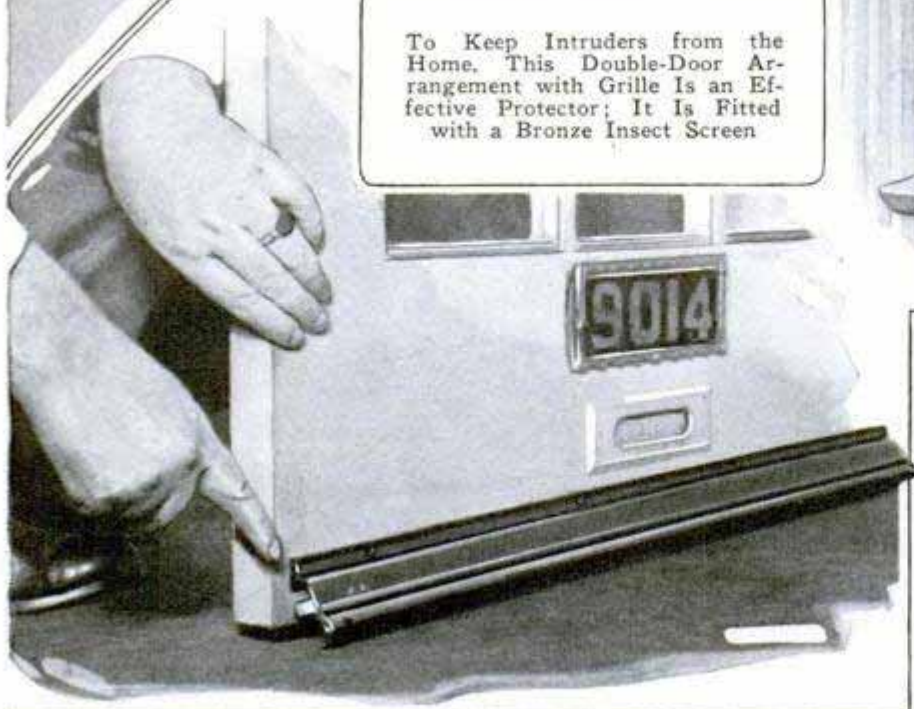
Making Home



Griddle Cleaner with Adjustable Blade Smooths and Cleans Surface Quickly



To Keep Intruders from the Home, This Double-Door Arrangement with Grille is an Effective Protector; It is Fitted with a Bronze Insect Screen



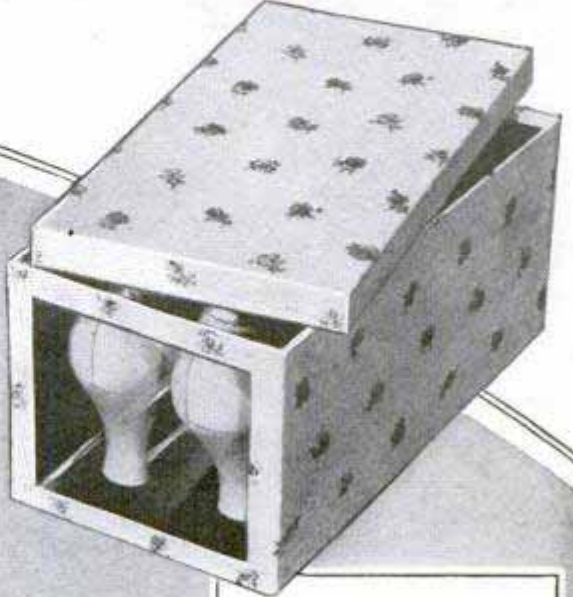
Above is an Oilcloth Curtain Protector to Keep the Drapes from Becoming Soiled when the Window is Open; It is Easily Cleaned and is Secured with Glove Fasteners; at Left is an Automatic Seal to Keep Air from Blowing in under the Door; It Lifts when the Door Opens and Lowers as it Closes; It may be Used Effectively on Outer Doors or Closet Doors to Keep Out Dust



Tasks a Pleasure



Here Is a Safety Can Opener for Any Shape or Size and That Works Right or Left-Handed



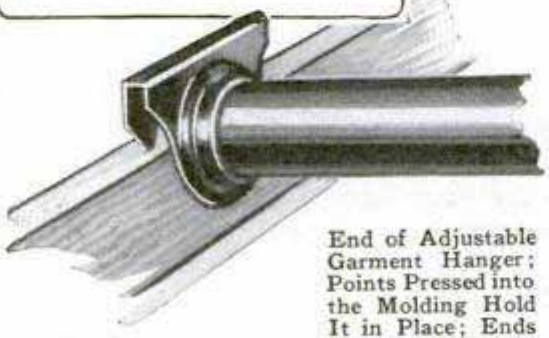
This Shoe Box with Transparent End Permits View of Contents without Removing the Lid



To Speed the Preparation of String Beans for the Table or for Canning; Turning the Crank Moves Three Blades to Cut the Beans to the Proper Size



For Safe and Rapid Clothes Drying, This Bag Has Electric Fan That Forces Heated Air over Coils; Unit May Also Be Used for Drying the Hair



End of Adjustable Garment Hanger; Points Pressed into the Molding Hold It in Place; Ends Contain Mothballs or Crystals

112 STRANGE CIRCLE OF LIFE IS REVEALED UNDER LENS



How strange that honey should be the only substance produced in nature without damage or loss of life to any living, growing thing. Insects simply gather it from flowers without injuring them in any way. Darwin definitely established the circle of life. It begins with the tiny algæ, those curious intermediaries between the lower forms of plant and animal life. Water fleas live mostly on the algæ; these fleas, in turn, serve to feed certain small fishes, small fishes feed larger ones, and so on, until the circle sweeps upward and widens to include man. Decomposition of all sorts of matter renders it fit for consumption

The Circle of Life; Below, Cheese Mites under the Microscope; Upper Left, Tiny Fishes Eating Water Fleas; Right, a Butterfly after Honey

by a multitude of creatures that are so constructed that they must wait for that process to set in before they can find nourishment. When a leaf withers and falls from its tree, that is by no means the end of the leaf, or rather of the matter of which the leaf is composed. Small creatures begin at once to devour that dead leaf. That which is left after their meal decays, and an amazing number of bacteria develop. Anything that is dead will be almost at once covered by a multitude of tiny creatures who merely seek food. This is one of nature's ways of eliminating that which might otherwise endanger the lives of other creatures.

RIVER MOVED OVER TWO MILES TO MAN-MADE CHANNEL

425 Because the Trinity river at Dallas, Tex., was restricting the growth of the city, it is being moved two and one-half miles and placed in a man-made channel. Twenty-five miles of embankments, thirty feet high and 154 feet thick at the base, will imprison the stream when the task is finished. The work involves moving the three forks which combine to form the river, and also a portion of the main stream, and because the artificial channel

will be straighter than the natural one, the river will be ten miles shorter after the engineers have finished with it. Moving about 18,000,000 cubic yards of earth is involved, and drag lines and hydraulic dredges are doing this work, in which 1,000 men are employed. When finished, 10,000 acres of waste land will be made available in the city, and the city itself will be united instead of being split by the river. In addition, the terrific floods which have in the past devastated this section on several occasions will, it is hoped, henceforth be unknown.

Com. Mabel H. Olobert, 223 N. Mont Clair
Dallas Texas

Eastman Kodak Co
Rochester, N.Y.

**X-RAYING OF TREES
SHOWS DEFECTS
IN WOOD** 454

and - J.P. Malloy
city forester, Rochester, N.Y.

Veneers Mar 1930 P. 17

Experiments in X-raying live trees indicate that such photographs may soon find a wide application in the lumber industry. Preliminary tests with logs in the laboratory showed that the X-ray revealed knots and cavities and even showed up the grain to some extent in smaller logs. Experiments with living trees likewise revealed the decayed and knotty places, and even showed live borers, leading to the conclusion that the X-ray may be useful in a laboratory study of tree disease and decay. While such photographs are expensive, the manufacturers of veneers from fancy logs can well afford to use the X-ray because foreign matter in such logs often results in serious damage to expensive knives. In most veneer factories is found a miscellaneous collection of nails, wire, screws, hinges, horseshoes, tool blades, stones and plow points, all taken from the heartwood of apparently perfect logs.



Huge Canvas Canopy over Deck of Vessel and Dock, So Flour Can Be Taken Aboard in a Rainstorm without Damage

**WET LOADING OF SHIPS AIDED
BY HUGE CANOPY**

Change

Wet-weather loading of a ship presents a problem when perishables are to be taken aboard, but one steamer, which could not be delayed, overcame the difficulty recently when taking on a cargo of flour at Sydney, Australia, by erecting a huge canopy over part of the vessel and the dock. The canvas covering was attached to masts and swung out over the dock so that the flour could be taken aboard without damage while the rain poured down.

**HAND-ADJUSTED HOSE CLAMP
IS QUICKLY INSTALLED** 313

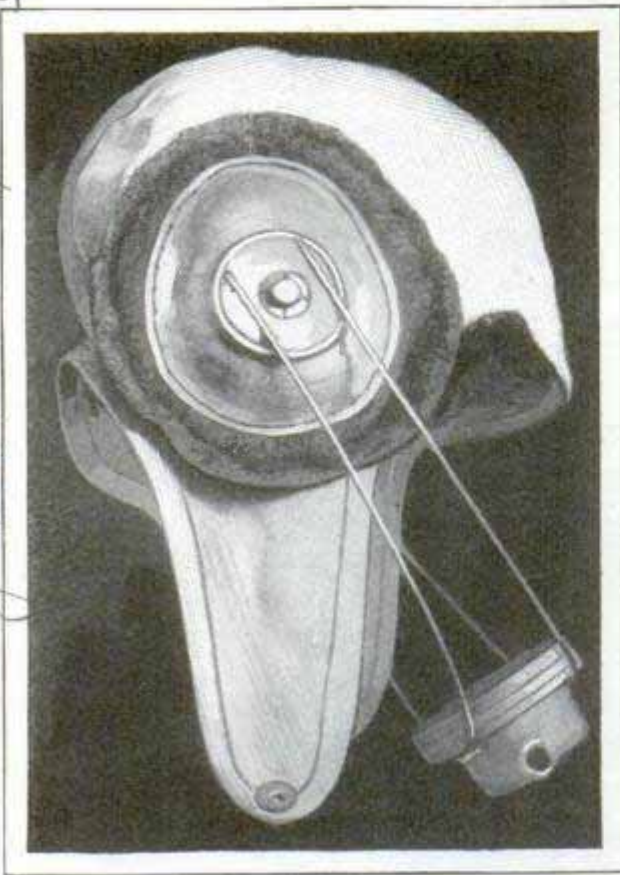
Adjustable clamps that can be used wherever hose connections of any kind are to be made are instantly installed or adjusted by hand without the use of any tools. A metal band fits around the hose and is locked in position by a latch and lever attachment, and rollers insure a tight fit.



Write our Bureau of Information, if you wish to know who makes or sells any article described in this magazine. Send no postage; the service is free.

Schuster & Schelbred,
602 Financial Center Bldg

*Boeing Airplane Co Seattle, Wash
54
Seeborg Station*



Pilot's Helmet Containing Radio Headset, Enabling Flyer to Talk with Persons on Ground

PILOT'S HELMET HAS HEADSET FOR RADIO REPORTS

Air-mail, express and passenger pilots of one air transport system now are using a combination receiving and sending headset which is made as a part of the helmet. It weighs one pound and enables pilots to communicate with ground stations 200 miles distant or with other planes in flight. A tightly fitting piece of sponge rubber in the ear is connected with two wires which are plugged into the cockpit, and over this radio system the pilot receives a weather report of conditions just ahead at intervals of ten minutes.

HEAT FILTER FOR MICROSCOPE AIDS NATURE STUDY

Living organisms can now be studied through a microscope that magnifies as much as 12,500 diameters as the result of a heat filter to prevent the strong light that has to be used from killing the specimens. The filter is a special chemical solution that not only absorbs the heat but also permits the use of rays of light that give greater visibility over the area to be

studied. A 900-watt bulb is employed. Its heat is so great that a piece of paper will char under the light, but the filter so effectively absorbs the heat that sensitive organisms remain alive while the effect of drugs and other substances upon the specimens is observed. The field under the microscope is projected upon a tracing-cloth screen so that the actions of the tiny specimens can more easily be observed. The unit is an aid in the preparation of moving pictures and is expected to help greatly in the further study of the effects of certain substances upon man. For instance, it has been found that the water flea reacts to various drugs in a manner similar to a human being so that data helpful to physicians and others may more quickly be obtained. The microscope was developed at the Philadelphia College of Pharmacy and Science.

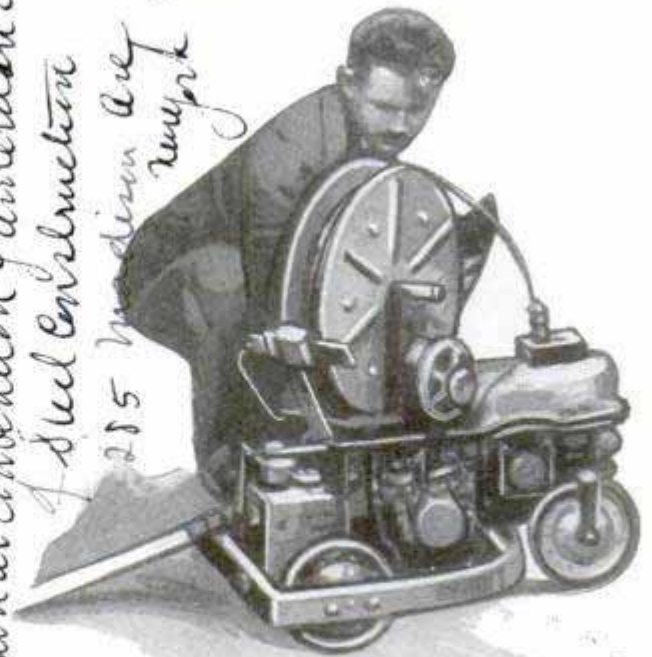
SEAMS SEWN IN STEEL PLATES BY AUTOMATIC WELDER

3845

Possessing the technical ability of a welding engineer, an automatic steel-welding machine was demonstrated recently. The apparatus, known as a "bug," sews up seams in steel plates as simply as a seamstress stitches cloth. It operates about four times as rapidly as welding can be done by hand.

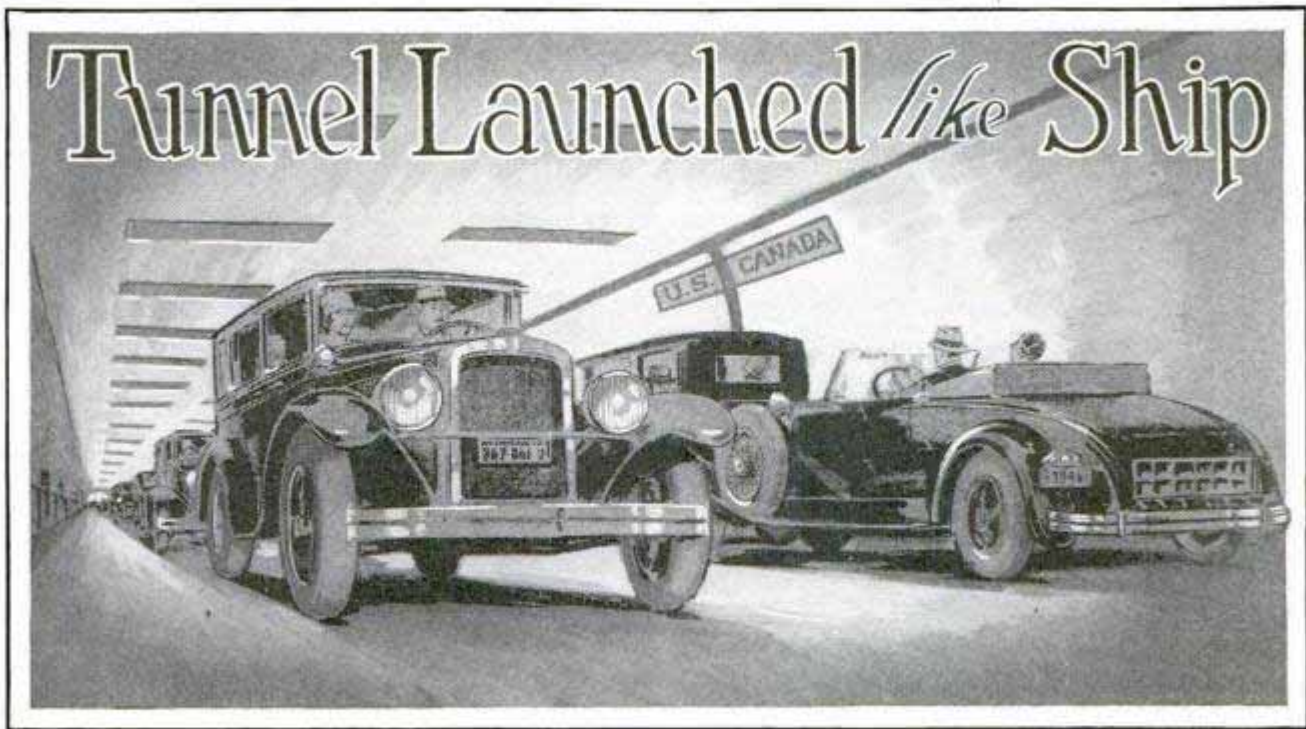
*Cont. George H. Eckhardt
4528 Walnut St. Phila*

*Shuman invention of American Institute of Steel Construction
255 Madison Ave
New York*



Automatic Welding Machine Which Stitches Seams in Steel Plates like Seamstress Sews Cloth

*Perfected in Research Laboratories Philadelphia
General Electric Co. Schenectady*



Crossing the Border by Tunnel Route; Artist's Conception of Interior of Passage When Completed; Note Air Ducts in the Ceiling; the Walk Is for Tunnel Attendants

By GEORGE ST. JOHN

"A TUNNEL that floats?" we asked the chief engineer. "Why, we had supposed that a tunnel, like a mouse, burrowed its way through the earth and went somewhere."

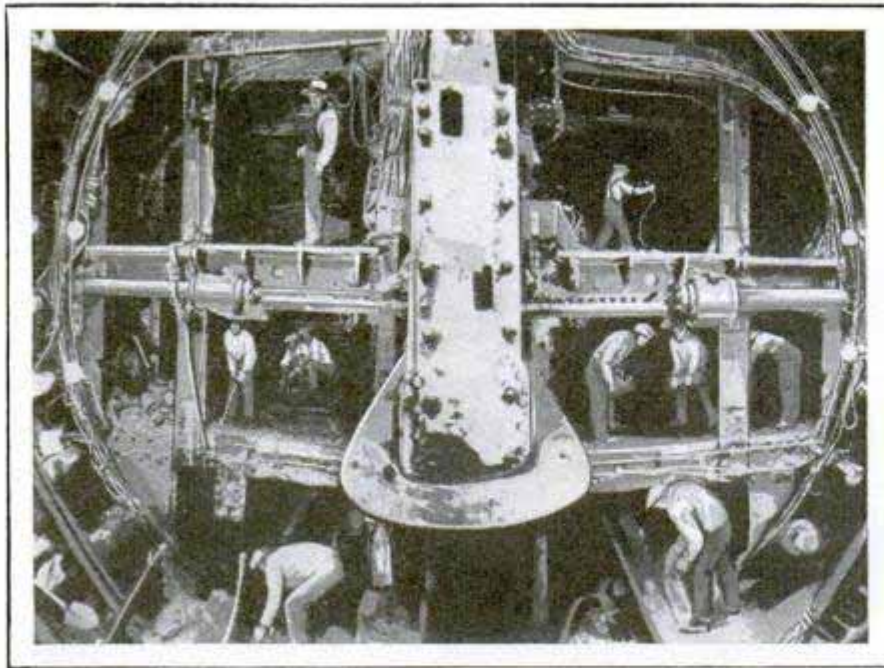
"Well, they did until we started making a tunnel swim like a fish," he replied with a smile. "Six miles downstream, we build our tunnel on dry land, tow it up here and sink it to the bottom of the river. It's the first time engineers ever tried the trick, and it works slick, too. By using this method, we are going to have a \$40,000,000 job at not to exceed \$25,000,000, and just as good a tube as you'll find anywhere."

A marvel of modern engineering achievement, the new vehicular tunnel running under the Detroit river, between the motor capital and Windsor, Ontario, is our first international tunnel.

Electric arc-welding machines "stuck" heavy twenty-four-foot steel plates together at Ojibway, Canada, six miles down the river from the tunnel site. Each of these 250-foot sections, with an inside diameter of thirty-one feet and an outside diameter of thirty-five feet, was built like a ship, on regular launching ways. Nearly eighteen tons of welding electrode was consumed in joining the nine giant tubes together.

After all the joints had been tested for leaks, bulkheads were placed at each end of the huge 450-ton steel tube, and it was launched. Then it was towed to the dock, up river, where some 4,200 cubic yards of concrete were poured into the form to line the tube and provide the inside covering. Weighing 8,000 tons, the shell was towed up river to the tunnel site, where steel masts were erected on either end of the great segment, which were used like sights on a gun. By aiming along these, engineers released the air and "shot" the great volley sixty-five feet to the trench that had been dredged out of the bed of the river, and so accurate were they in aiming that the one-inch leeway provided for error was not needed. Heavy steel cables and huge scows assisted in lowering the great "stovepipe" volley, and controlled the lateral movement due to the current of the river. By means of derricks on the scows, each segment was carefully shot into position.

"Our method differs from those previously used in sinking tunnel segments," said Maj. Burnside R. Vale, engineer in charge. "Up to now they have been sunk by filling them with water or sand and water. We place no extra weight on the outside until it comes down to the sur-



with the power shovels. After the dirt has been removed, the shield is driven forward, thirty inches at a step, by means of hydraulic jacks that are capable of exerting a pressure of 150 tons.

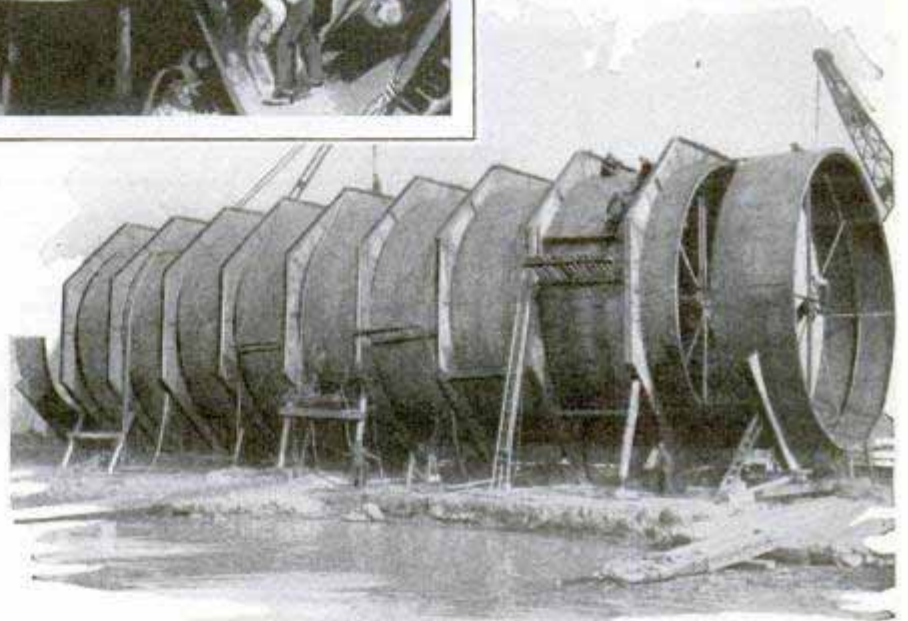
To make the resemblance to an animal more striking, a long tail projects from the posterior end of the shield. This tail prevents the roof of

face of the water. Then we speed it on its way to the bottom by adding enormous concrete blocks that weigh 8,000 tons. When the divers have bolted it to the next tube, already in position, all we have to do is to knock out one of the bulkheads and we have another watertight link in our tunnel."

More than 300,000 cubic yards of clay was removed from the bed of the Detroit river, on a line between Detroit and Windsor, to provide the trench in which these 250-foot segments were submerged. Once each is set in its twenty-foot groove, at the bottom of the stream, it is covered with fifteen feet of clay to protect it from dragging anchors.

Approaches to the submerged tube are being bored by the largest shield ever used in America. The distance excavated by this marvelous machine is 466 feet on the Detroit side, and 986 feet on the Windsor side. Thirty-five feet in diameter and fifteen feet long, the great shield resembles nothing so much as an overgrown prehistoric burrowing monster.

Its teeth and claws are the 110 men, called "muckers," working in three eight-hour shifts, whose task it is to dig away the earth from in front of the machine



Top, Digging the Tunnel; the Huge Shield Is One of the Largest Ever Made; Below, a Section under Construction

the tunnel from caving in until the steel lining and concrete inner tube have been put in position.

The completed tunnel will be nearly three-fourths of a mile long, about one-half mile of which is accounted for by the segments sunk under the river. The roadway will be twenty-two feet wide and allow clearance of more than fourteen feet overhead. The width will permit the operation of two traffic lanes continuously, with space for a third lane in case of emergency.

To keep water out of the tube is only half the battle; providing ample ventilation is the other. Without plenty of oxygen, a tunnel filled with motor cars would become a death trap. Fresh air, changed every few minutes, is provided by the two ventilating plants, located on either bank of the Detroit river.

Beauty Queen
in Hatton Garden

385

POPULAR MECHANICS

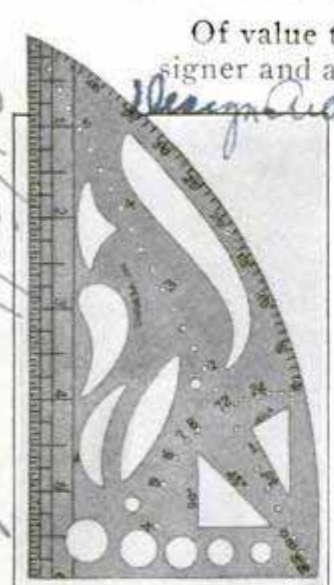
PEARLS INJURED BY COSMETICS
SENT TO JEWEL HOSPITAL

Sick pearls, like sick persons, go under the surgeon's knife in a London hospital for damaged jewels. Once a pearl has been drilled for threading, it is an easy prey to every kind of chemical poison and absorbs cosmetics from the skin of its wearer until its beauty is greatly impaired. Cold cream and oils make it dull and greasy. rouge and powder destroy the color, acids from the skin eat it away, and the thread on which it is strung wears it down to a fraction of the original weight. The pearl surgeon removes the outer shell to expose a clear, bright surface beneath it, unless the pearl happens to have a core that is stained and valueless. Sometimes, when it has merely grown greasy with unguents, medicine is used instead of the knife. In this case it is baked on blotting paper in a miniature Turkish bath until the grease is absorbed. An expensive pearl often is examined by ultraviolet light before "skinning" is attempted. The skinning usually reduces the weight by thirty per cent. The ultraviolet rays also tell the expert from what part of the world the pearl came, by showing different colors under these rays.

Healthy men 2/24/30

463

DOZEN DRAWING TOOLS IN ONE
SERVE MANY NEEDS 204



Of value to the draftsman, designer and art student is a drawing instrument that has twelve distinct uses. It is in the form of a flat celluloid piece with perforations of various shapes and sizes, and can be used as a compass, divider, rule, square, protractor, parallel, stencil set, group of French curves and for many angles. A circle can be divided with the instrument quickly by placing a pencil in a hole at the number of divisions required, and drawing a line through this point.

1133/1270 CW
no'm 9ll- 7/22/40

A. S. Patents Corp
20 W. 22nd



Cleaning the Teeth Electrically with a Brush Which Plugs into Any Convenient Light Socket

ELECTRIC TOOTHBRUSH CLEANS
TEETH AUTOMATICALLY

Cleaning the teeth now is accomplished by pressing a button with the aid of an electric toothbrush exhibited in London recently. The brush is coated with dentifrice and placed in the mouth, the cleaning and brushing being accomplished electrically as the brush is moved over the surface of the teeth and gums.

HEEL PAD HOLDS BOOT IN PLACE
LIKE A LACED SHOE 340

Sponge-rubber heel pads now are being produced to hold the boot to the foot with the snugness of a laced shoe. Two pads are placed in each boot in such position that they conform in shape to the taper of the heel at the sides, just above the broadest part. They clasp the heel closely and also draw the vamp tightly over the instep.



not yet in production
5/31/30

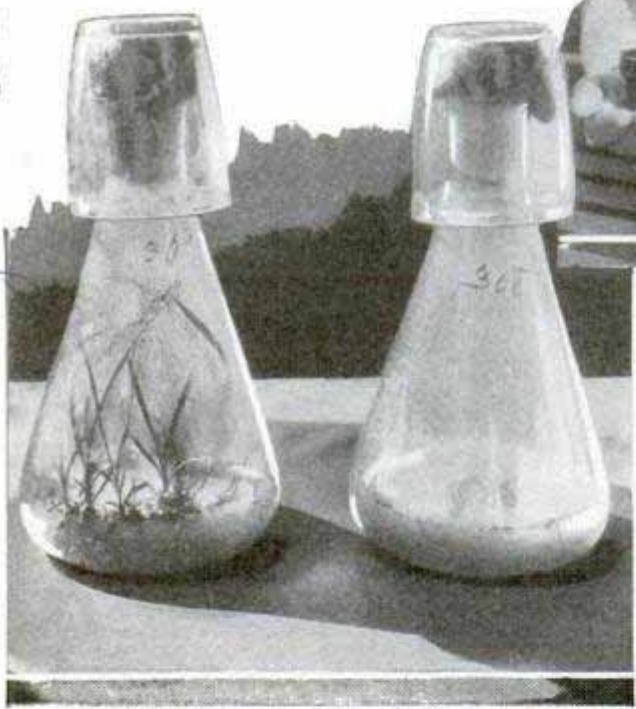
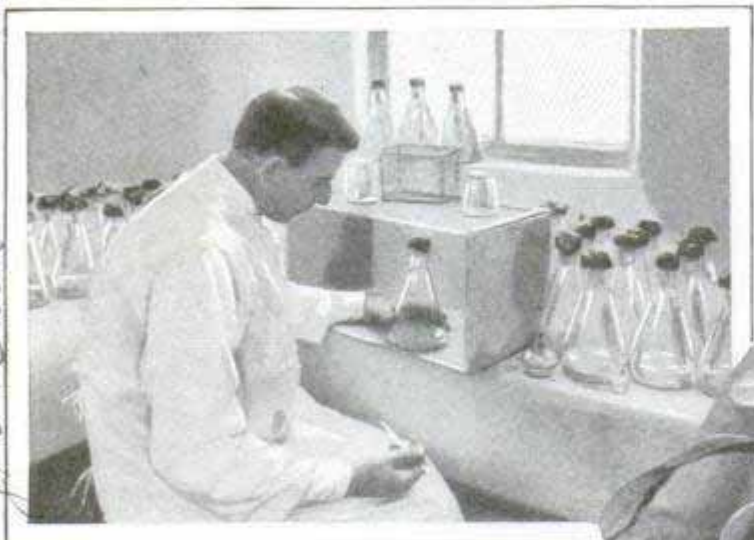
C. W. Chester & Son
Box 858, Petchikari

W.C. England
London W.C. England
Luginis & Co, Strand,
W.C. England

Used by Armistosh & Ooyosh, dms,
Florists, Sawtelle, Calif

INCUBATORS FOR BABY ORCHIDS SAVE PLANTS

Method developed by University of Chicago
according to Mrs Bracey, orchid culturist



Upper Left, Flasks as Incubators for Baby Orchids; Below, Close-Up of Growing Plants; Above, the Seven-Year Cycle from Seed to Flower

Incubators have been developed by nurserymen for nurturing the delicate and precious orchids through the critical germination stage, the weakest period in the flower's life cycle. Under ordinary hothouse conditions only a small percentage of the fragile plants passed through the seven-year period to the flowering stage, but by incubation, ninety-five per cent of the plants come through the first stage successfully. The apparatus consists of a wide-bottomed flask on which is a layer of agar jelly, with a bit of moist cotton or moss stuffed in the top. About 100 orchid seeds are scattered on the jelly, and often a drinking glass is also inverted over the opening to further protect against any

chill breeze. For from five months to a year the plants remain in the incubating flasks, with a temperature never below eighty degrees. The most virile shoots are transplanted to small clay pots and later repotted, finally to mature in six or seven years.

"COFFEE GRINDER" RADIO DIAL MAKES TUNING EASY

Doing away with delicate fingering of radio dials, a "coffee grinder" station finder now is being installed in some airplanes to enable the pilot to adjust his set quickly and easily. The finder has a handle like those on the old-fashioned coffee grinder, and is placed above the throttle



in such a way that the pilot, even when wearing heavy gloves, can make minute adjustments merely by knocking the handle back and forth, which operates the dial connected to it.

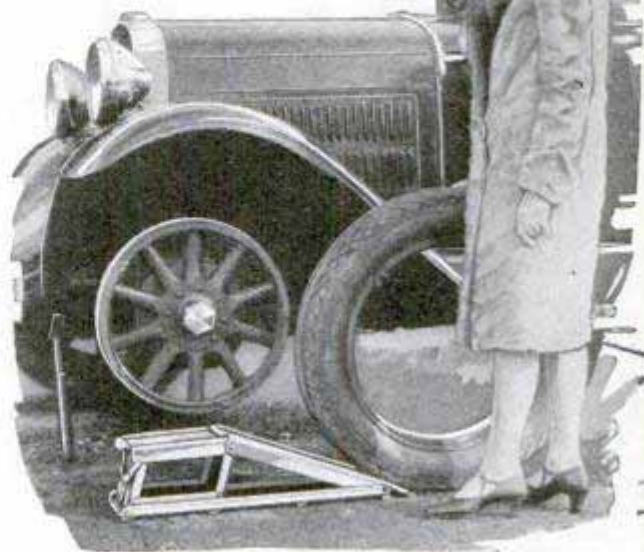
*Boeing Airplane Co
Georgetown, States*

Oakland Calif. Industrial Chemist
POPULAR MECHANICS

as report of American Chemical Society
BACTERIA EXTRACT PLANT OILS
DOING WORK OF PRESSES

Collapsible Runway Hoist and Standard Which Replace Jack in Raising Auto Wheel, While the Car Engine Replaces the Man's Power

Certain forms of bacteria are able to do the work of ponderous presses in extracting vegetable oils from many varieties of seeds and nuts. Vegetable oils are held in microscopic cells whose walls are composed of tough cellulose. These cells must be crushed to extract the oils, but the walls are so tough that the use of pressure often is unsatisfactory, as the residue is left in poor form for cattle food. Neither can chemicals be used, because they affect the oils, but a hardy and vigorous bacterium obtained from brewer's malt has been found satisfactory in the oil-recovery process. Cultures of this organism are mixed with disintegrated nuts, together with ground limestone and water, the mush being placed in an incubator where active growth takes place. The free oil appears in six days in such form that it can be recovered by filtration. The residue is in perfect form for cattle food, the quality of the oil is better and the amount obtained is greater than by pressing, which also is more costly.



COLLAPSIBLE RUNWAY HOIST FOR THE AUTOMOBILE

Made of light metal and weighing only a few pounds, a small collapsible runway hoist to be used in place of a jack for raising the automobile to change a tire, now is on the market. When not in use, it is folded and placed under the seat. With the hoist goes a small standard which slips into clips attached to the springs. To operate it, the hoist, in upright position, is placed in front of the wheel and the car is driven on it. The standard is inserted in the clip attached to the spring and automatically drops into place. To remove the hoist, it is only necessary to step on a small lever, which causes it to collapse so that the car rests on the standard that acts as a jack. After repairing a tire, the car is driven or pushed off the standard as in the case of a jack. The car engine does the work of lifting.

LOW-WING BULLET MONOPLANE SUCCESSFUL IN TESTS

Department of commerce approval has been given to a low-wing cabin monoplane after successful tests of the craft, known as the bullet plane because of the shape. Its cabin, set above the wings, is higher and affords better visibility than is the case with the ordinary ship. It carries four passengers and is said to possess remarkable maneuverability.



Alexander Bullet at Bolling Field Wash.

© U. & U.

Low-Wing Bullet Monoplane Adapted to Remarkable Maneuverability; Note Streamlined Under Carriage and Cabin above the Wings

Alexander Aircraft Co., Colorado Springs Colo

30
Howat
Michigan are cheap
2129th
Urban Runway

Plug-in Amplifier



in the wiring of the receiver. The input plug may be inserted in either the first or last a.f. socket as desired, and the signal is thus transferred from the grid connection of the socket to the grid of the power tube.

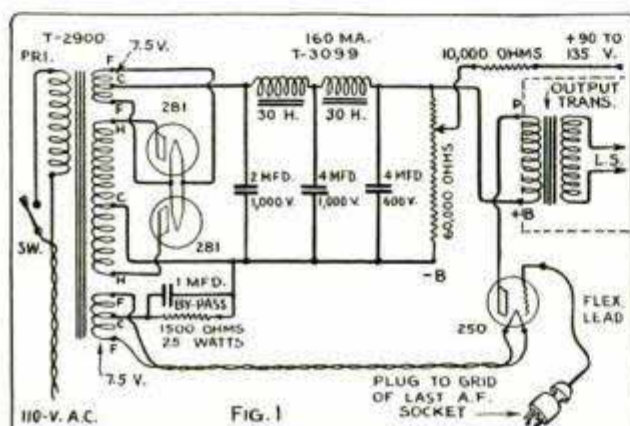


FIG. 1

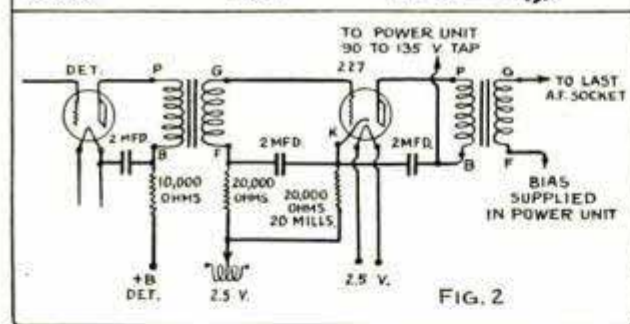


FIG. 2

By FRANK L. BRITTIN

THIS single-stage power amplifier, which was designed and built in Popular Mechanics radio laboratory, employs a 250 tube, and is intended for the last stage of audio amplification in receivers for home use. The instrument may be used with either dynamic or ordinary high-impedance cone speakers of the magnetic type. It is merely plugged into the last tube socket in the receiver, which may be of either the a.c. or battery-operated type, and is, of course, a.c.-operated, so that a source of 110-volt 60-cycle current is required.

It is unnecessary to make any changes

Ample power is provided to operate the 250 tube at full efficiency, as well as a B-supply tap, adjustable from 90 to 135 volts, for a separate plate supply for the first audio tube. This is an ideal arrangement for the prevention of feedback, a common source of distortion when only one B-source is used for r.f., detector and audio stages.

The amplifier is very easy to assemble, and simplified wiring diagrams are available for those who prefer them to the schematic shown in Fig. 1. In designing this instrument, the parts have been arranged to keep inductive coupling between the circuits to the minimum; therefore the parts should be placed on the base in the manner shown, in order to prevent any tendency toward a.c. hum.

An aluminum baking pan, which can be obtained from any department or hardware store for 95 cents, is used for the base. The bottom of the original pan measures 8½ by 12 by 2 in. deep, providing plenty of space for the instruments as well as room underneath for the resistors, by-pass condenser, sockets and wiring.

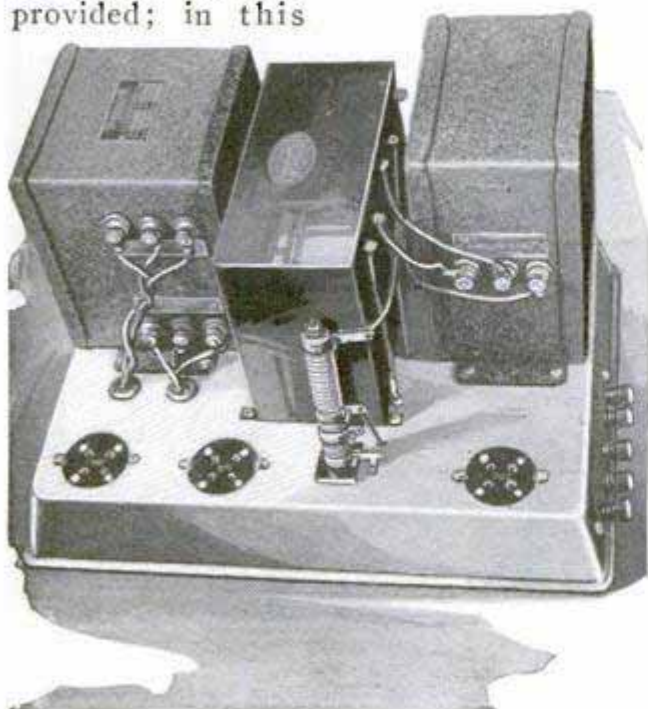
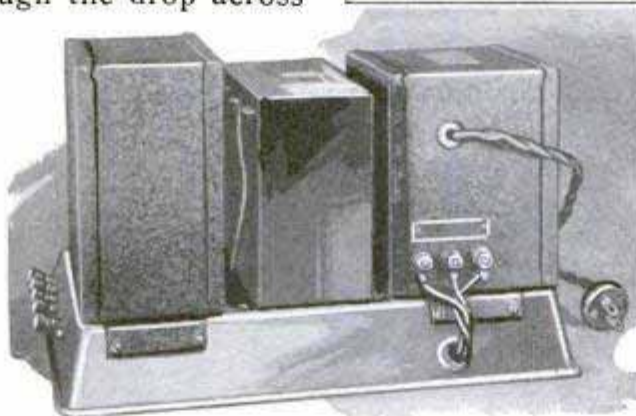
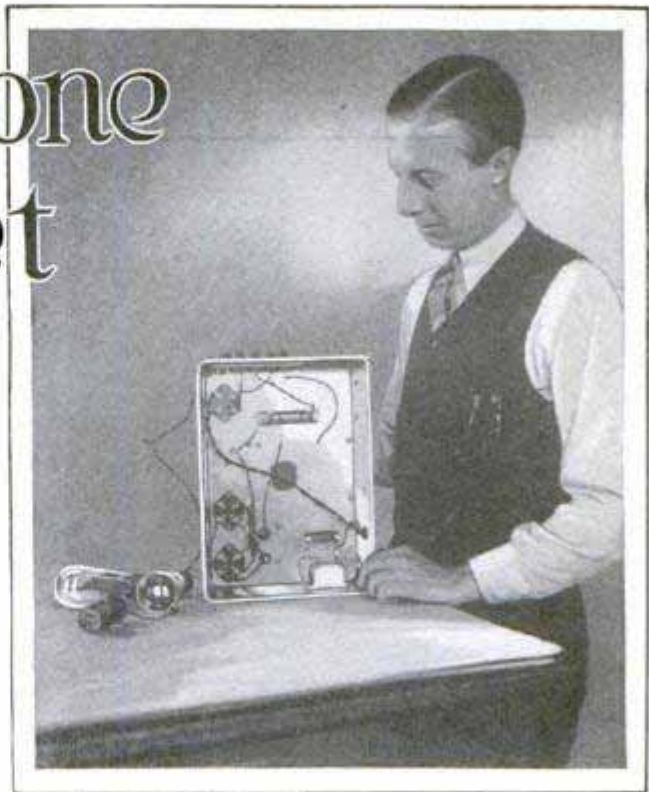
Five binding posts are mounted on a bakelite strip, ¾ by 1 by 5 in., screwed inside the base at one end. Use the strip as a template for drilling the holes in the side of the pan. Enlarge the holes to pass the posts, leaving them mounted only on the bakelite strip. The posts are arranged in the following sequence from the front of the base: Ground, connected directly to the metal base; grid, for the flexible lead to the plug; B, 90 to 135 volts; plate, from 250

Improves Tone of Any Set

tube to output transformer; B-power for same tube to output transformer.

The rectifier tubes are located directly in front of the transformer, and the 250 tube in front of the choke.

The 60,000-ohm wire-wound resistor is a 50-watt 29-milliamp. type, with an adjustable sliding clip. All wiring is done with heavy-duty, flexible rubber-covered wire, and all connections are carefully soldered. A grid bias of 80 volts for the 250 tube is obtained through the drop across the 1,500-ohm resistor in the circuit between the center of the power-tube filament winding and negative-B, which is the metal base. This resistor is by-passed by the 1-mfd. condenser. In some sets, binding posts for power-tube grid bias are provided; in this

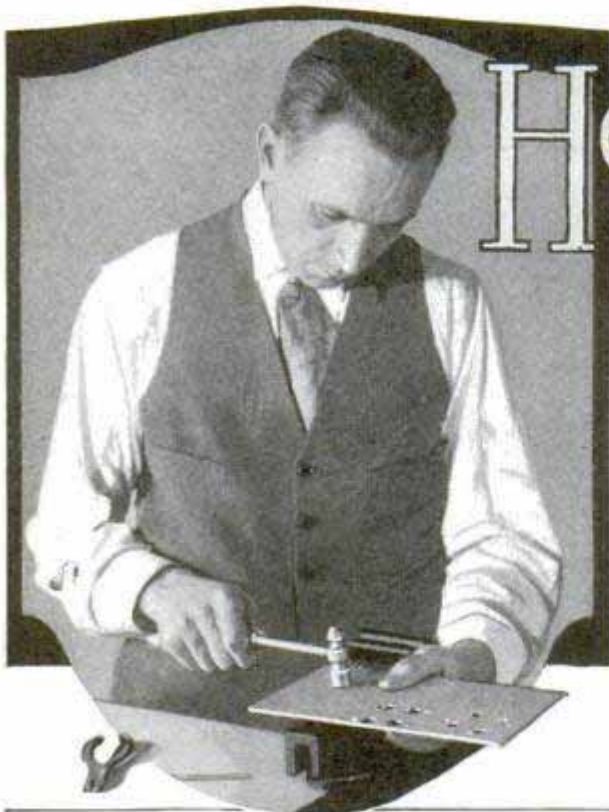


case, connect these posts so as to complete the grid-return circuit.

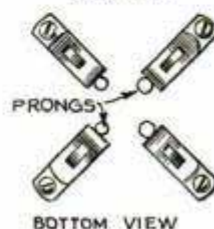
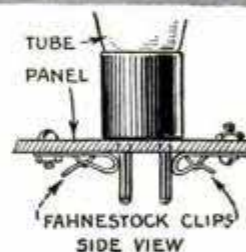
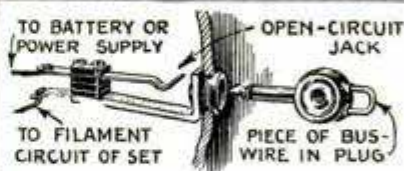
B-negative in Fig. 1 is grounded to the metal base; the ground post on the base is connected to the regular set ground.

The speaker-coupling transformer is a separate unit. The primary is connected to B-power and plate posts on the amplifier, and the output directly to the dynamic-speaker voice coil, or to the magnetic cone speaker, as the case may be. The dynamic speaker may have a suitable transformer already built into it, and in that case the plate and B-power posts on the amplifier unit are connected to the speaker cord direct.

Fig. 2 shows the detector and audio stages of the usual a.c. receiver, equipped with the necessary resistors and by-pass condensers for best results. The ordinary battery-operated set will usually perform in a satisfactory manner if by-pass condensers only are used between all B-supply leads and the negative filament of the tube. This also applies to some a.c. sets, but, of course, the cathode is by-passed in the case of the heater-type tubes.



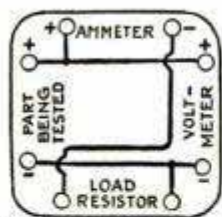
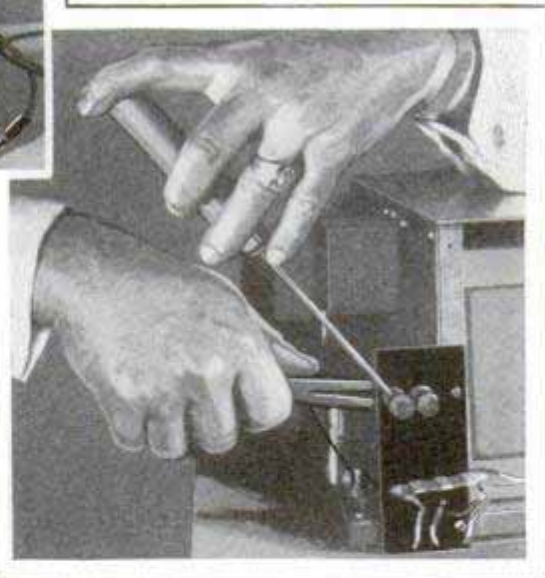
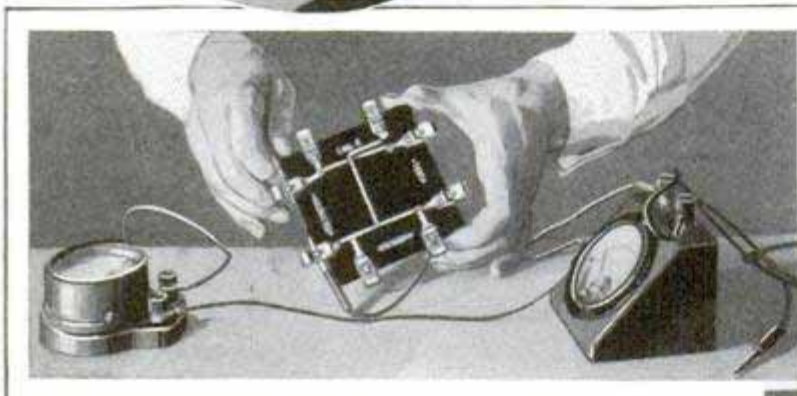
Helpful Hints



Left, Reclaiming Discarded Aluminum Shields; the Undesired Small Holes Are Closed by Hammering In Short Lengths of Wire Solder and Smoothing the Surfaces with a File; Above, a Secret Switch for the Radio Set Made with an Open-Circuit Jack Mounted at Any Convenient Point; the Shorted Plug Acts as a Key to Close the Circuit When Plugged into the Jack



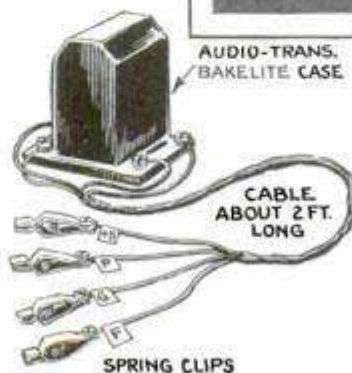
GAUGE FOR DRILLING SCREW HOLES FOR CLIPS
Sockets from Fahnestock Clips; Old Socket Is Template for Drilling Prong Holes



TERMINAL SIDE OF CONNECTOR

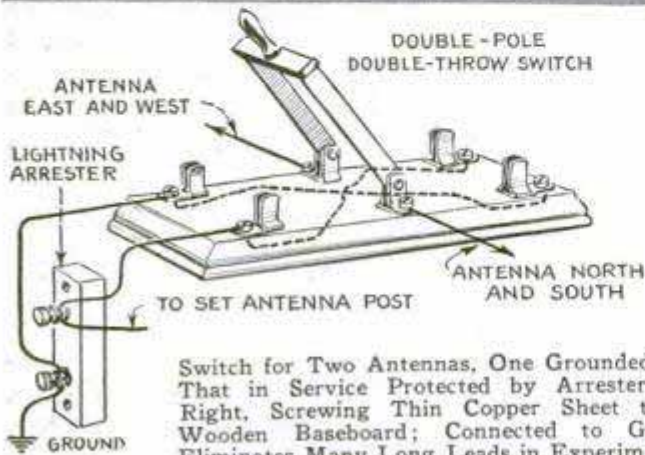
PART UNDER TEST	CHART METERS	RESISTANCES
B-ELIMINATOR	0 TO 250 VOLTMETER 0 TO 200 MILLIAMMETER	0 TO 5000 OHMS
A-ELIMINATOR	0 TO 10 VOLTMETER 0 TO 5 AMMETER	0 TO 50 OHMS
A-BATTERY OR CHARGER	AS ABOVE	AS ABOVE

Handy Connector Block for Making Tests on Chargers, Eliminators and Power Packs, to Determine Output Values under Load; the Block Is Wired and Marked to Prevent Error When Making Connections to the Various Instruments; It Is a Handy Addition to the Experimenter's and Service Man's Kit; the Bakelite Panel Is 3/16 In. Thick and 4 In. Square, Drilled for Machine Screws to Hold the Connector Clips and Wired as Shown in the Diagram; the Chart Is Pasted on the Reverse Side and Shows Meter and Resistor Values to Use for Testing Various Apparatus



Above, Tightening Binding Posts by Inserting Scratch Awl in Wire Hole and Turning Nut in Rear with Pliers; Left, Audio Transformer in Bakelite Case to Prevent Shorts, Equipped with Test Connections, Used When Transformers Are Suspected; Remove Lead from Windings of Suspected Transformer When Testing

from the Radio Lab.



Switch for Two Antennas, One Grounded, That in Service Protected by Arrester; Right, Screwing Thin Copper Sheet to Wooden Baseboard; Connected to Ground, It Eliminates Many Long Leads in Experimental Sets; Below, Method of Tapping Inductance Brings Tapped Lead to the End of the Coil

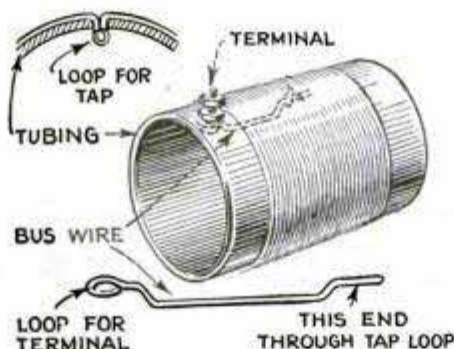
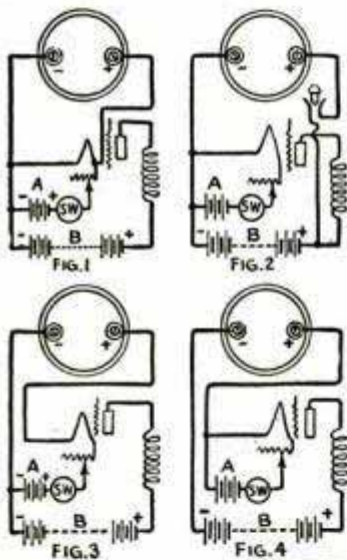
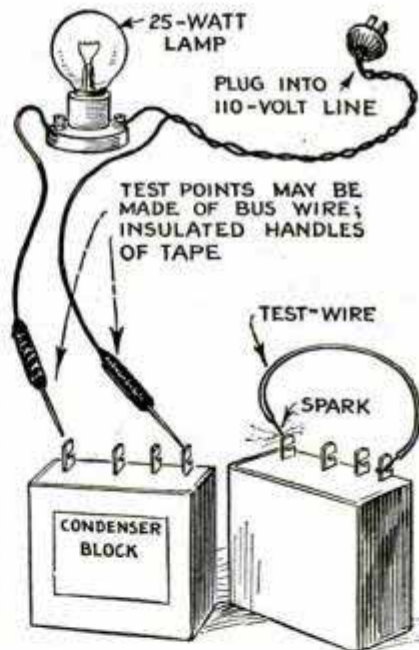
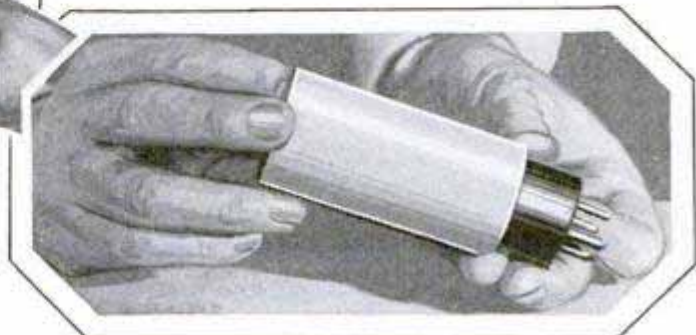
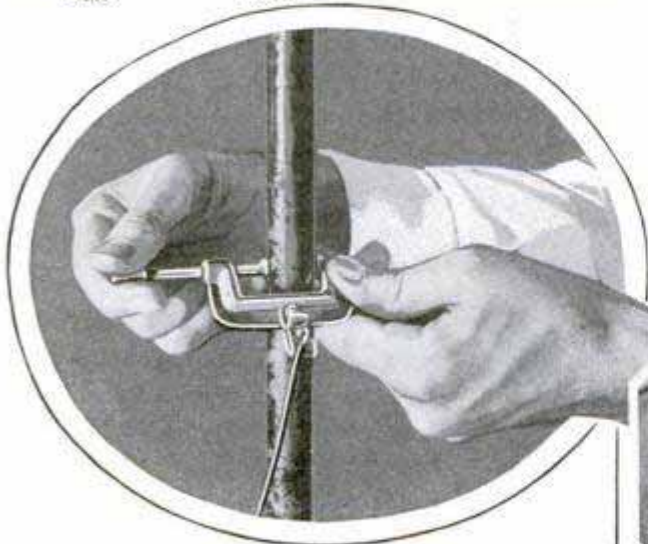


Fig. 1, Connections for Leaving Filament Voltmeter in Circuit; Fig. 2, Voltmeter for B-Supply Only with Push Button; Fig. 3, Ammeter Connected to Show Filament Current; Fig. 4, Milliammeter to Measure Total Plate Current; Left, C-Clamp Makes Good Ground Connector

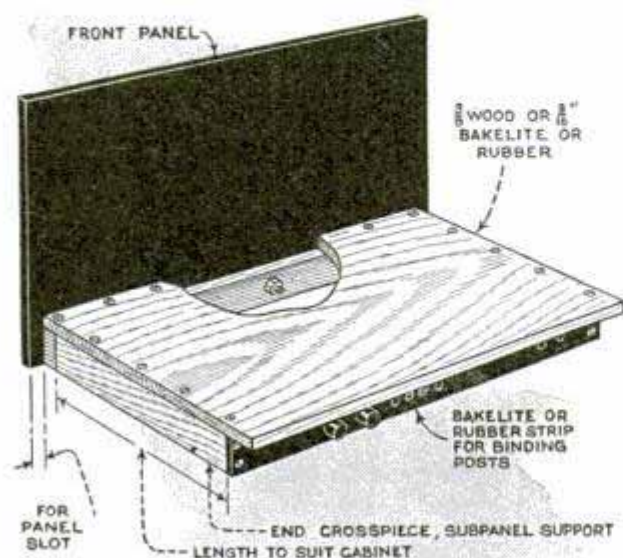


Above, Testing Filter Condensers; Lamp Brilliant Indicates Short; if Leaking, Condenser Will Not Show Spark Ten Minutes after Charging; Below, Lengthening Tube-Base Coils



Making Strong Subpanels

The subpanel has always been more or less of a stumbling block in radio-set



Construction of Homemade Subpanel for Supporting Heavy Radio Parts

building for those who do not wish to go to the expense of heavy metal construction. It has been common practice to use bakelite for this purpose, supporting it above the table with either metal or rubber brackets so as to provide room underneath for by-pass condensers, resistors and other small parts, as well as for concealing the wiring as much as possible. This has its disadvantages when heavy parts are used, so the writer set about to remedy the difficulty with the result shown in the sketch. The width of the supporting strips will depend on the thickness of the wood used for the subpanel, and the over-all height must allow for the height of the sockets, so that the tubes do not come above the top edge of the front panel. With this method of supporting the subpanel rigidly, a bakelite subpanel may be used if the parts are not too heavy. A bakelite strip for the binding posts is screwed onto the ends of the side cleats at the rear, and the subpanel is screwed down as shown in the sketch. —Henry Laraby, New Haven, Conn.

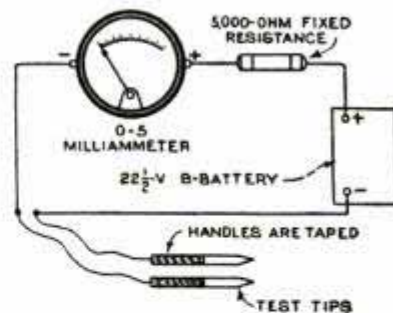
Avoiding Wrong Connections

When disconnecting a unit from a receiver to install a new one, such as a power pack or similar piece, care must be

taken not to mix the connections. This is sometimes rather difficult if there are many wires. A time and money-saving kink is to take a pencil and paper before the substitution is attempted and draw roughly the outline of the part in question. Indicate on this the relative positions of the terminals and the colors of the wires which are fastened to them. If the wires are not of different colors, tie bits of string around them and use numbered cardboard tags, mark the terminals with corresponding numbers, and then go ahead with the work.

A Simple Homemade Set for Making Continuity Tests

For a handy and effective continuity-test set all that is required is an 0 to 5 d.c. milliammeter, a 5,000-ohm fixed resistor, a 22½-volt B-battery and a pair of homemade testing tips connected as shown in the diagram. These tips may be made from ¼-in. brass rod, ground to a point at one end, and a length of rubber-covered flexible wire soldered to the other. The handles of the tips should be taped to prevent current from passing through the body, as a reading of ½ milliamp. or so will be obtained when holding the tips in the bare hands unless this precaution is taken. When the tips are touched together, a reading of 4½ milliamp. should be obtained, and when testing for an open in an audio-transformer winding, a



reading of from 1 to 3 milliamp. is usually about right, depending upon the type of transformer, if there is no open circuit. There are a great many uses for an instrument as sensitive as this, such as for determining the primary and secondary of a transformer that is not marked, open circuits in a resistance, leaky condensers and similar tests. If the meter is mounted on a small panel and placed in a cabinet with the battery, it makes a compact and portable instrument.—Gordon I. Henry, Omaha, Nebr.

BEGINNERS S-W T TRANSMITTER *uses* LOW POWER

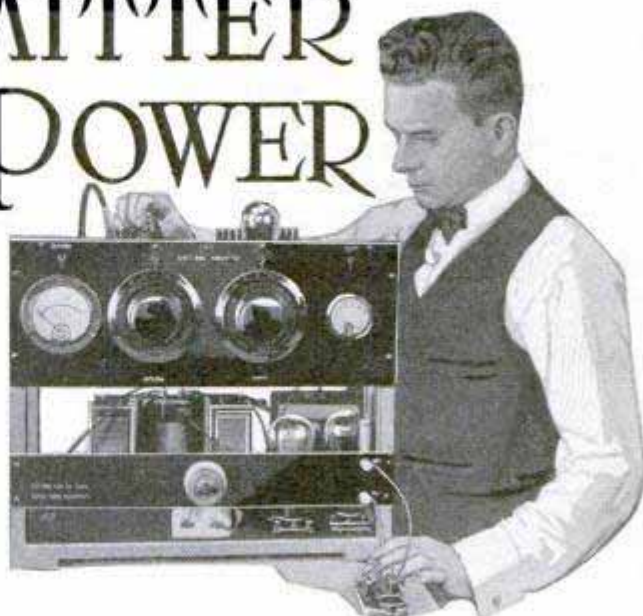
EMPLOYING no more power than that used for the plate supply of a modern broadcast receiver, this short-wave transmitting circuit, an adaptation of the famous Hartley, will span continents and oceans in the hands of an experienced amateur. This does not mean that the beginner will not have satisfactory results with it, but perfection in tuning and operation comes with practice. The equipment used is almost the minimum possible for successful operation, and the cash outlay involved is very low considering the surprising results obtainable.

The double-deck frame used in Popular Mechanics radio laboratory for this particular circuit is simple to construct and presents a pleasing appearance.

The following material is required for the frame: 1 baseboard, $\frac{3}{4}$ by 10 by $17\frac{1}{4}$ in.; 1 shelf, $\frac{3}{8}$ by $6\frac{1}{4}$ by $18\frac{3}{4}$ in.; 2 pieces, $\frac{3}{4}$ by $1\frac{1}{2}$ by 16 in.; 2 pieces, $\frac{3}{4}$ by $1\frac{1}{2}$ by 12 in.; 4 strips, $\frac{3}{8}$ by $1\frac{1}{2}$ by 10 in., and 1 strip, $\frac{3}{8}$ by $1\frac{1}{2}$ by $18\frac{3}{4}$ in.

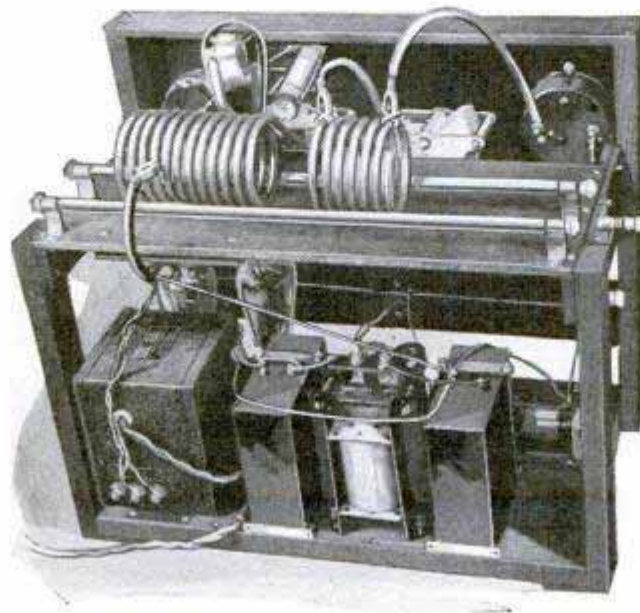
Considering first the power supply, two 281 tubes are used in a full-wave rectifier circuit with the usual filter and the resistor R_3 , of 20,000-ohm 40-watt wire-wound type, across the output of the filter. The filter choke is a 30-henry 150-milliamp. type, and the two filter condensers C_7 are 2 mfd., each of the 1,000-volt test variety.

The two rectifier tubes, choke and condensers are arranged as shown in the lower photo, on this page, and the 20,000-ohm resistor is mounted directly



in front of these units. A porcelain fuse block is mounted at the front edge of the lower deck.

Next to consider, after the lower-deck wiring has been completed, is the transmitter proper. The upper deck is just wide enough to accommodate the coil rack, which consists of two glass towel bars, and the oscillator-tube socket, located directly in front of the coil. The coils are wound with $\frac{1}{4}$ -in. soft copper tubing, and a section of iron pipe, $2\frac{3}{8}$ in. in outside diameter, is used for the winding form, as shown in the upper photo, page 1006. Wind the turns closely by hand and space them afterward by running a $\frac{1}{4}$ -in. rod between the turns. The



ends of the plate coil L, forming the tank circuit, should extend to the rotor and stator of the .0005-mfd. variable condenser C_2 , and the ends should be flattened out and drilled to take machine screws. Small brass angle brackets may be screwed to the condenser terminals to take wingnuts for quick connections. The plate coil carries

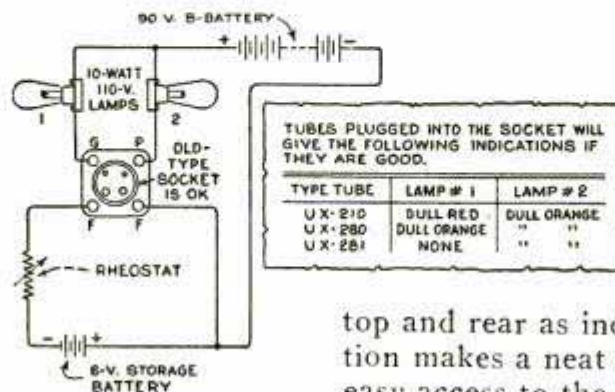
this information is available as well as simplified wiring diagrams for those who prefer them to the schematic type. The matter of suitable antenna and counterpoise will depend on the location and facilities of the builder. An article on this subject will appear in a following issue.

Make Good Filament Connections

Many amateur radio experimenters seem to think that any size of flexible rubber-covered cable connections between their a.c. receivers and filament transformers will answer the purpose. Ordinary hookup wire, however, is not heavy enough to eliminate losses at this point. Special No. 14 stranded two-wire cable, which is made for equipment drawing large quantities of current (not asbestos-covered heater cord), may be obtained from any electrical shop and should be used for this purpose. It will be found that this wire, when stripped at the ends for making the connections, seems quite heavy or about $\frac{1}{8}$ in. in diameter. The stranded-wire ends should be twisted tightly and coated with solder. While this cable may seem large, do not use more than 15 or 16 in. of it, or you will still notice some drop in voltage.

Testing Power Tubes

When a power tube is to be tested, the average radio dealer merely plugs it into another receiver employing a similar tube. However, the set owner who is having trouble and is not close to a dealer, service man or another set at the moment, and wishes to determine whether the trouble is in the power tube may make the simple test outlined in the diagram and chart. The rheostat should be able to carry as much as 2 amp. and is set at about $\frac{1}{2}$ ohm or until the filament glows cherry-red in the power tube. If the tube is good, the 10-watt lamps will tell the story as indicated in the chart.—Ross J. Plaisted, Cleveland, Ohio.



Radio Shield Has Removable Cover

Homemade aluminum shields for shielding screen-grid stages or for housing



Above, Bending the Aluminum Sheet; Below, Diagram Showing Construction of Removable Top and Back

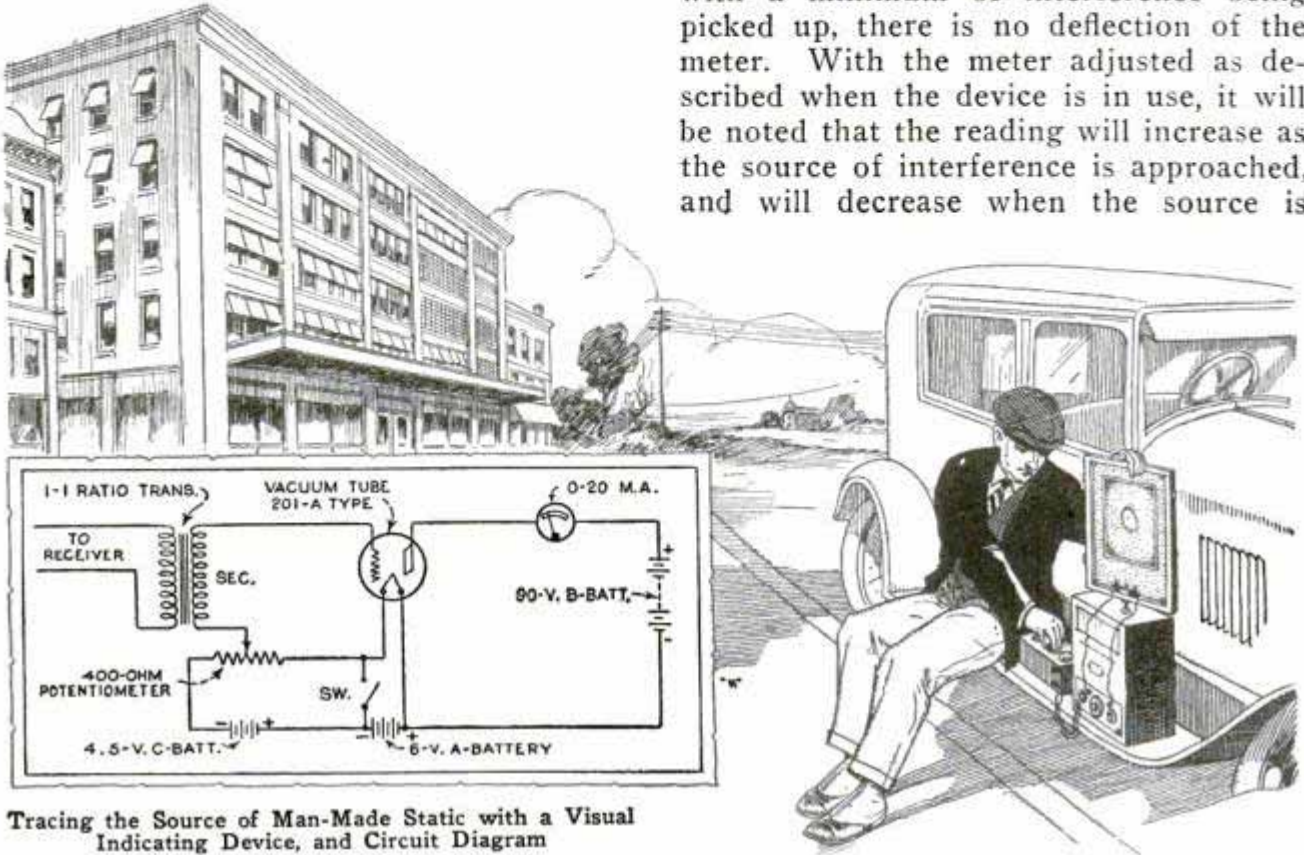
short-wave sets and adapters may be easily made from No. 24 gauge aluminum sheet. It is easily worked and may be bent to shape between two wood blocks clamped in a vise as shown. If desired, the front may be covered with a bakelite panel for mounting the instruments without disturbing the efficiency of the shield. In this case cut-outs are made in the metal front to clear the shafts of the instruments. It is a simple matter to make the top and back in one piece, as shown in the diagram, so that the shield can be removed easily. It is built up from

four pieces of aluminum, the two ends, the lid, and the one-piece top and back. The slotted lid is held in place with four 6-32 brass machine screws and nuts at

top and rear as indicated. This construction makes a neat appearance and permits easy access to the circuit. Partitions may be built in to meet any interstage shielding requirements of the circuit.

Visual Interference-Indicating Device

When looking for the source of "man-made" interference in the neighborhood, the usual procedure is to travel around



Tracing the Source of Man-Made Static with a Visual Indicating Device, and Circuit Diagram

the locality with a small loop-operated receiver in a car. As a rule, these sets are not very sensitive, a feature which makes it desirable for the purpose of locating noises in close proximity, as a sensitive receiver may intercept noises not in the particular area under observation. Since the output of the receiver, as indicated audibly in the headphones or speaker, may have the same apparent strength over a considerable area on each side of the interference source, it is necessary to have a set equipped with a visual means of indicating the proximity of the noise. To the writer's knowledge there is no such device on the market at the present time. The construction of an instrument, to be used with any type of receiver suitable for the purpose, is really a very simple matter and the results obtained are well worth while. The device may be built in a small case with a bakelite top for the meter and controls, the necessary batteries included. The input is merely plugged into the output jack of

the receiver instead of the phones or speaker. The meter in the plate circuit of the tube is a milliammeter having a full-scale deflection of 20 mills. The grid-bias potentiometer is so adjusted that with a minimum of interference being picked up, there is no deflection of the meter. With the meter adjusted as described when the device is in use, it will be noted that the reading will increase as the source of interference is approached, and will decrease when the source is

passed, which enables one to locate the interference within reasonable limits. Separate batteries are required for best operation, as the plate supply of the receiver, if used to power the instrument, may cause a false reading. When the apparatus causing the trouble is located, suitable filters now available can be used to eliminate the interference.—D. A. Brown, Marion, Ohio.

Airplane Receivers Now in Demand

One of the most practical receivers now being widely adapted for airplanes employs four heater-type tubes, three of which are of the screen-grid type. Two stages of r.f. amplification are used, with a detector and one stage of audio amplification. A space-charged grid-detector circuit makes the set extremely sensitive.

☛ For further information on any radio construction article write to the radio department; this service is free.

AMATEUR MECHANICS



A Tandem Swing

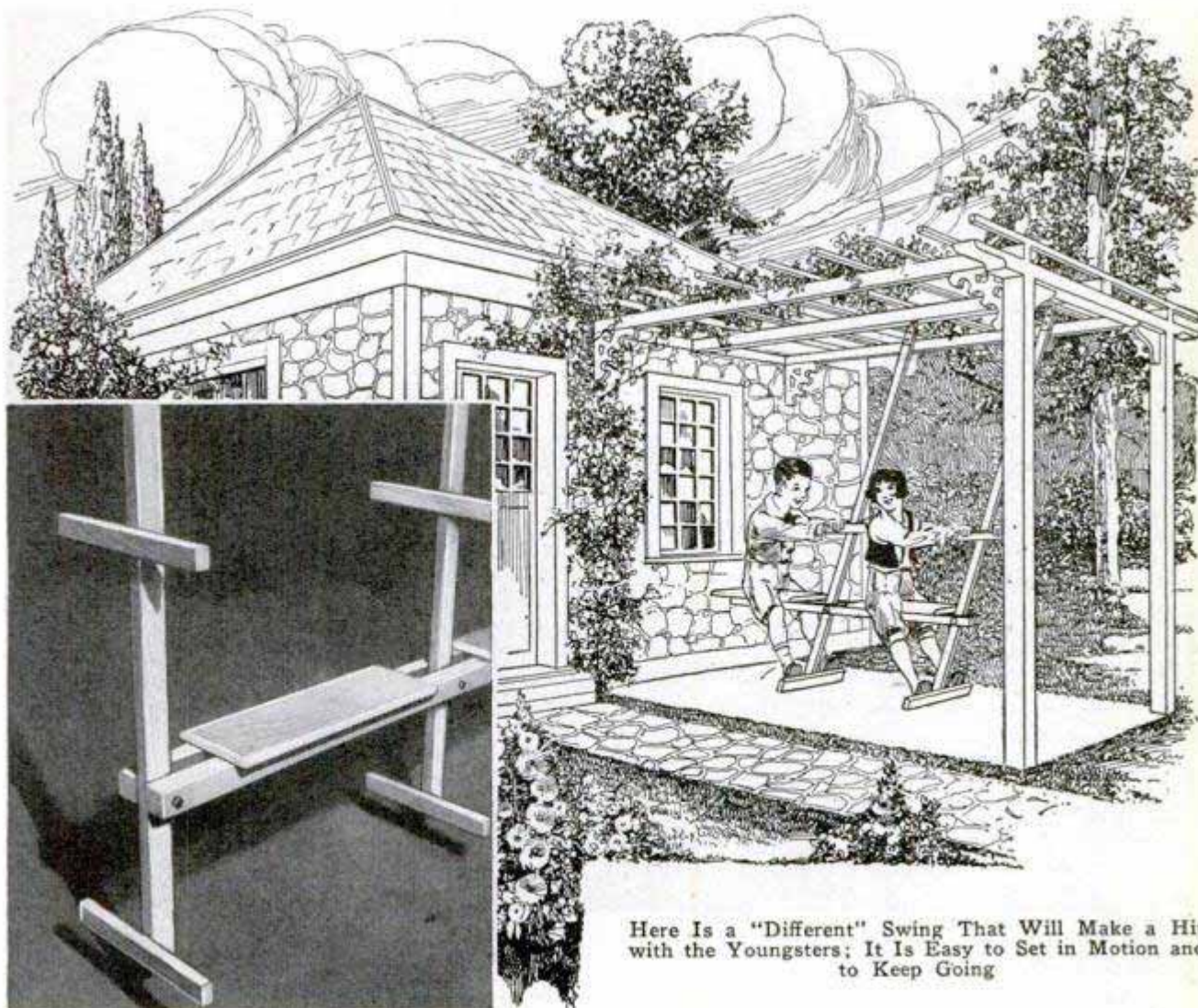
By HOWARD DALTON

A SWING requires about as little power to keep it in motion as any play device. However, there is nothing solid against which to push with the usual swing, and therefore more energy is needed than if all of the force used could be applied to making it go.

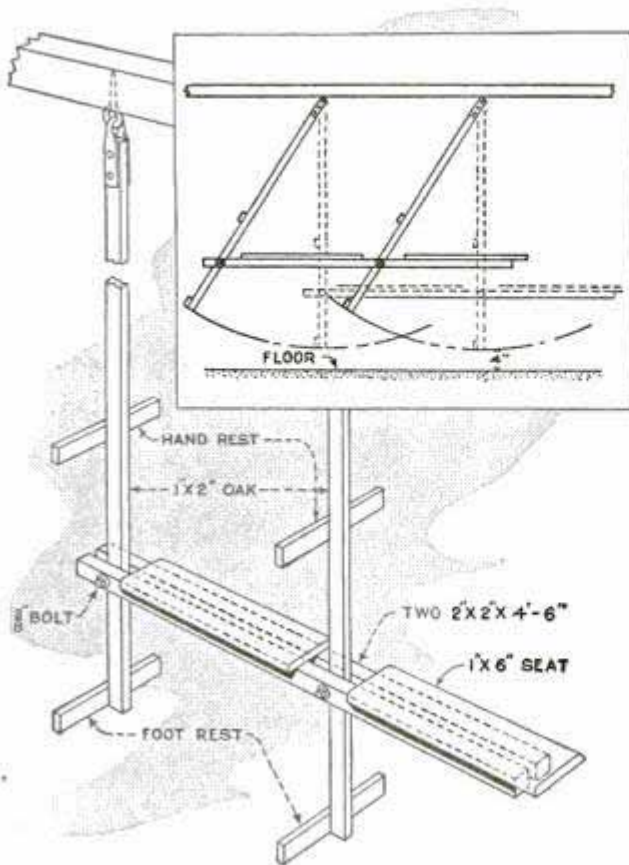
Here is a swing which supplies that very thing. It is ideal for those stormy days

in the winter, and, with only a little more work, you can set up two rather high posts with a timber across their tops in summer and thus extend the usefulness of this tandem swing over the entire twelve months.

The device is simple to make. Two oak, or other hardwood, pieces, 1 in. thick and 2 in. wide, are suspended from a floor



Here Is a "Different" Swing That Will Make a Hit with the Youngsters; It Is Easy to Set in Motion and to Keep Going



joist or other cross member. To the lower ends of the arms are attached wooden cleats, about 12 in. long, to serve as hand and footrests. They should be glued and screwed to prevent working loose. Space these to suit the convenience of the young folks who will use the swing. Two 2 by 2-in. pieces are now bolted to the hardwood arms as shown. The bolts may fit tightly in the 2-in. pieces, but should move freely in the holes bored for them in the vertical arms. Then, to finish, nail two boards, about 6 in. wide and of appropriate length, to permit complete freedom of the arms when in use, to the tops of the 2 by 2-in. pieces. Round off the top edges of each seat for greater comfort. To prevent squeaking, these seat boards should also be coated with glue before you drive the nails or screws. Washers on each side of the vertical arms between the sidepieces will result in a freer movement of the swing.

Make the vertical arms long enough to reach from the lower edge of the joist to within 4 in. of the floor. If desired, these arms can be made in two pieces, one overlapping the other for 12 in., and held together by two bolts, which can be set in any two of a series of holes bored 2 in. apart. Thus you can adjust the seat

height at will. Not only can the youngster impel himself, with the first stroke, over a swing 10 ft. long or more, but he can maintain the motion with very little effort. He can also move equally well in a circle or smooth oval, which is quite exhilarating. This swing is especially popular in the neighborhood, because two young folks can use it in perfect comfort at the same time. There is another swing—the regulation rope affair—in the basement, but since the installation of the tandem swing, it is but seldom used.

Revolving Bench for Washtub

Where it is necessary to move washtubs from place to place, within a radius of a few feet, the revolving bench shown in the illustration will be found convenient. We have used one for over ten years and would not be without one as it eliminates all the labor of lifting the heavy tubs. A 4 by 4-in. upright is pivoted between the floor and ceiling as indicated, and the bench is then built at a suitable height, diagonal braces of 2-in. stock providing sufficient strength to support the tubs. Of course, the pivot points and the bear-

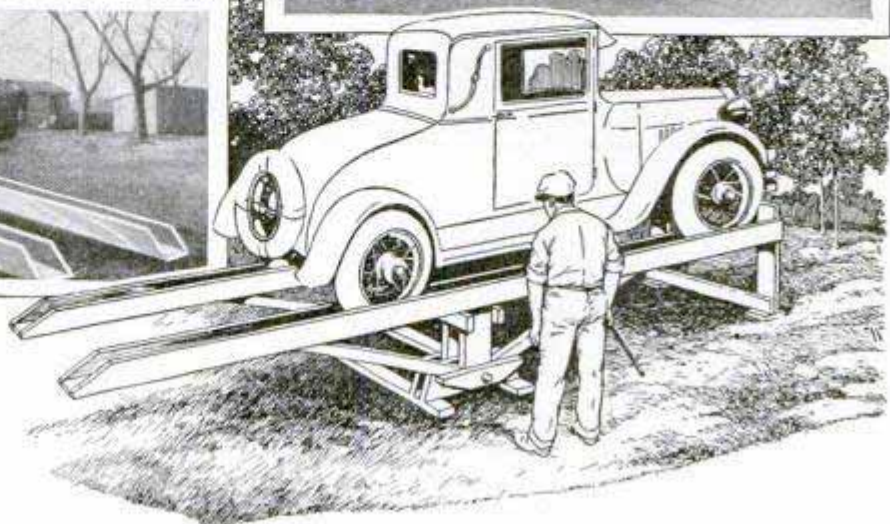
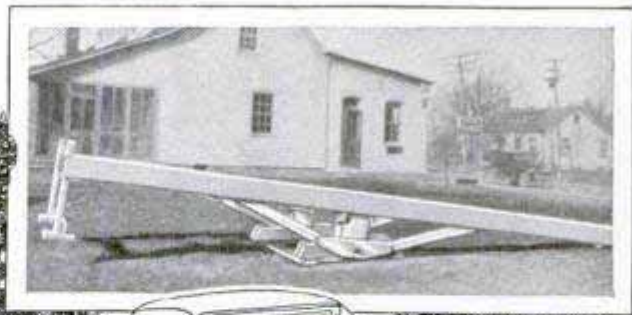
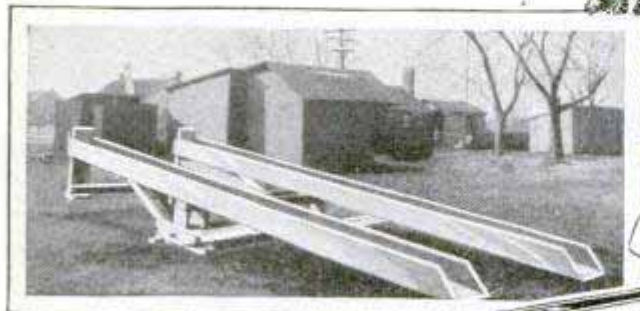


Swinging Washtub Bench in the Basement Eliminates Hard Work

ings must be of metal in order to make the bench rotate easily without excessive friction.—Mary K. Ashbrook, El Reno, Oklahoma.

Homemade Car Hoist

The accompanying illustrations show a simple car hoist that can be made by anyone handy with tools, and at a price considerably cheaper than most of the ordinary hoists. It is



of the seesaw variety, and when a car is put on the runways and advances toward the far end of the hoist, it rises to a horizontal position, as the pivots are off center and the weight of the car does the trick. The construction is plainly indicated in the photos. The lumber is all of standard lengths, and the only piece of metal used is a 1 or 2-in. bar for the axle on which the pivot works.

Ernest Brunckman, Chawville

Emergency Angel-Cake Tin & ll.

An ordinary square or round cake tin can be utilized as an angel-cake tin by placing a small funnel upside down in the center. Butter the tin and the funnel, and pour the batter around it. This method will also prevent ordinary cakes from falling.—Douglas Leechman, Ottawa, Can.

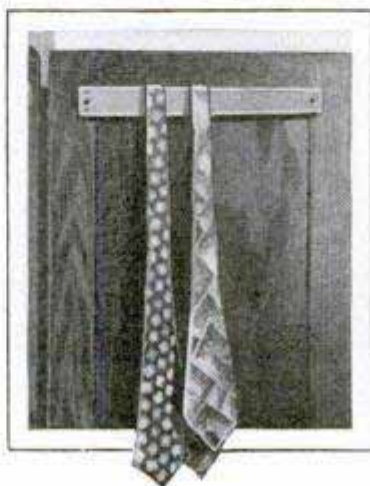
Self-Bailer for Boats

A simple device that most fishermen will find a worthy accessory on their boats is a self-bailer. It is made of a few feet of garden hose, a small piece of wire mesh and several staples, or large screweyes, to hold the hose in place. Cover one end with the wire mesh and fasten that end to the bottom of the inside of the boat. The hose is then fastened under the middle seat close to one side and is run over the gunwale and down below the water line to the stern. Each bend should be prevented from buckling by holding it between two staples or

screweyes. Cut the hose off flush with the stern. Use as many staples or screweyes as necessary to hold the hose securely to the underside of the boat. When the boat is propelled through the water, the suction at the end of the hose at the stern rapidly drains the water from the boat.—Arthur E. Sharpe, Willimantic, Conn.

Necktie Rack in the Chifforobe

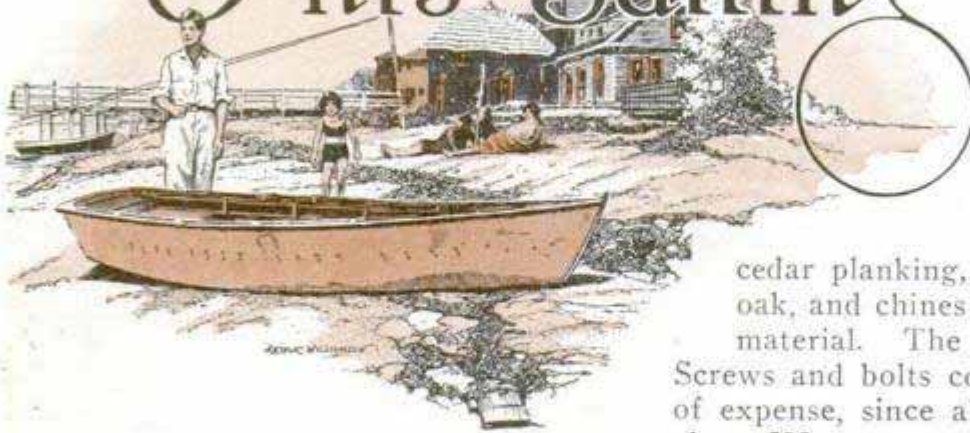
Instead of keeping neckties in a drawer, or holding them on a tie rack of the ordinary type, provide a suitable hanger on the inside of your chifforobe. Made of $\frac{3}{8}$ -in. stock, about 2 in. wide, and just a trifle shorter than the width of the door, the hanger is fastened to the top by means of a tight-fitting brass hinge. When the



hanger is pressed against the door the ties will be held securely. It should not swing out upon opening the door, but if the hinge loses its stiffness, a clasp may be fitted at the other end.

This Sailing Skiff

by Lowell Brown



Sides and bottom are of $\frac{1}{2}$ by $7\frac{1}{2}$ -in. cedar planking, ribs of $\frac{3}{4}$ by $1\frac{1}{2}$ -in. oak, and chines and skeg of the same material. The seats are of pine. Screws and bolts composed a large item of expense, since all were of brass, and about 200 screws were used. Incidentally, no nails were used in construction.

WITH the opening of lake and sea-shore navigation only a few weeks ahead, this is a good time to decide on the type of craft you want for the season's cruising.

For the amount of labor and expense involved, few other boats afford as much genuine satisfaction as this 12-ft. sailing skiff, which I completed during a vacation at the beach at an outlay of about \$25 for materials. Practically every part was made with ordinary tools and the limited facilities of a shore resort. It can easily be duplicated by anyone who has had average experience with tools by following the accompanying diagrams.

Begin with the ribs, made up according to the diagram, Fig. 4, which gives the sizes for the five required. Each is notched for the side and bottom battens and 1 by 1-in. chines, as indicated, and the uprights are screwed to the bottom pieces to form lap joints.

It will be necessary to bevel the uprights of ribs A, B and E to fit the curve of the side planks. Build up the oak transom (Fig. 1) and make the oak stem piece, as in Fig. 3. The latter requires considerable labor, as a recess must be cut on each side to receive the forward ends of the side planks. This recess is made by boring a series of closely set holes, about $\frac{3}{4}$ in. diameter and $\frac{1}{2}$ in. deep, and chiseling out the intervening material. Additional fitting at the stem may be required before the planks are screwed down.

Space the ribs, stem and transom as follows: 21 in. from nose of stem to center of bottom member of rib A; 24 in. center to center for ribs A, B, C, D and E,

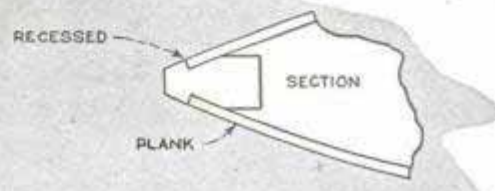
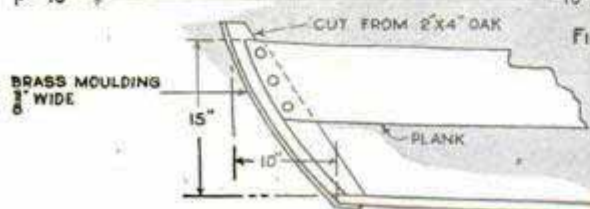
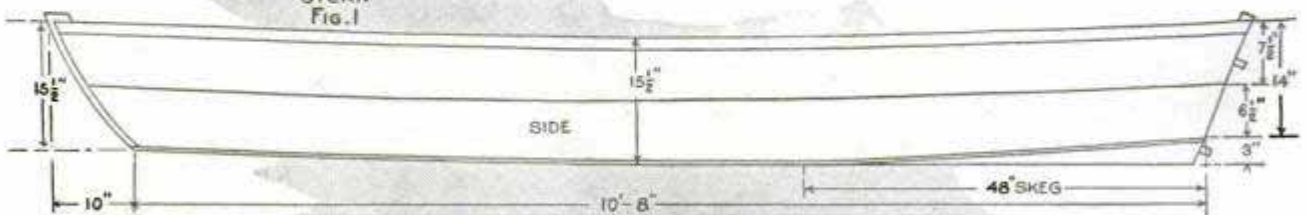
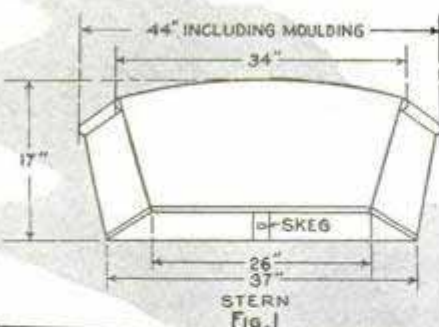


Fig. 3

Is Easy to Build

and 26 in. from center of rib E to center of transom thickness. Fasten them in place with the chine and bottom and side battens, which fit into the notches shown. Temporary crosspieces should brace the top ends of the ribs.

Bevel the edges of the cedar planks so there will be V-shaped joints to receive the cotton caulking. See detail, Fig. 6. Next install the top side planks (forming the gunwales), screwing securely to ribs, transom and stem with flat-head brass screws. When secured at stem and stern and all ribs, these outward-curving side planks form the upward sweep of the boat at the ends, although the edges of the planks themselves are straight. Follow with the lower side planks, bringing the edges snugly together. Note that the rear end of the lower side plank, Fig. 2, is 1 in. narrower at this point, being tapered back to give the more pronounced up-sweep under the stern.

Continue with the bottom planks, beginning with the center. This should span the center line, so there will be no opening. The outer bottom planks can be marked to the curved outline and sawed to shape before screwing down permanently.

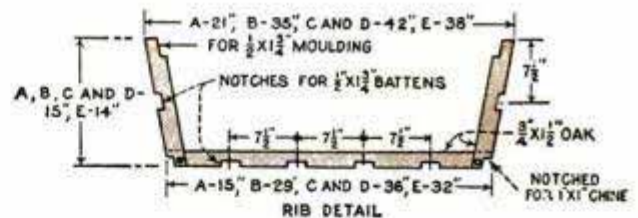
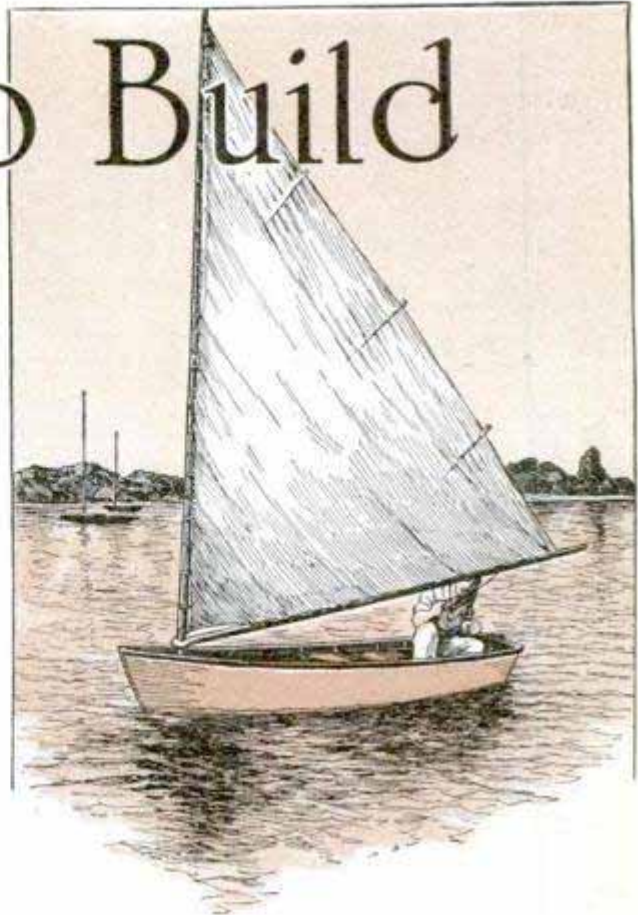


Fig. 4

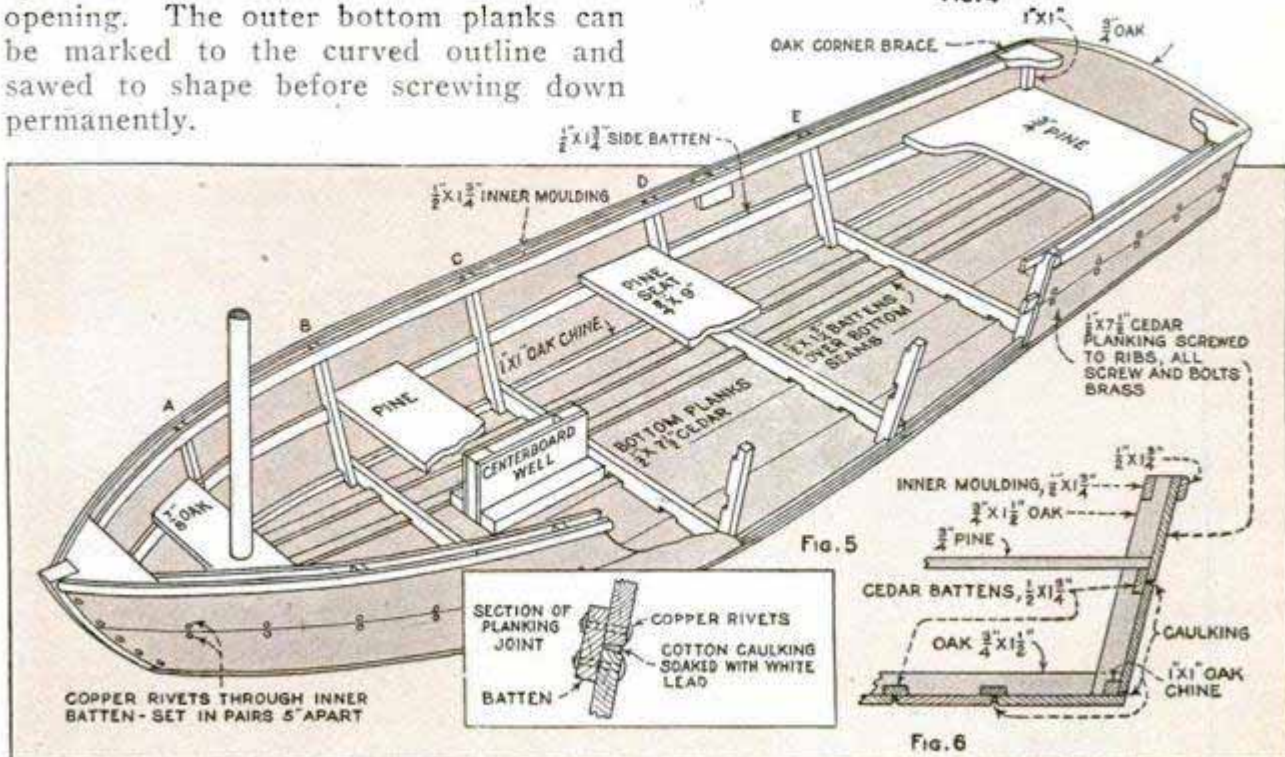


Fig. 5

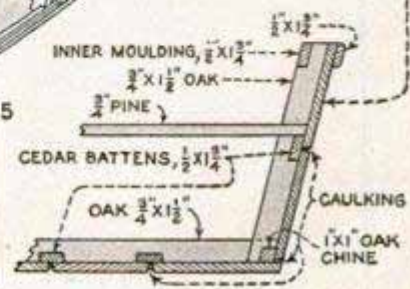
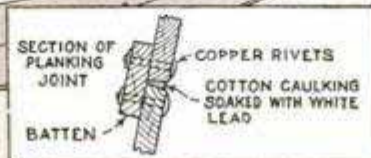
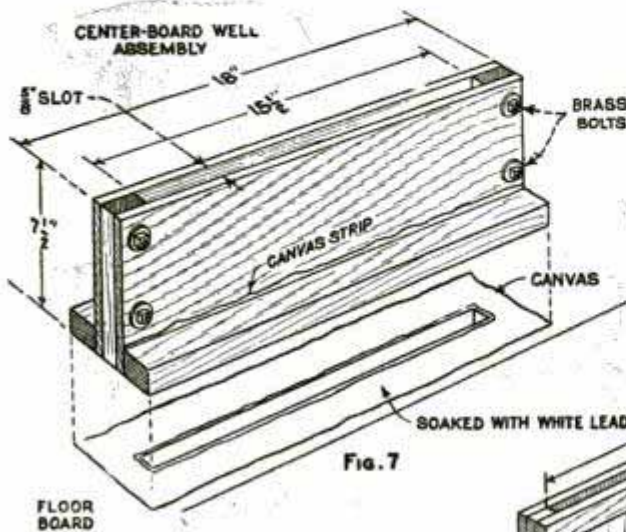


Fig. 6

COPPER RIVETS THROUGH INNER BATTEN - SET IN PAIRS 5" APART

Your next job will be riveting the planking to the battens. The rivets should be of copper, and are best installed with standard riveting tools. Set them in pairs,



5 in. apart, along all seams. Use rivets with small shanks so there will be less danger of splitting the wood, and rivet on the inside.

You are now ready for calking. Twist cotton strands and tap lightly into the V-shaped seams with a blunt chisel. Be thorough and cover every bit of seam. When finished, slosh thin white lead liberally into the seams.

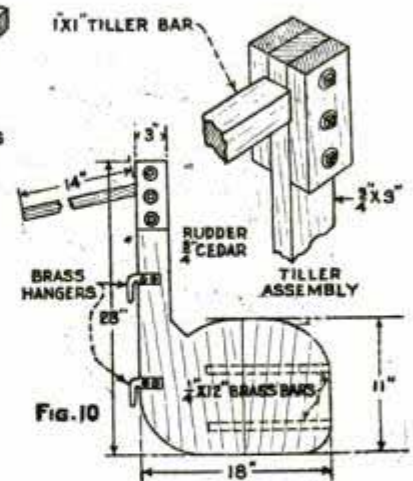
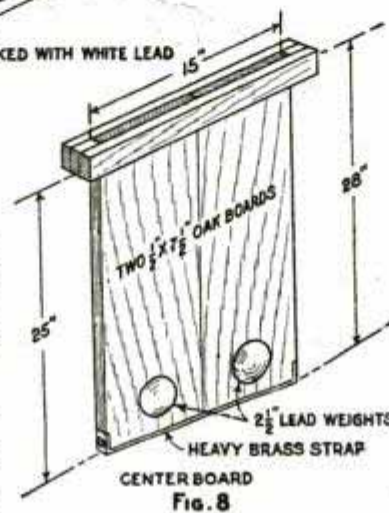
Use your most careful workmanship on the centerboard well, as this is an awkward place to make watertight. Observe Figs. 7 and 8 carefully. Cut a slot, 15 1/2 in. long and 5/8 in. wide, in the center plank, so that the end of the slot is just 1 1/4 in. in front of rib C. The well itself is built up of the same material as used for planking, all joints being bedded in white lead, with a slot corresponding to that in the bottom plank. Lay a piece of canvas around the slot on the bottom, after soaking it in white lead, and screw the centerboard well tightly against it, through the bottom from below.

At this time give the entire boat a priming coat of white lead and oil. When it is dry, fit the corner braces or knees at stem and transom, install a heel block and crosspiece for the mast, the seats and the inner molding. Turn the boat over and fit the oak skeg, securing it with a bolt through rib E and screws at other points.

Also fit the floor grating inside, shown in the photo but not in the drawings. The seat at the transom is 16 in. wide.

Brass hangers for the rudder can be purchased from a hardware store in lake or seashore towns. Note that one eyelet goes into the end of the skeg and the other into the transom. The rudder is built up of two pieces of cedar (or pine) 3/4 by 9 in., and reinforced with two 1/4 by 12-in. brass rods. Boring the holes for these requires a long bit and a good eye. An oak tiller bar, 1 in. square and 14 in. long, is fitted in the manner shown.

For the centerboard, oak is preferable to cedar or pine because of its weight and strength. Make it up according to the dimensions shown in Fig. 8. Bore two holes 2 1/2 in. in diameter near the bottom, drive nails halfway in, after the manner of spokes, lay on a flat board and fill the holes with molten lead, as shown in Fig. 9. With a rasp, smooth the weights flush with the centerboard. Screw a heavy brass strap to the bottom edge. This type of centerboard is very effective and can



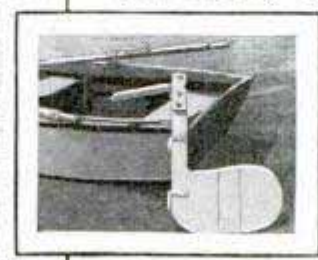
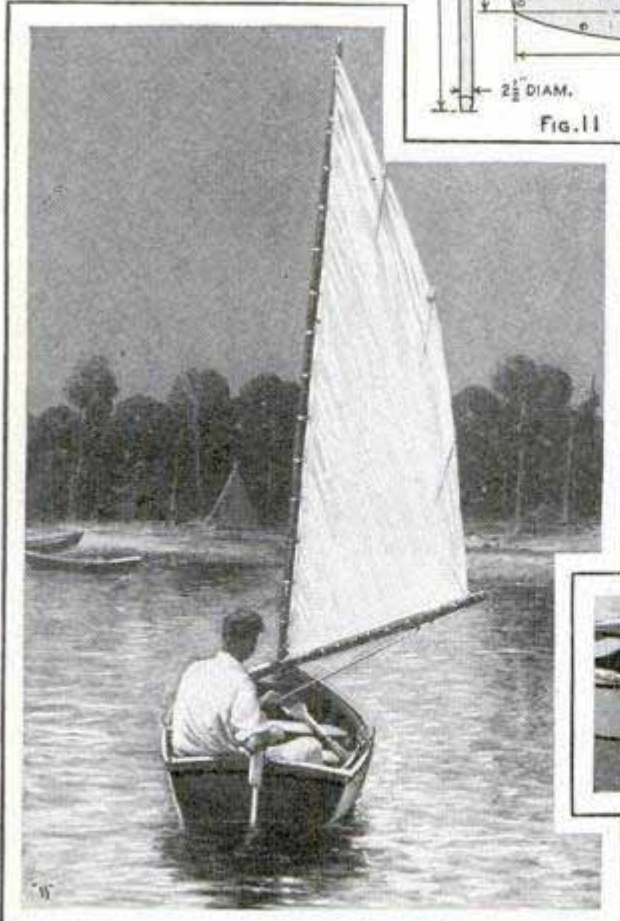
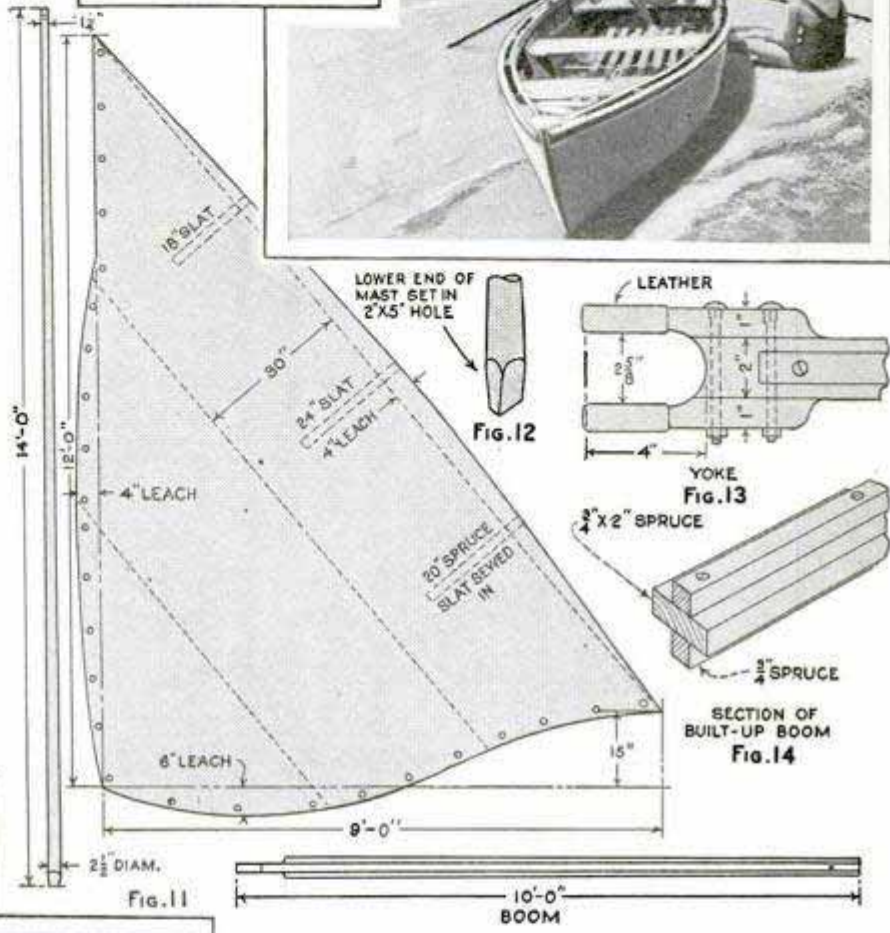
be drawn up quickly when beaching the boat, or in case of striking a sandbar. When using the skiff for rowing, the centerboard is simply lifted out completely.

Plane the mast (Fig. 11) to a taper from a 2 1/2-in. square piece of clear, straight-grained spruce, 14 ft. long. The bottom

end should be tapered and squared to fit in a square socket in the heel block. It should taper to about $1\frac{1}{4}$ in. at the top, where a hole is drilled for the stay which supports the sail.

The boom is built up of three pieces as shown in Fig. 14. The yoke is also built up, the ends being covered with leather or buckskin to prevent chafing the mast.

For the sail, you can use whatever weight and width material is most easily obtainable. An 8-oz. duck, about 30 in. wide, is suitable. Note that the sail is not cut to an exact right-angled triangle. On the contrary, the boom "kicks up" aft in order to clear the skipper when coming about, and about two-thirds of the mast and



boom edges of the sail are leached, that is, curved outward, while the long side is leached the entire length. This allows the sail to belly properly in the wind. Splints, or slats, are sewed into pockets on the sail at the diagonal side. Strips of spruce, about $\frac{3}{16}$ by 1 in., cut to the lengths shown, are satisfactory.

Brass eyelets, set 9 to 10 in. apart, carry the lacing which secures the sail to mast and boom, and the extreme ends of the triangle are held to the top of the mast and the end of the boom by lines through holes in the latter. The sail is not intended to be raised and lowered. To furl it, the skipper simply raises the

end of the boom and lashes it and the folded sail to the mast. The entire unit can then be lifted out when rowing.

As to color scheme, that is a matter for the new skipper to choose. The skiff shown has two coats of white marine enamel outside, with natural finish for the mast, boom, transom and corner pieces in two coats of spar varnish. The inside and molding at the gunwale are painted green. This finish has proved very durable. In fact, the entire skiff has demonstrated its stanch construction, for although left to the elements all winter on the beach, it began its second season without the necessity of overhauling. After it had been in the water half an hour for the first time in six months, there was not even the slightest seepage through any of the neglected seams. And although it is by no means a fast boat, it is exceptionally seaworthy and a very comfortable craft in a vigorous wind.

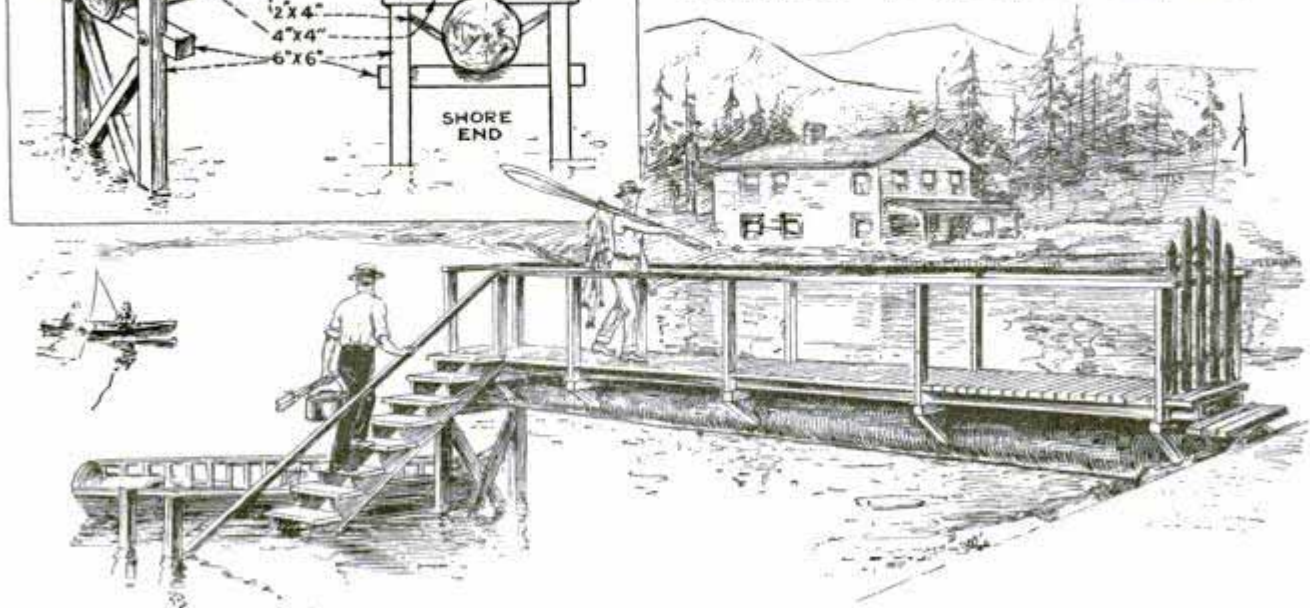
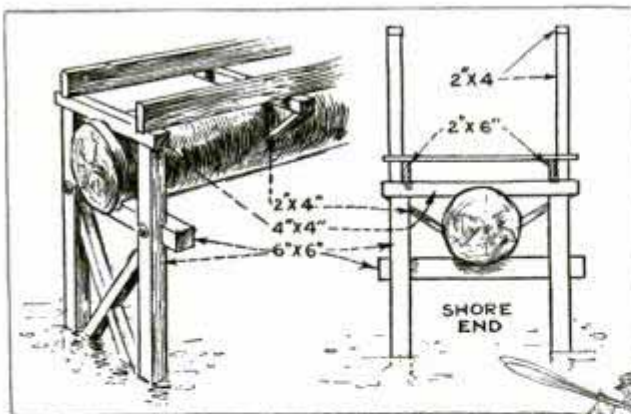
Telephone Pole Forms Backbone of Pier

By using part of a discarded telephone pole for the main support, a stanch private pier has been built at a California resort. The pole extends out over the water horizontally and is supported by 6 by 6-in. posts and crosspieces. On the top side of the pole notches are cut to receive 4 by 4-in. crosspieces, braced at the ends by

short pieces of 2 by 4-in. stock, nailed on at an angle, as indicated. Joists of 2 by 6-in. stock are run over the crosspieces, and the walk is then nailed to the joists. Vertical pieces of 2 by 4-in. stock, nailed to the joists, support a railing. Steps running right into the water, are built at the sea end and supported by 6 by 6-in. posts. At the shore end a gate is provided, which can be padlocked, making the pier strictly a private one. Built well above high tide, this pier has been found highly satisfactory.—Hi Sibley, Pasadena, California.

Softening Hard Pigment in Paint

In a can of paint that has stood for some time on the shelf, the pigment is often found settled in a mass so hard that it seems almost impossible to mix it by stirring. In such a case, pour off the liquid and attack the pigment with a round wooden rod, such as part of an old hoe handle, with the end smoothly shaped like a ball-peen hammer. Work this up and down, adding a little of the liquid now and then. In this way the pigment can be softened in a comparatively short time. The remainder of the liquid can then be stirred in easily. Remember that the final operation of paint mixing should always consist in pouring the paint back and forth slowly from one can to another. This gives a smoothness and uniformity of mixture that stirring alone does not accomplish.—J. G. H., Dunedin, Fla.



Telephone Pole Serves as a Strong and Durable Support for Small Private Pier, with Steps Leading Down to the Water

Copper Container for Cut Flowers

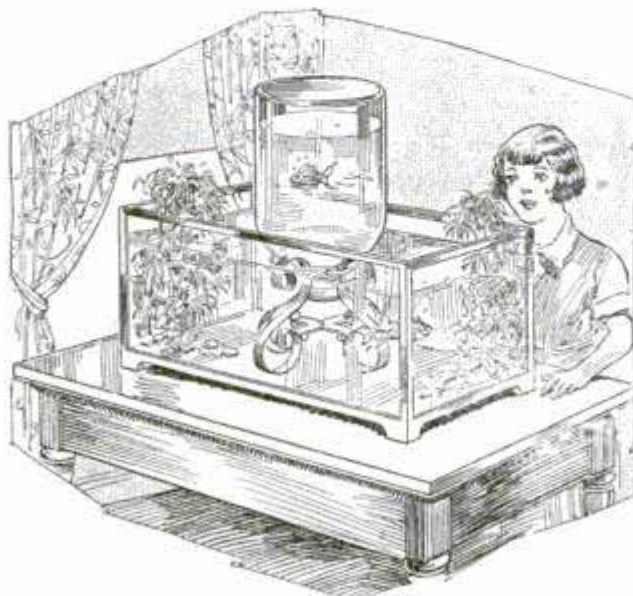
We have found that a copper receptacle for cut flowers will almost double their life. After cutting the flowers, the stalks are clipped and placed in warm water for a few minutes until the stems are full, and then they are transferred to a copper container filled with cold water. For comparison we placed some similar flowers in a glass container, after following the same procedure. It was quite surprising to notice that those in the copper container remained fresh almost twice as long.—Mrs. August Jeffers, Louisville, Ky.

Removing Grease Spots from Shoes

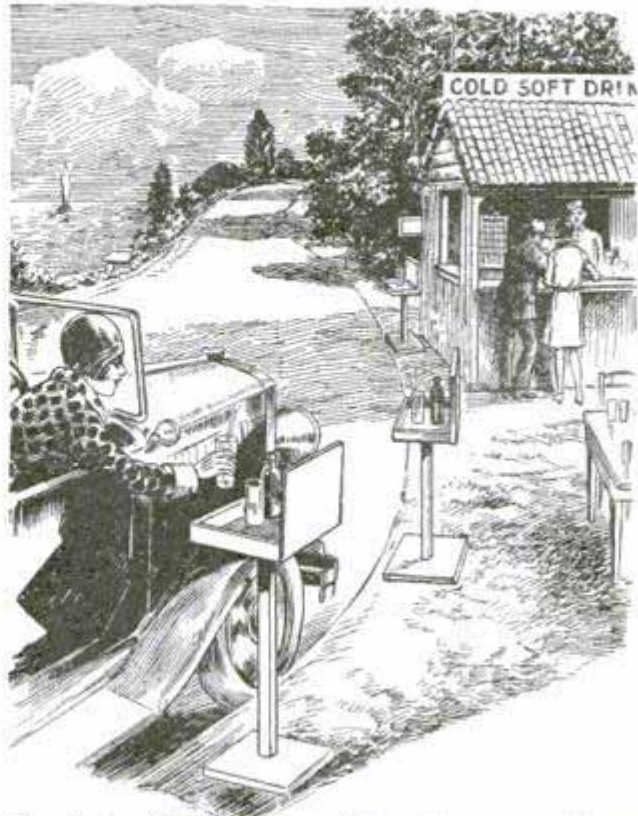
Grease spots on shoes, especially tan shoes, are very hard to remove, and when gasoline or other cleaning fluids are used, a conspicuous light spot with a ring around it is often left. A better method, which will be found entirely satisfactory, is the application of ordinary rubber cement, which is customarily used for patching inner tubes. Put a thick drop of cement on the grease spot and rub it down evenly with your finger, tapering it to a thin edge. After it has thoroughly dried, rub it off and repeat the process until the spot has disappeared. This method leaves no ring or light spot.

Novel Arrangement of Aquarium

To arrange an inverted glass jar to hold water above the level of that in the aquarium, permitting the access of the fish, the jar is first filled and then inverted while the mouth is fully submerged, after which the jar can be set on a suitable support. The jar must, of course, have a wide mouth, and the stand should be made of flat metal, and given a coat of waterproof paint to prevent corrosion.—James Williams, Evanston, Ill.



Novel Arrangement of Inverted Glass Jar in Aquarium Which Adds to Its Capacity



Stands for Holding Empty Soda Glasses and Dishes Prevent Loss and Save Customers' Time

Stands at Curb Save Soda Glasses

Loss of soda glasses at a roadside soft-drink and ice-cream stand, was reduced greatly by providing stands of the type shown, on which the empty glasses, dishes and bottles could be set when nobody was present to collect them. The stands consist of a 2-in. base, an upright and a light, shallow box or tray. As the fountain boy serves refreshments, he places a stand within easy reach of the customer. The stands not only prevented considerable

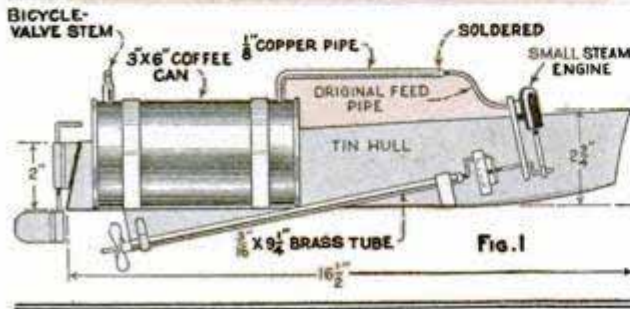
loss, but actually helped to build up the trade, as the elimination of waiting for someone to collect the empty dishes was appreciated by the customers.—H. E. Benson, Denver, Colo.

☐ Spruce siding, when painted, should be given a coat of white lead, thinned with raw linseed oil and a little benzol, using a small amount drier.

824 Ridge Terrace

Tiny Cruiser Runs

by Hi Sibley



A FAST and light toy cruiser can easily be made from a sheet of tin, a small coffee can and parts of a toy steam engine. Soldering is the most important part of the work, and as the writer is not by any means an expert in this line, any boy should be able to turn out a very satisfactory job.

If you have any choice in small steam engines, select one of the upright type with an oscillating cylinder. The one illustrated was a single-action, that is, having a power impulse on the downstroke only, yet it proved a marvel for performance. But most any discarded engine will do.

First make a cardboard pattern for the hull by laying out the diagram, Fig. 2, in $\frac{1}{2}$ -in. squares. Cut out on the heavy lines, lay over the tin and mark the outlines. The slot for the propeller shaft in the middle of the bottom can be cut with

a narrow chisel and small gouge, or by drilling two holes and cutting away between. Fold the tin hull on the dotted lines, and begin soldering at the wedge-shaped opening in the bow. By bending the points up, the edges will come together. Acid-core wire solder is excellent for this purpose, and by heating the tin first, the solder will flow smoothly and uniformly under the soldering iron. Next solder the transom, or stern, and after that finish the bow.

Cut exactly like the diagram, this makes a very graceful hull as well as a light and speedy one. For the compressed-air tank almost any can of suitable size will do. A small coffee can with a compression lid serves the purpose very nicely, as the lid can be soldered down and the cylindrical shape fits into the hull well. To reinforce the can against air pressure, run solder along the seams; otherwise they may blow out when the tank is pumped up.

The writer was amazed at the amount of pressure a can of this type will stand; in fact, we pumped as much pressure as

we could with a hand pump without opening a seam.

At one end, punch a hole and solder in a clean bicycle-valve stem, and in the other end a length of $\frac{1}{8}$ -in. copper tube. See Fig. 1. Plug the tube and pump in air through the valve stem and test under water. Solder up any leaks that develop. If there are numerous very tiny leaks, remove the valve from the stem and pour in a

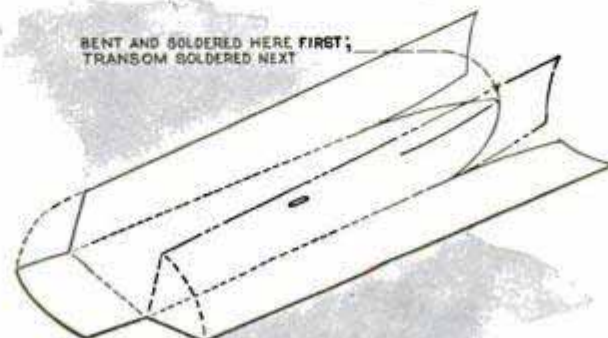
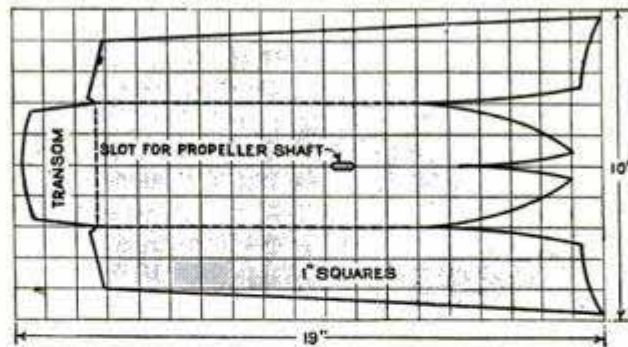


Fig. 2

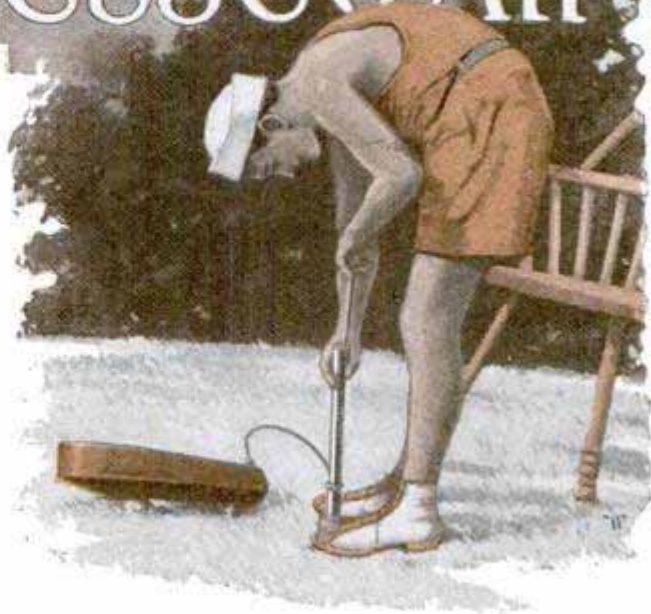
on Compressed Air

tablespoonful of shellac or varnish through a small tube so that it will not gum the valve stem. Turn the can in all directions so that the varnish will work into all leaks and then pump air through, without pressure, to dry it.

Now install the propeller-shaft tube, as in Fig. 3. Brass tubing, about $\frac{3}{16}$ -in. inside diameter, is best for the purpose, being straighter than copper tubing, although the latter can be used. The length, and the angle at which it is set in the hull, are determined by the engine to be used. The after end of the tube is secured to the hull by means of a tin keel made in the manner shown, and a V-shape bracket holds the forward end rigid.

Small lead or babbitt bearing plugs for each end of the tube are made by pouring the molten metal into a tapered hole in a block of wood with a nail in the center, as shown in Fig. 6.

For the propeller shaft, use a section of stiff brass wire. This must be absolutely straight; otherwise it will bind and slow down the engine. Bend a crank in the forward end, which is driven by a spoke of the flywheel. This makes a very satisfactory form of universal joint and permits shaft and



engine to run freely. After the shaft is inserted in the tube and the bearing plugs are pressed in, put a small brass washer on the after end and solder on the tin propeller. Make the latter about $1\frac{1}{2}$ in. in diameter, with four blades having a pro-

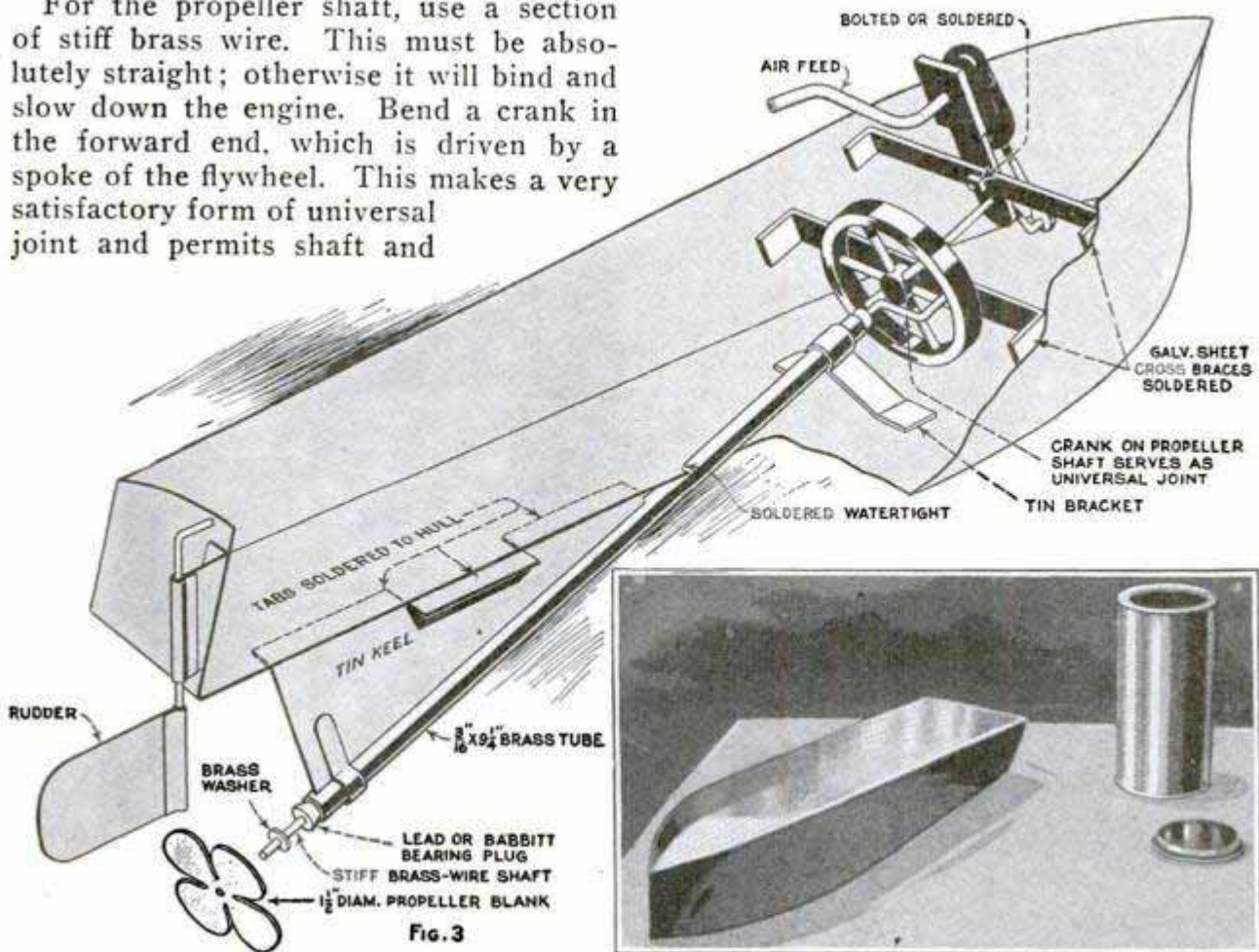
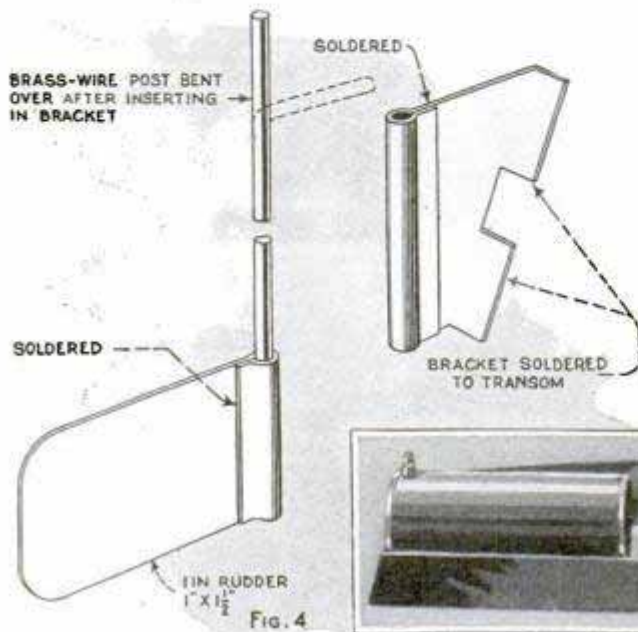


Fig. 3

nounced pitch, so that the engine will not run at excessive speed and exhaust the air pressure too soon.

The engine supports depend, of course, upon the type of engine used, but it will not be difficult to make brackets to suit



the one selected, similar to those shown in Fig. 3. It is best to solder the brackets to the side instead of the bottom, as this arrangement eliminates vibration better than the other way.

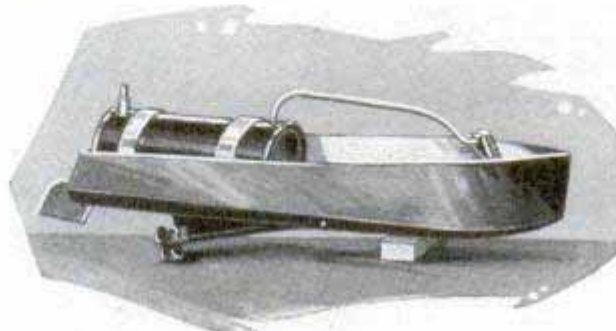
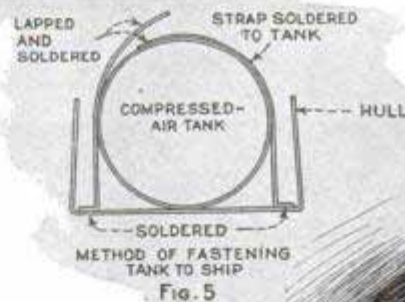
Install the air tank next. Four straps of tin are soldered to the bottom, the tank is set between the pairs, and the straps are brought over the top and soldered in place. The short feed pipe of the engine, usually about $\frac{1}{8}$ in. or less in outside diameter, is inserted into the larger copper pipe from the air tank and the joint soldered. Heating the joint will make a better job.

The rudder and bracket (Fig. 4) are very simply made. When these are soldered in place, your cruiser is ready for a trial. Ten strokes with a foot pump, or twenty with a hand pump are enough for a try-out. It may be necessary to hold the cylinder against the valve plate while pumping, to prevent high pressure forcing air out at this point. But once the little speed boat is placed

in the water, she goes—and how! After the trial, you can pump as much air in with a hand pump as you have strength to do, but don't take any chances with the high pressures of an automobile service station, or the tank might explode. You will get plenty of action with ordinary hand pumping.

Any sort of paint will do to finish the job, but brushing lacquer is best, since it dries in about half an hour and leaves a gloss. The craft shown here was given a coat of battleship gray above the water-line and Chinese red below; the tank was painted black and the straps, valve stem, etc., aluminum. This combination makes a very smart-looking job.

By adjusting the rudder, the boat will travel straight or in a large or small circle, as desired. The rudder shaft must not be too loose, or it will



not hold its adjustment. If it does become loose, remove it from the bearing and bend slightly in order to make it move more stiffly and remain adjusted.

Cleaning Rubber Goods

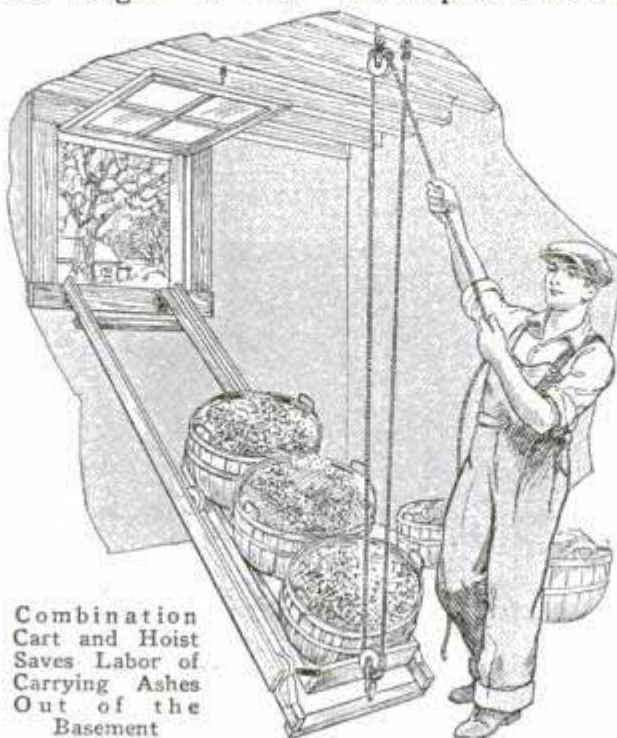
Ordinary soap and water is usually not sufficient to take dirt off the surface of soft-rubber goods, for instance oily stains on tires; nor are abrasive cleaners much better. Crystals of tri-sodium phosphate sprinkled on a wet brush and scrubbed vigorously on the rubber act quickly as a cleansing agent. Plenty of water should be used, and the crystals must be carefully washed off the rubber after it is clean.—C. Tetig, Los Angeles, Calif.

Brine for Killing Weeds

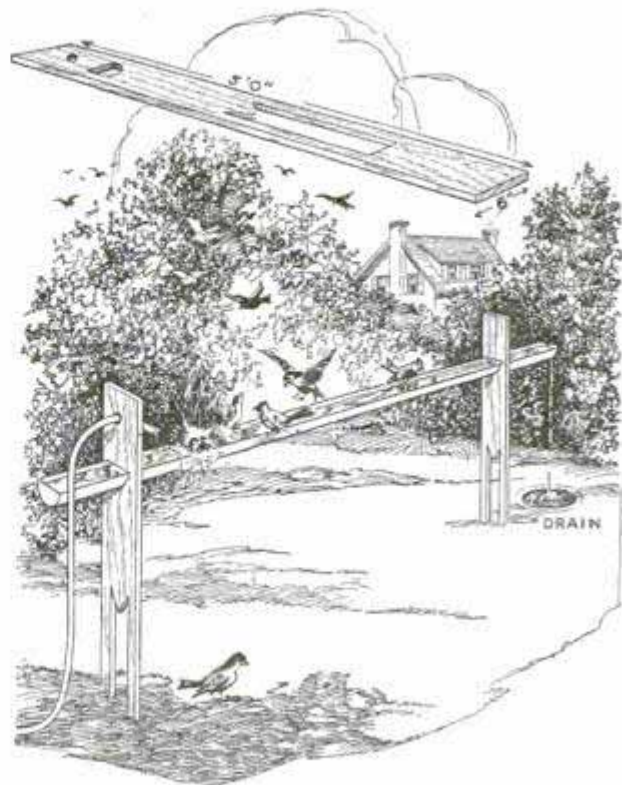
Those who live near the sea, where salt water is available, will find this a most effective weed killer. Applied with an ordinary garden sprinkling can, it is fatal to practically all land vegetation. Those living inland can get similar results with brine made by mixing any kind of cheap salt in water, making a saturated solution. The reason for making the brine stronger than ordinary sea water is that the latter contains, besides salt, bromide and other chemicals harmful to land plants.—J. G. H., Dunedin, Fla.

Simple Hoist for the Basement

In many homes it is inconvenient as well as messy to carry ashes out of the basement. In one case where the owner had to go the entire length of the basement to reach the stairs, he improvised the hoisting device shown in the illustration. It consists of a framework made of 2 by 4-in. stock, hinged to the window sill and forming a track for a low cart long enough to accommodate three baskets of ashes. A block and tackle enabled him to raise the track to the window level and the loaded cart could then be pushed outside.



Combination Cart and Hoist Saves Labor of Carrying Ashes Out of the Basement



Bird Bath, Made from Roof Gutter, Makes Fitting Garden Ornament

Bird Trough for the Garden

In a garden of suitable size the bird trough shown in the illustration will be found a fitting and useful ornament. It consists of a 10-ft. length of ordinary roof gutter, supported at the ends by 5-ft. boards, cut out to make them slightly ornamental and driven into the ground to stand firmly. A hole is bored through the top of one of these supports to receive the end of a hose with which the trough is filled. Both ends of the trough are closed and a notch is cut in the top of one end to allow the overflow to drip off. Painted white, this bird bath will contrast nicely with lawn and shrubbery.

☛An emergency screwdriver for tightening a screw in eyeglasses can be had by turning a steel pen end for end in its holder.

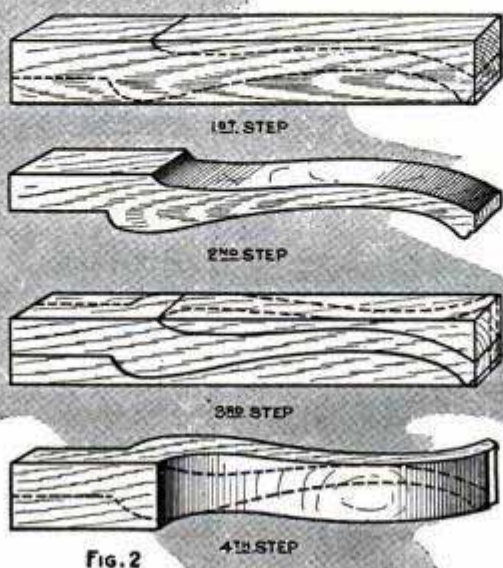
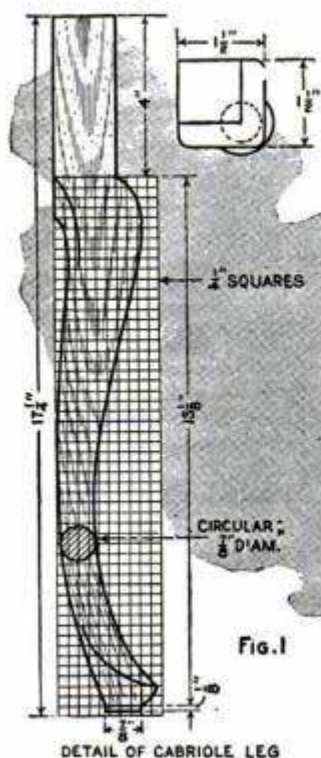
Building a Drop-Leaf

by R.O. Buck



ADVANCED craftsmen will derive a great deal of pleasure from the construction of this little drop-leaf table. It is an authentic design and a fine example of the Queen Anne period to which it belongs, with its simplicity of design, cornered cabriole legs and lack of any carving or applied decoration. It is really a

little gem, and will delight any lover of fine furniture.



Walnut was the wood used for a great deal of the fine furniture produced during the Queen Anne period; in fact, the period is often classed as the walnut period. However, the table would be equally beautiful in mahogany if you are not concerned with having it true to period.

A band saw is required to make the cabriole or "bandy" legs. If you have no band saw, I would suggest that you have the legs and other formed parts sawed at a local cabinet shop.

The materials necessary are: Four pieces, $2\frac{1}{2}$ by $2\frac{1}{2}$ by $17\frac{1}{4}$ in., for legs; four pieces, $\frac{3}{4}$ by 4 by 9 in., for rails; two pieces, $\frac{3}{4}$ by $6\frac{1}{2}$ by 14 in., for leaves; one $\frac{3}{4}$ by 14 by 14-in. piece, for top; one $\frac{3}{4}$ by 3 by $8\frac{1}{4}$ -in. piece, for brackets; four 1 by 1-in., and two $\frac{3}{4}$ by 1-in. brass hinges.

The procedure in constructing the table should be as follows: First rough out all stock for the job and glue up such pieces as necessary to the proper width and thickness. You will need material that is $2\frac{1}{2}$ in. square, in the rough, for the legs. Solid stock is preferable, of course, but you can glue up stock for this purpose satisfactorily if care is taken to match the color and direction of the grain.

To make the legs, lay off a pattern from Fig. 1 in the usual way, and mark the line

of the band-saw cut on one side of the stock, as shown by the first step in Fig. 2. After this cut has been made, tack the waste piece back into place to use as a cradle while you are making and sawing the second cut. Be sure to put your pattern on in the same position shown in the figure. After the sawing is completed, the legs are shaped up with a spokeshave and coarse sandpaper. Note that the up-

Queen Anne Table

per part of the leg is square, with only the corners rounded, while near the foot it is round, as shown by the sectional view. All the legs are made the same way, and as near alike as possible. See page 1050 for complete directions on cutting cabriole legs.

The rails are formed on the bottom edge, squared on the ends and doweled to the legs, or, if preferred, mortised and tenoned.

Square and smooth up the faces of the top and leaves. The molded edge of the top can be made with a universal plane, using the No. 86 cutter, or can be worked with a small plane and chisel without much difficulty. Of course the incurved or formed molding on the leaves, Fig. 3, will have to be worked by hand in either case.

The concave molding on the inner or hinged edge of the leaves, Fig. 4, may be cut with a No. 73 cutter in a universal plane, with a gouge and marking gauge or with a molding cutter on the circular saw. In order to throw the leaf in and thus avoid a great gap when the leaf is down, the hinges are sunk flush with the surface and the center of the hinge pin is set back from the edge, as shown in Fig. 4.

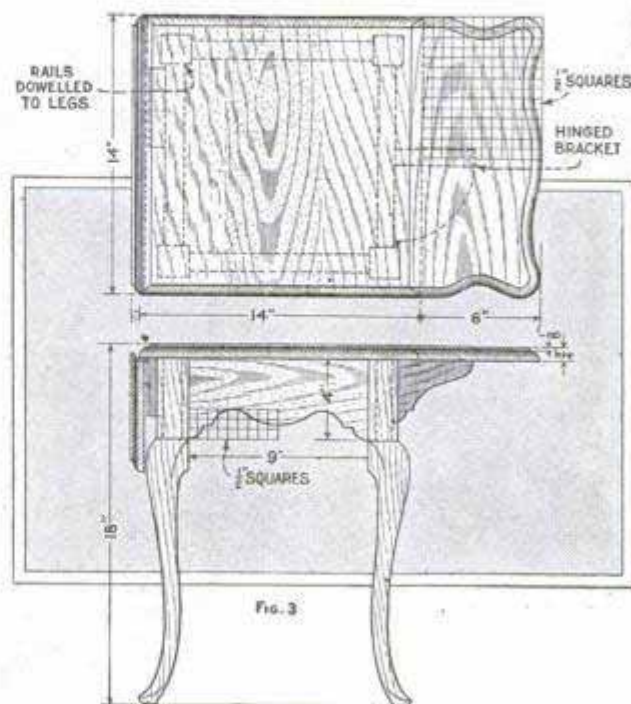
This type of hinged joint is known as a rule joint, and it must be carefully set out and worked if the finished effect is to be good. The little square portion of the top molding, which acts as a stop for the leaf, must be square above the center of the hinge pin, and the hinge pin is the center of the arc of the molding, so that, as the leaf swings up and down, the edges of the moldings fit close and conceal the housing of the hinges.

The leaves are held up with formed wood brackets, the design for which is also given in Fig. 4. The mortise or recess in the bracket for the hinge is made deep enough so that it takes the whole thickness of the hinge when closed. The brackets should be hinged so that they swing in opposite directions.

After the table has been glued and



sanded carefully, it is ready for the finish. Tables of this period were generally finished with two or three coats of material similar to white shellac, followed by numerous polishings with turpentine and beeswax. The modern method is as follows: Sponge the wood with water. When dry, sand with No. 000 sandpaper. Stain with walnut or mahogany water stain. Sand off any fuzz raised by the stain, and follow with brown wood filler worked well into



the pores. Apply one coat of shellac and two of rubbing varnish. Rub to an egg-

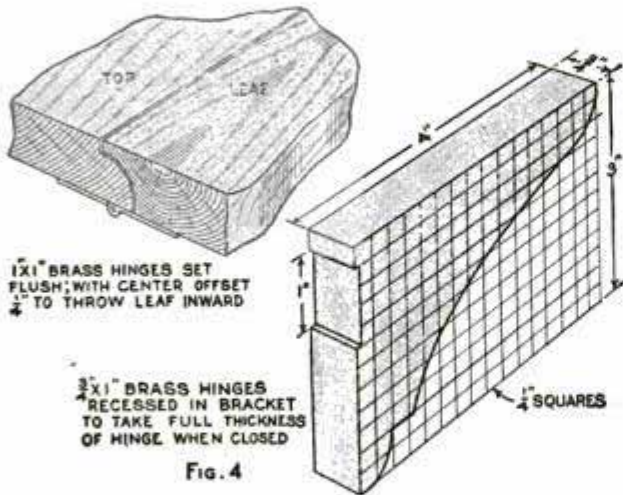


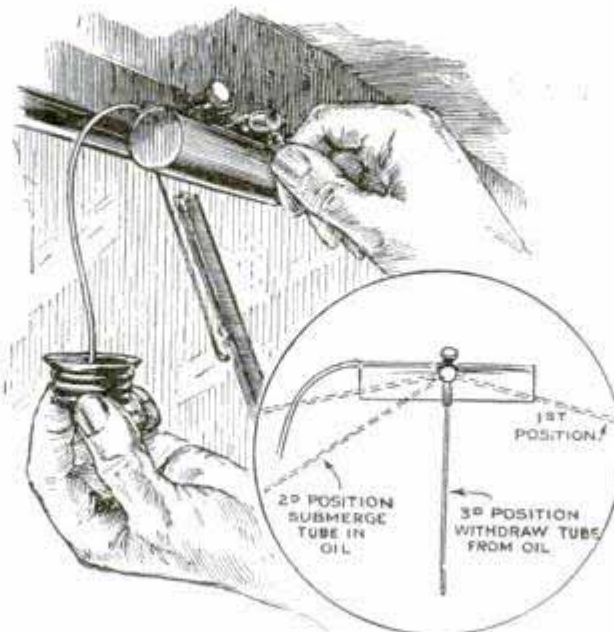
Fig. 4

shell gloss with No. 3F pumice and paraffin or rubbing oil.

Some authorities advise a very thin coat of shellac applied after the stain has dried and before filling. This serves two purposes; it sets the stain and also stiffens the fine fuzz raised by the stain so that it is more effectively sanded down, thus making for a clearer finish. This "wash" coat must be very thin.

Removing Blue Film on Furniture

Many pieces of attractive mahogany furniture often become covered with a blue film, which cannot readily be removed with polish. It seems that this condition is brought about by the constant changes of humidity during the spring and fall of the year. The interior of the home is likely to be closed at this time and temperature changes require intermittent heating, which varies the humidity considerably. A good remedy for the trouble is to sponge off the furniture with cold water, dry it with a soft cloth and, if convenient, set the pieces in the sun to dry for some time, according to the temperature.



Method of Oiling Suction Type of Windshield Wiper

Cleaning Lacquer Brushes

Cleaning lacquer brushes thoroughly requires a rather large quantity of thinner, which is expensive, and if the brushes are not cleaned properly, they will dry too hard for use with varnish or enamel. This difficulty can be overcome by first wiping off as much lacquer as possible with a rag moistened with thinner, then dipping the brush in alcohol, after which it can be washed with soap and water. A brush so treated will dry as clean and soft as a new one. The alcohol has the peculiar property of mixing freely with both thinner and water and enables the soap, which otherwise is entirely inactive against lacquer, to remove it completely.

Lubricating the Windshield Wiper

Windshield wipers on automobiles are usually rather difficult to lubricate, owing to the fact that they are fitted to the windshield directly under the top, where it is impossible to use an oilcan. Without oil, however, the leather washer or packing on the piston inside of the wiper becomes hard and dry, and in a short time leaks air, so that the wiper works sluggishly or becomes entirely inoperative. A good method of avoiding this trouble is shown in the drawing. Two teaspoonfuls of very light oil are poured into a small container, such as a deep saucer or a fruit-jar lid. The air hose is disconnected from the nipple on the cylinder, and a 6-in. length of tubing substituted. Open the air valve, and move the wiper to the extreme right, until the valve clicks. Then move the wiper to the second position, which is about three-quarters to the extreme left. At this point, the tube is submerged in the oil and the wiper is then given a quick movement to the right until it is vertical, as in the third position. Then the tube is with-

drawn from the oil. If the second movement toward the left carries the wiper to the extreme left point of movement, start all over again. Repeat the procedure, starting from the left, then reconnect the vacuum tube. Under ordinary conditions the wiper should be oiled once every three months.

Vacuum Cleaner Spreads Perfume

Your vacuum cleaner can be used to freshen the air in your home at the same time that it is used for cleaning the rugs. Place a few handfuls of pine needles in the bag, some balsam tips, or a few drops of perfume. The air passing through the bag will carry with it the fragrance.

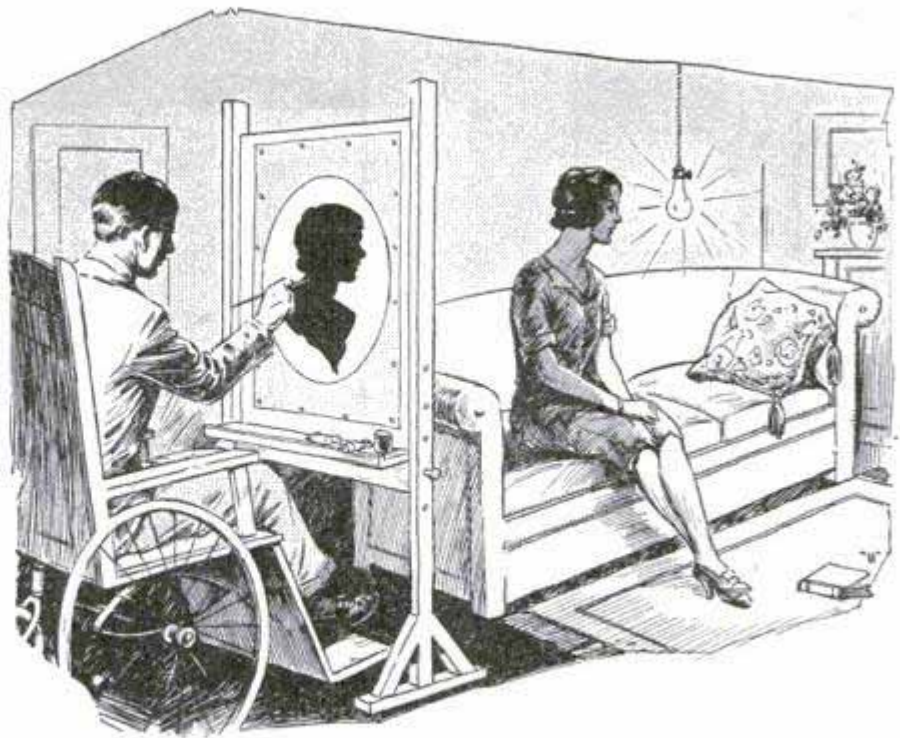
Removing Hot Electric-Light Bulbs

Removing hot electric-light bulbs is made easy by placing a rag or handkerchief over the



mouth of an ordinary glass tumbler as shown in the illustration, and then, holding the tumbler up against the lamp, turn it. There will be no risk of dropping the lamp if it is too hot to hold in the bare hand.—A. K. Baker, Chicago.

☐ To clean marble, mix equal parts of quicklime and potash lye, dilute with water to a thin cream and apply with a brush; let stand for 24 hours or more, and wash off with hot soapsuds.



This Method of Painting Silhouettes Brought a Large Business to an Invalid Confined to a Chair

Silhouettes Painted from Shadows

By substituting a large wooden frame for a drawing board or easel and stretching paper, parchment or cloth over the frame to catch the shadow of an object located between the frame and a strong electric light, an invalid, confined to a chair, was able to build up a considerable business in painting silhouettes. After a little practice it will be found just where the person, who should be seated on an ordinary straight-backed chair, must be placed with respect to the frame and the light to cast a sharp shadow, which is first outlined carefully and then filled in with india ink, charcoal, water colors or oil paints, as desired.

Novel Desk Ornament

Bearing a small clock or watch at the propeller end, a small model airplane makes a novel desk ornament, and, if desired, can be used as a paper weight, provided the base is heavy enough. A fitting motto, neatly lettered on the top, is shown in the illustration.—C. L. Meller, Minneapolis.

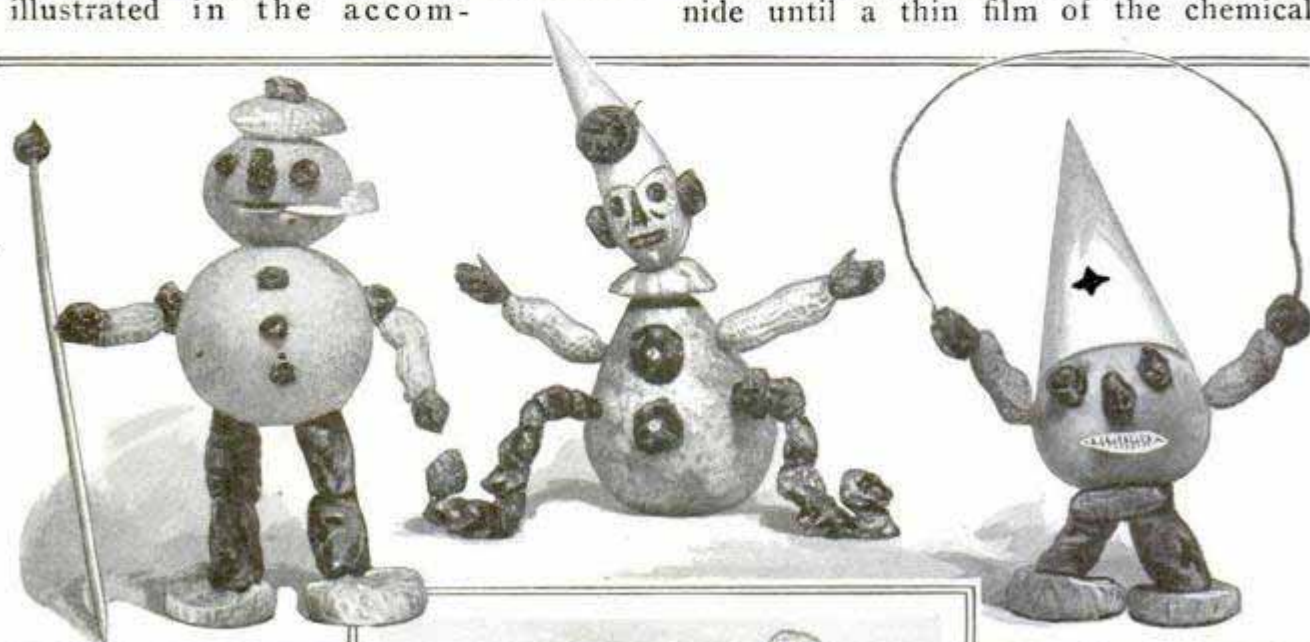


35 25. Portland Ave

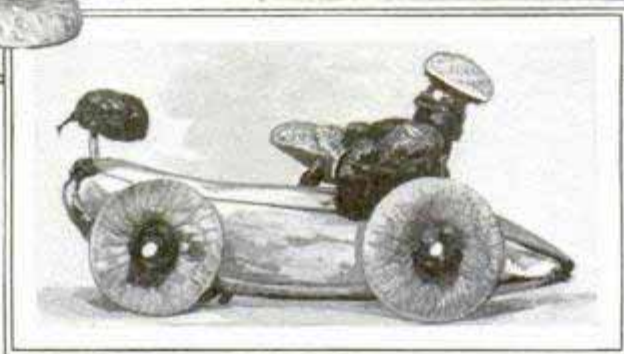
Figures Made of Fruits and Nuts Form Table Favors

A large variety of novel and amusing favors for the party, some of which are illustrated in the accom-

The simplest method of doing this is to obtain some cyanide of potash and crush it to a powder in an iron vessel. The part to be casehardened is then heated to a dull cherry red and rolled in the powdered cyanide until a thin film of the chemical



panying photos, can be made of fruits and nuts. Lengths of soft iron wire and toothpicks are used to hold the parts together, while the dunce hats are made of paper and the mountain-climber's stick from a swab holder. Oranges, pears and apples serve as bodies, while raisins are particularly adaptable for arms and legs, as they can easily be slipped on the wire, which is then bent as desired, although peanuts have also been found well suited for making these appendages. Dried figs make good wheels as can be seen in the lower detail, which represents the latest type of rocket car, a banana serving as the body.



Figures of All Kinds Can Be Made of Fruit and Nuts, the Parts Being Held Together by Means of Wire and Toothpicks; They Make Amusing Table Favors

covers the surface. Allow the part to cool somewhat, then reheat to a dull cherry red and quench in cold water. The fumes from the cyanide of potash, as well as the chemical itself, are

poisonous, and care must be taken not to breathe them. This method, of course, is a crude one, although commonly used in small shops, and quite effective for certain work. Steel cannot be hardened unless it has a certain carbon content, and the purpose of the cyanide or other casehardening agent is to supply carbon, which is taken up by the hot steel. The hardened skin produced by the above means is very thin. When parts are to be casehardened in quantities, they can be packed in a piece of iron pipe with the carbonizing agent, which may be cyanide of potash, prussiate of potash, charred leather, or powdered bone. The whole pipeful is then heated to a dull cherry red and allowed to remain at that heat from half an hour to an hour or two. Instead of quenching the work direct from the carbonizing heat, it is best to allow the pipe and its contents

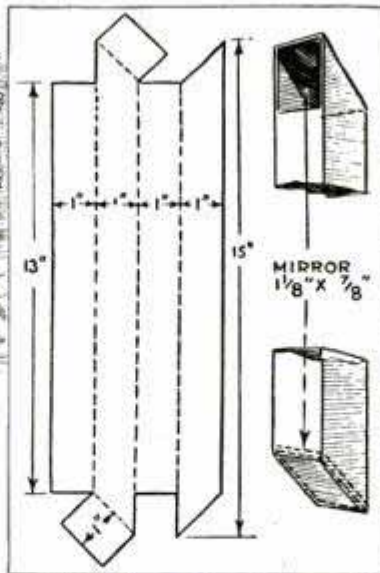
How to Caseharden Steel

The home-shop worker often finds it desirable to harden small articles of steel, to increase their wearing qualities. If made of cold-rolled steel, as is usually the case, they cannot be hardened and tempered like tool steel, but they can be casehardened, which will often serve quite as well.

to cool, then reheat to a dull cherry red and quench in cold water. For a very hard surface use salt water. For a reasonably hard surface with a tough core quench in oil, which may be either linseed, cottonseed, lard or lard and paraffin. A little sal ammoniac in the oil tends to make the parts come out clean.

Old Cistern Makes Good Oil Tank

Capable of holding a large quantity of oil, an old cistern was repaired and found highly satisfactory as an oil-storage tank. As the floor of the cistern was originally lower than that of the basement, where the oil was to be used as fuel, it was evident that a considerable quantity of oil would be trapped below the level of the drain to the burner. Therefore, the lower part of the cistern was filled in to a higher level with dirt over which a 4-in. layer of concrete was laid, sloping it to the center where the drain was installed. The sides of the cistern were also gone over thoroughly so that there would be no leakage. Using a cistern as a substitute for an oil tank effected quite a saving.—R. F. Starzl, Le Mars, Iowa.

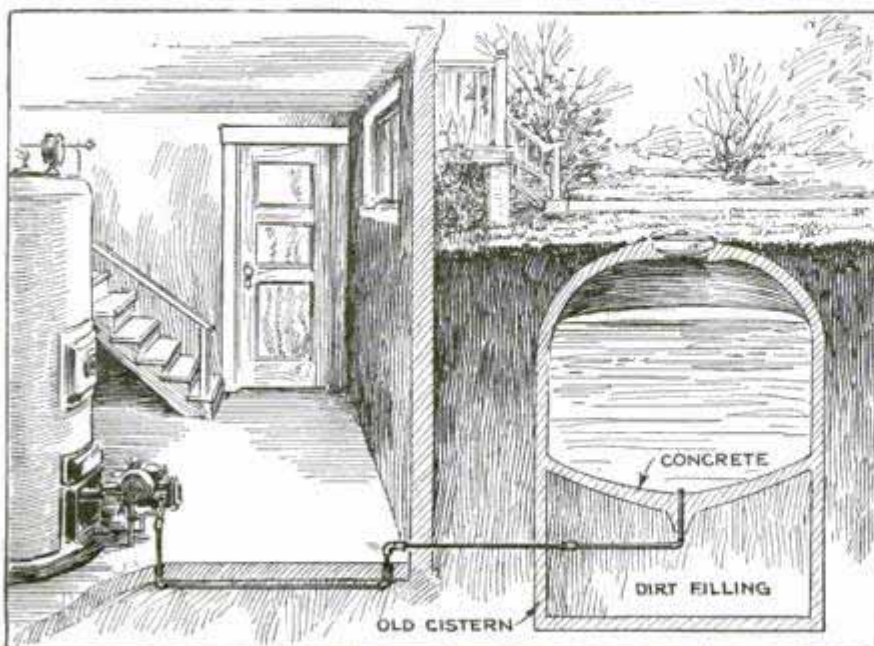


Small Periscopes, Made in a Few Moments' Time, Add Sport to the Children's "War" Games

Periscope Adds Sport to "War" Games

In our neighborhood the children have been having great sport in using home-made periscopes when playing "war" games, the periscopes being used by both sides to observe the "enemy." The instrument consists of a long and narrow tube in the top and bottom of which two small mirrors are set parallel to each other at an angle of 45° with the sides of the box. The layout shown in the drawing can be followed to make a box 1 in. square and 15 in. long, although these dimensions need not be followed, as it is easier to cut the box to fit the mirrors than to cut the mirrors to fit the box. In general, it is

best to make a narrow box, which is less noticeable than a wide one, and the color should also be inconspicuous, such as gray or tan. A square opening is left at the ends of the periscope as indicated to enable the reflected light to reach the eye of the hidden observer. It is immaterial which end is placed uppermost.—Hi Sibley, Pasadena, Calif.



Old Cistern Used for Oil Tank Cuts Down Expense of Oil-Burner Installation

☐ An old auto tire placed on a buoy will prevent it from marring the hull of a boat.

Modernize Your



NEW? As new as the minute! Practical? Attractive? Easy to build? Straight lines, every one of them, fashioned from sheet copper, wood and glass, these modernistic lighting fixtures should appeal to the amateur craftsman for their appearance and simplicity of design.

Figure 1—the hall, bedroom or sunroom fixture. The foundation for this fixture, consisting of a ceiling canopy, socket and harp, as shown in Fig. 2, is necessarily a product of the electrical store. The whole outfit costs about \$1, and this initial cost may be reduced materially if you are “bargain-wise.” The rest of the light is your own creation. Start by cutting, from double-strength ground glass, six pieces of the size and shape shown in Fig. 3. Then, cut out, from heavy copper or aluminum (this should be almost inflexible), a piece of the shape shown in Fig. 4. Bend the points of this “star” upward, as shown by the dotted lines, to form Fig. 5. Make a second star-shaped piece, this one from slightly more flexible material, and about $\frac{1}{4}$ in. smaller, as shown in Fig. 6.

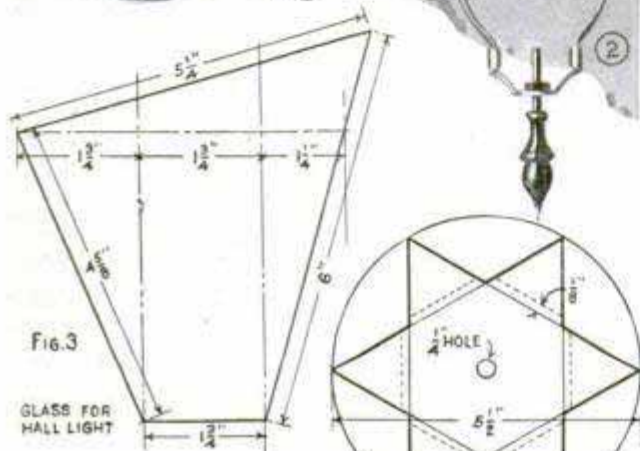


FIG. 3
GLASS FOR HALL LIGHT

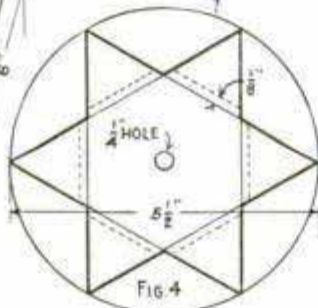


FIG. 4



FIG. 5

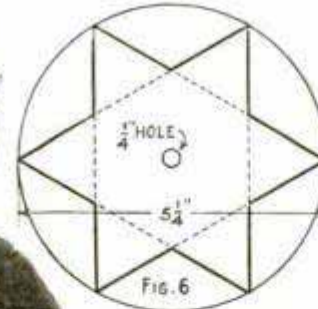


FIG. 6

BENT ON DOTTED LINES



FIG. 7

Now, place the two stars together, the smaller one on the inside, and fasten the pair to the lower end of the fixture by means of the ornamental end which goes with the outfit, as in Fig. 7. Insert the six glasses loosely between the inner and the outer star, allowing each glass to overlap its left-hand neighbor. After getting the glasses into place, tighten the screw on the bottom so that the flexible (inside) star will be pulled tightly against the outside star, making all secure and completing the fixture ready for hanging, as pictured in Fig. 1.

The table light or torchere shown in Fig. 9 is a truly popular conception of the modernistic mode. The base for this excellent light consists of a wood block of the size and shape shown in Fig. 10. The second hand-made portion of the light consists of a piece of sheet copper or brass (16-oz. material) of the shape shown

Lighting Fixtures

in Fig. 11. This is bent on the dotted lines, to form a cuplike shell similar to Fig. 12, which also shows how the small tabs of Fig. 11 are fitted into the slots to hold the form secure; note, too, how the small triangular pieces in the bottom of the shell are turned upward.

This light, like the hall lamp just described, requires a factory-made canopy. There are many designs to select from, and almost any will do. At any rate, get a canopy and mount it, with the light socket and copper shell, onto the wood base, as in Fig. 13, which shows the light at this stage in diagram form. You can readily see how the canopy and socket are attached to the base; also how the wires run from the socket, down through the standard $\frac{1}{8}$ -in. pipe, through the horizontal pipe, and out at the side of the base.

The next consideration is the glass. You will need four pieces, ground glass, double-strength, cut to the size and shape shown in Fig. 14. The pieces, when cut, are inserted into the copper shell, and fastened by means of the triangular flaps at the bottom of the cup and the prongs on top. Looking back at Fig. 9, you will get an idea of how the finished lamp should look. You will notice that a pull-chain socket has been used in the construction of this unit, the chain running down through one of the small triangular holes in the shell.

From these two typical examples you will easily get the idea of one branch of modernistic lighting—straight lines, indirect light and ground glass.

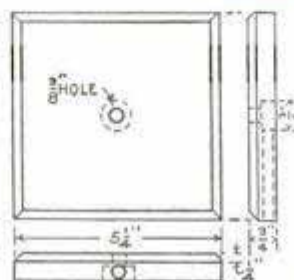


FIG. 10 BASE OF TORCH

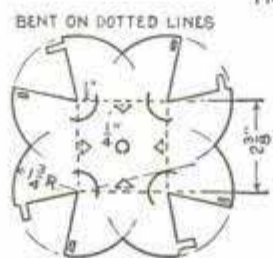


FIG. 11
PATTERN FOR TORCH SHELL
CUT FROM 16-OZ. COPPER

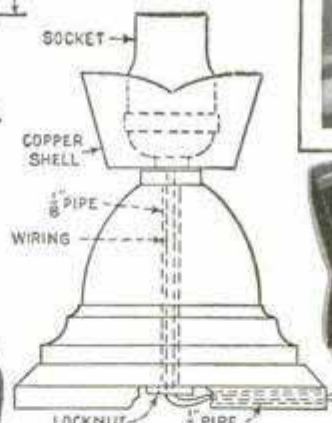


FIG. 13

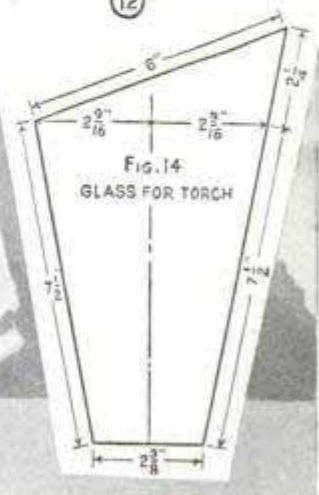
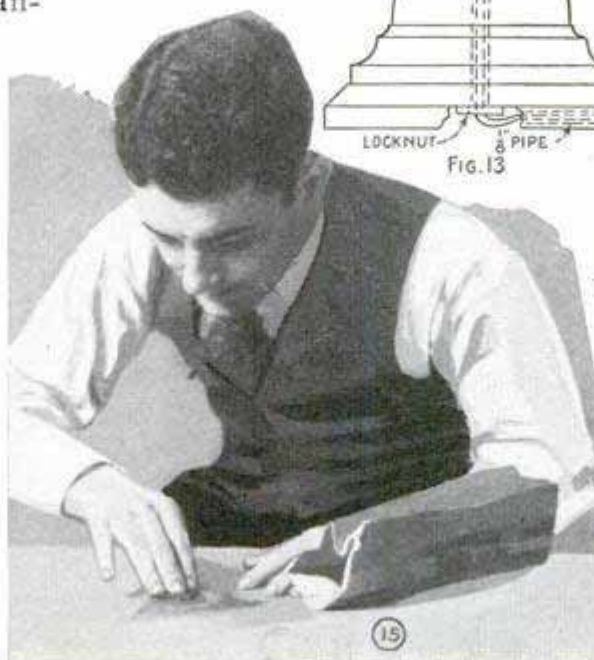
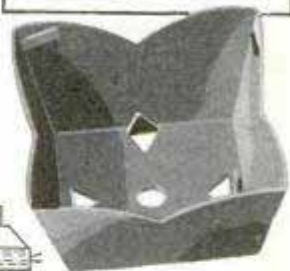
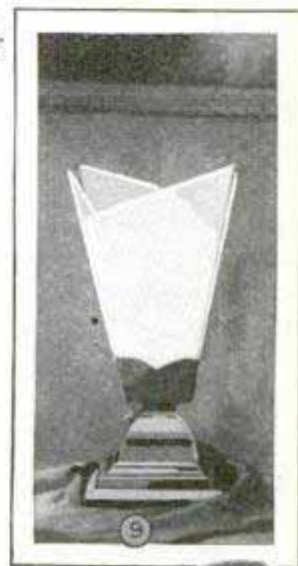


FIG. 14
GLASS FOR TORCH



About this ground glass. It is fairly familiar to most craftsmen, being merely plain glass with a surface that has been ground on either side to a smoky-white finish, more or less opaque. While this glass is readily obtainable in most places, many craftsmen will no doubt be unable to procure it in their home town. But, there's a remedy. Ordinary clear glass can be easily ground with No. 80 emery dust, which is obtainable almost everywhere, and water. The method is simple. You merely mix the emery dust with water to form a paste, then rub this over the glass, using a second and smaller piece of glass to do the rubbing, as shown in Fig. 15. Four minutes will do for the average glass. It should be ground on both sides. If you must resort to this method, you can save time by doing all of the glasses at the same time, using one of the actual glasses for the "rubber."

For something entirely different in the way of modernistic lighting, try the "fountain" effect shown in Fig. 16. This fixture, more so than the others, is a matter of converting a standard fixture to comply with the modern style. The basis for the whole affair is a round bowl of the type which was, and still is, much in vogue for a dining-room light. This fixture generally consists of the bowl, with three lights suspended at equal intervals around the outside rim.

Now, since modernistic lighting is almost entirely indirect lighting, the first step in the transformation calls for the removal of these three direct lights. The bowl, thereby stripped of its old-fashioned trimmings, is ready for the metamorphosis. Like this: Fashion from thin wood (the fiber composition boards are excellent) three pieces of the general size and shape shown in Fig. 17. Through the small holes which are drilled in these pieces, thread lengths of fine copper or steel wire, as pictured in Fig. 18.

Now, give each piece a

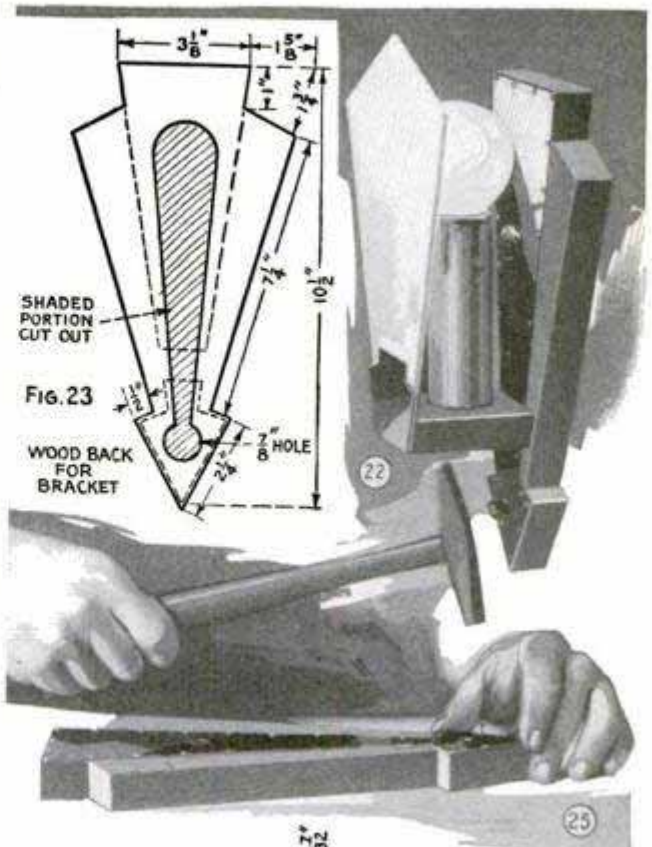
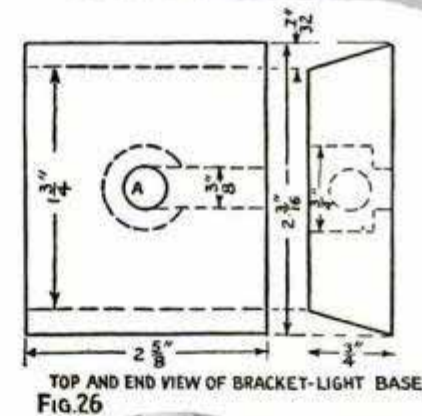


FIG. 23

WOOD BACK FOR BRACKET



TOP AND END VIEW OF BRACKET-LIGHT BASE
FIG. 26

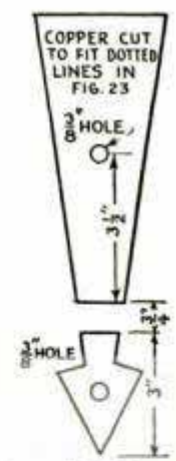


FIG. 24



FIG. 28

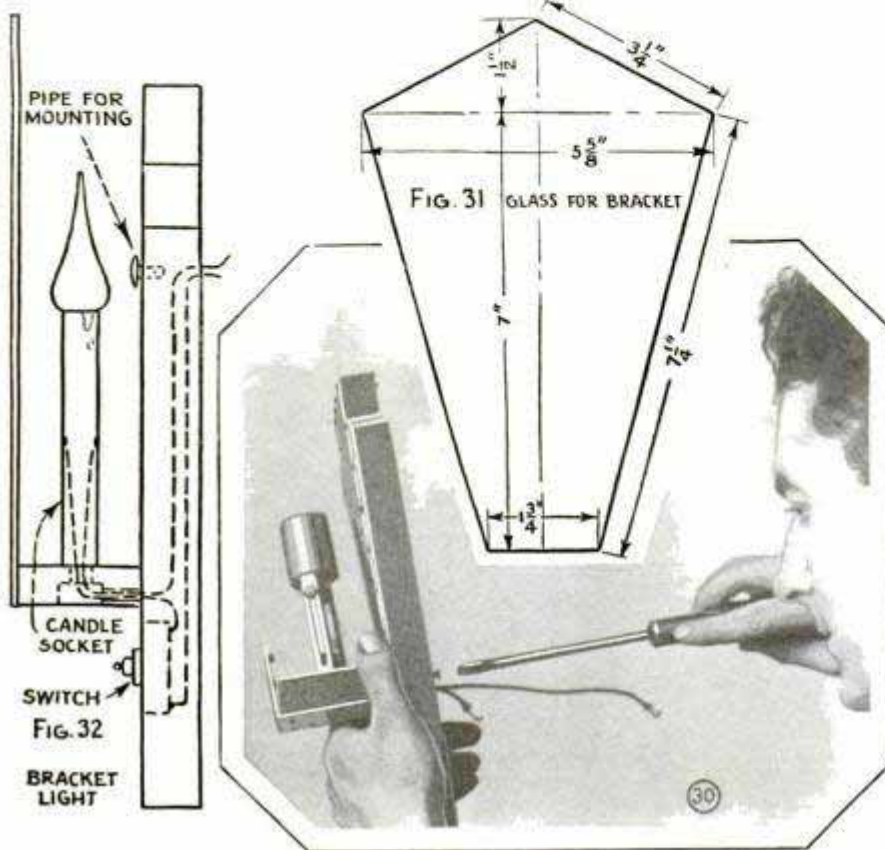
TAB TO HOLD GLASS
COPPER PIECE FOR BRACKET LIGHT

coating of thick white paint, and, while the paint is still wet, pour on white

any difficulty is experienced in getting the fountain arms to hold their position with-

out swaying. Three lights should be used with this fixture, all inside the bowl. The same three chains which held the original fixture likewise hold this new creation. And, simple as it all sounds, the play of light on the glass-covered arms and the shimmering softness of the beads provide an effect that must be seen to be appreciated. Incidentally, it is best to have the bead strings of varying length; some quite long, some short.

The bracket light shown in Fig. 22 is another attractive number. Start this fixture by cutting from $\frac{3}{4}$ -in. hardwood a piece of the size and shape shown in Fig. 23. Then cut from 16-oz.



ground glass, as shown in Fig. 19, covering the form completely. This powdered glass goes under the commercial name of "smalt," and can be procured at any paint store. Immediately after applying the white smalt, lightly sprinkle the two tips of each piece with a fine mixture of light-blue smalt.

After the paint is dry, which will result in the permanent fastening of the sparkling bits of glass to the wood, you can go ahead with the next step in the making of the fountain. This consists in threading onto the wires, at the tips of each fountain stem, seven or eight fairly large pearl beads, as pictured in Fig. 20. Tear-shaped beads are best suited for this purpose, but since they are not often easily procured, the average craftsman usually will have to be content with the round beads shown in the photographs. Thirty-five cents' worth will do the job.

The rest is simple. You merely glue an ordinary glass flower holder to the inside of the bowl; then insert the ends of the fountain stems into three equally spaced holes in the holder, as shown in Fig. 21. The holes may be filled with clear glue if

copper two pieces like those shown in Fig. 24, and nail these pieces over the wood block, as pictured in Fig. 25. Use round-head brass nails. Put this piece aside, and consider the next operation. This consists in fashioning from wood a small block of the size and shape shown in Fig. 26. Mount an ordinary candle socket at the point marked A, running the wires down through the hole and across the block as in Fig. 27. You can readily see from the photograph how these wires are insulated by being run through standard $\frac{1}{8}$ -in. pipe. Note that the sides of the block taper to conform to the wood back.

Now, cut a piece of copper like the one shown in Fig. 28, and nail this to the bottom side of the wood block, as in Fig. 29. Screw the block to the base of the fixture, as in Fig. 30. The glass for this light is shown in Fig. 31, and you can see from Fig. 30 how this is inserted between the front of the block and the copper plate, with the two tabs holding the glass farther up.

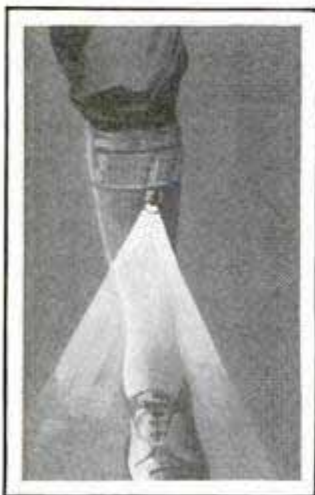
The lower hole on the copper plate which forms the back for the fixture is

occupied by a canopy switch. This costs 30 cents. The switch is simply fastened by means of a locknut on either side. The upper hole is occupied by a short length of pipe, capped with an ornamental nut. This is used to fasten the light to the wall in the familiar "crowfoot" manner. An ordinary pull-chain candle socket may be used instead, and two screws will serve to hold the light securely to the wall, but the canopy switch is by far the most practical. Fig. 32 shows the wiring.

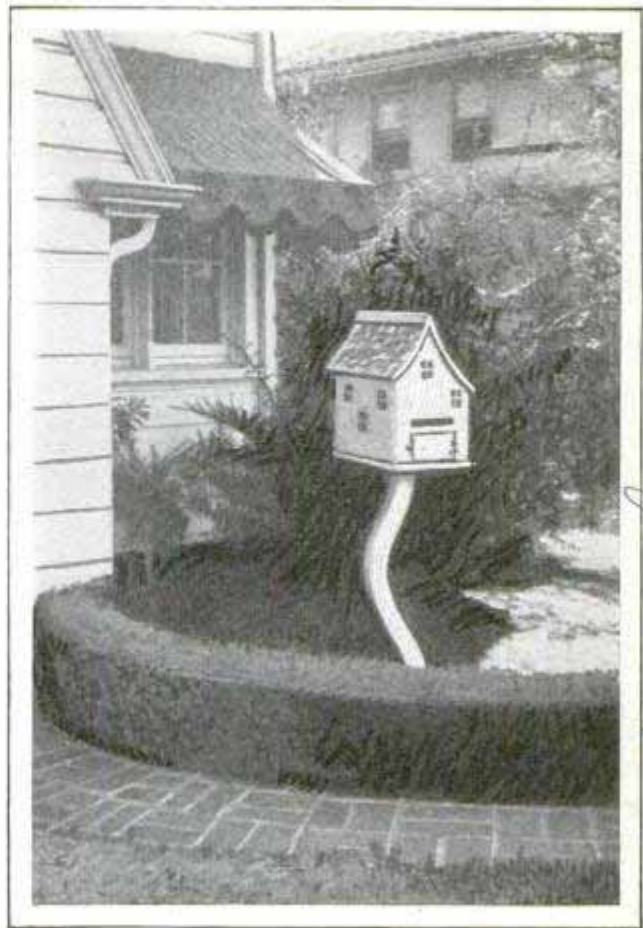
And there you have them—four modernistic lights for your consideration. None of these, as you probably will have seen, are described at any great length; rather something is left to the imagination and ingenuity of the home craftsman. Also, plain ground glass has been talked of throughout. Really, however, much more charming effects can be obtained through the use of tinted ground glass which is obtainable in a number of different shades, green, blue, red, amber, etc. This glass is quite expensive, but equally good effects can be obtained by painting the glass with transparent oil colors, and then fixing the colors with clear brushing lacquer. This method is sometimes more desirable than the actual stained glass, since it permits making of designs which would be impossible otherwise.

Flashlight Strapped to Leg Lights Way

Campers will find the flashlight kink shown of considerable utility when walking



through brush, etc., at night. The light is merely slipped under the cuff of knee breeches, or it can be held by means of a section of inner tube slipped over the leg. One can readily ascertain just at what angle to arrange the light so that it will be most convenient for the purpose. This method is especially useful to those who are carrying a load.



Unusual Type of Mailbox Made to Represent Home of Bird-House Proportions

Miniature House Makes Novel Mailbox

Designed to represent a miniature home of bird-house proportions and mounted on a curved post, the mailbox shown in the photo is rather unusual and adds to the individuality of the private home. It is made of $\frac{1}{2}$ -in. material, except for the floor, which is of $\frac{7}{8}$ -in. stock and measures 9 by 13 in. Tiny hand-cut shingles, laid in irregular courses, form the roof. The windows, each of which consists of a small square of glass, are held in place by narrow strips of wood tacked to the inside. The only evident irregularity is the comparatively large hinged opening for removing mail. Painted white with green trim and varicolored shingles, this mailbox helps to embellish the lawn.

A Staining Hint

When you have a job of staining and wish to match the light woodwork of your home, try diluting oil stain with linseed oil. The oil slows up the action of the stain, giving the worker plenty of time to wipe the work.

Cont. C.A. Byers, 2335 - 4th Ave Los Angeles, Calif.

Corrugated Cardboard for Picture Panels Replaces Plywood

Corrugated cardboard can be used as a substitute for plywood, and is some-



FIG. 1

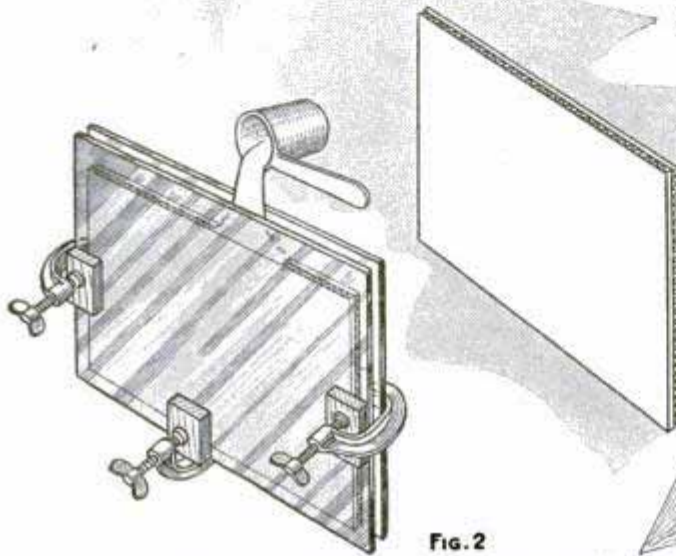


FIG. 2

Sheets of Corrugated Cardboard Serve Instead of Plywood for Making Picture Panels When Stiffened with Plaster Poured into Corrugations

times even better, especially in the case of picture panels. It is quite a fad nowadays to mount a picture on an artistically shaped plywood panel, and then build up a molding around the picture with artists' clay, which is later stippled and bronzed. The moisture of the clay sometimes loosens the glue between the layers, which spoils the job, but corrugated cardboard, treated as indicated in the drawing, is not subject to this trouble and is much cheaper. Two sheets are glued together with the ribs at right angles, and the openings at one end of each piece are plugged with putty or clay. The piece is then clamped lightly between two sheets of ordinary window glass and thin plaster of paris is poured into the space between the ribs, as in Fig. 2. It is well to hold the board at an angle while pouring, in order to prevent air locks. The board can be removed from the form as soon as the plaster has stopped flowing, but it must be placed on a flat surface until the

plaster has set firmly, preferably overnight. A wooden form can be used instead of the glass, but the glass is better, as it is easily cleaned. After the plaster has set, any pattern can be cut with a small fretsaw or with a sharp knife. The picture to be mounted is glued on, and the border is built up with artists' clay in the usual way. It is a good idea to coat the back of the panel with melted paraffin in order to prevent moisture from affecting the plaster. Small screweyes will hold in the plaster, if a clean-cut pilot hole is drilled first. These panels possess remarkable strength and will not warp under any

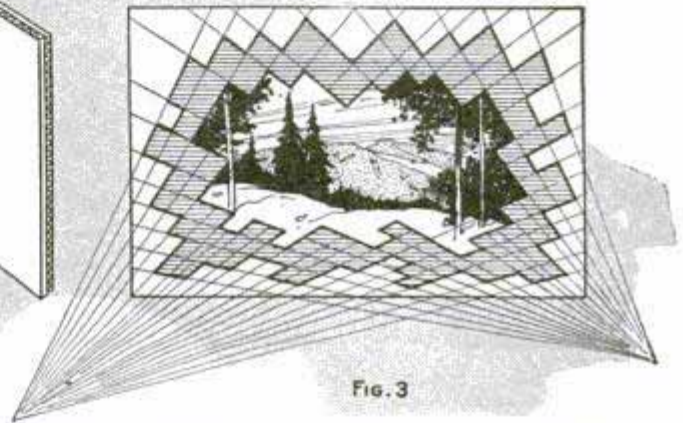


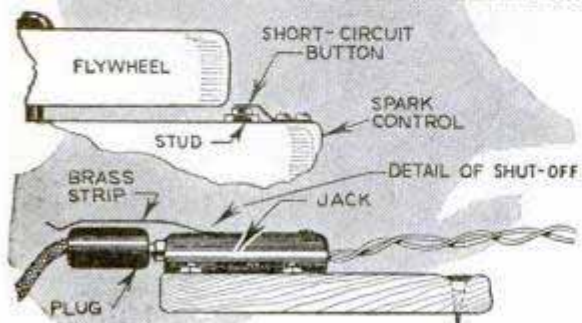
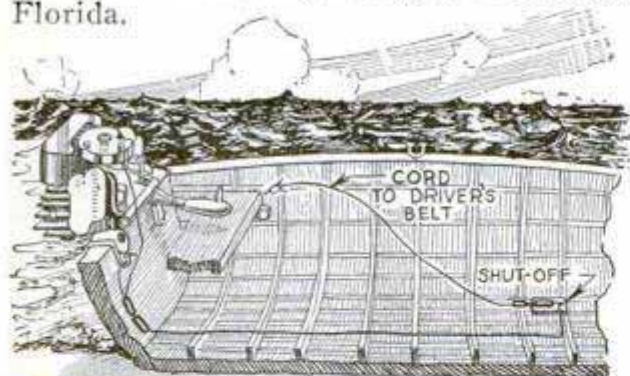
FIG. 3

conditions. Fig. 3 shows a border made by crossing lines drawn from two vanishing points, which puts the border in perspective, making it quite unusual and interesting.—Dick Cole, Los Angeles, Calif.

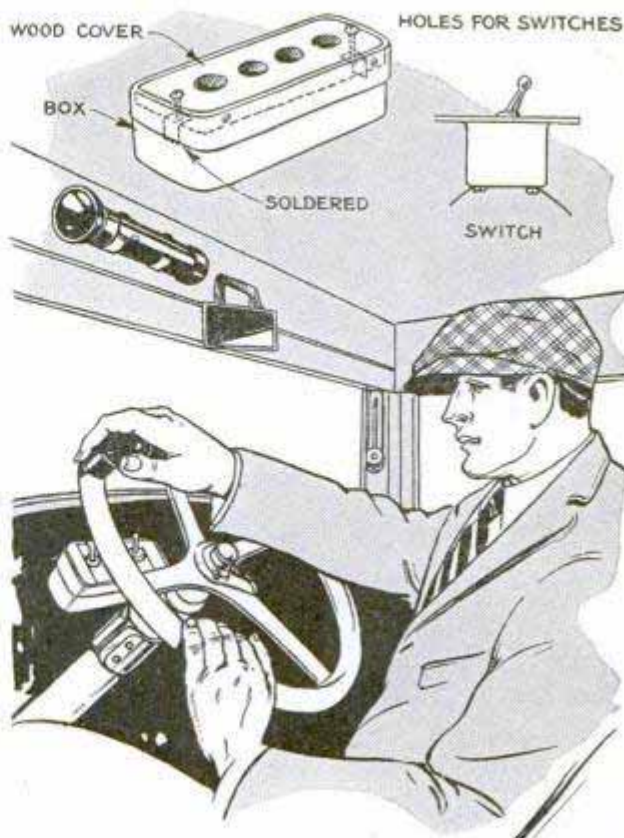
Safety Shut-Off for the Outboard Motor

Although modern outboard motors are highly efficient, their use still presents a number of problems, the most important of which is emergency stopping. In a racing outboarder, where the driver is likely to be thrown out by rough water, collision with floating driftwood, or by making a short turn, the uncontrolled boat presents an element of danger. It has a tendency to turn in a circle, and there are cases on record where the drivers, floating in the water, have been seriously injured. To avoid this, it is an easy matter to arrange a switch circuit, which, when closed by the removal of a plug, will ground the ignition current and stop the

motor. A short high tension cable is run from the insulated stud on the spark control, that is used to stop the motor, to a plug of the kind used for radio loud speakers, and a second wire is run from the plug to the frame of the motor. A long double-conductor cable, suitable for high-tension current, is fitted with a single-circuit radio jack at each end, the jacks being the kind that open when the plug is inserted. The double-conductor cable is fastened to the side of the boat, so that the plug on the short cable already attached to the motor can be engaged with one jack, while the second jack is located in a suitable position in front of the driver, where it is fastened to a small block which is screwed to two ribs, as shown. A plug is also inserted in this jack, a length of strong cord being tied to it and to the driver's belt. Obviously, the removal of the second plug allows the jack to close, which grounds the ignition current and thus stops the motor. So, if for any reason, the driver falls out of the boat, the forward plug will be pulled out, which automatically kills the motor. If the plug does not fit tightly enough in the jack, bend a strip of spring brass and attach it to the block so that it holds the plug in place without defeating its purpose. The first plug and jack are disconnected when the motor is removed from the boat.—A. B. Boynton, Jr., Melbourne, Florida.



Simple Wiring Arrangement Which Shuts Off Outboard Motor When Driver Is Thrown Out

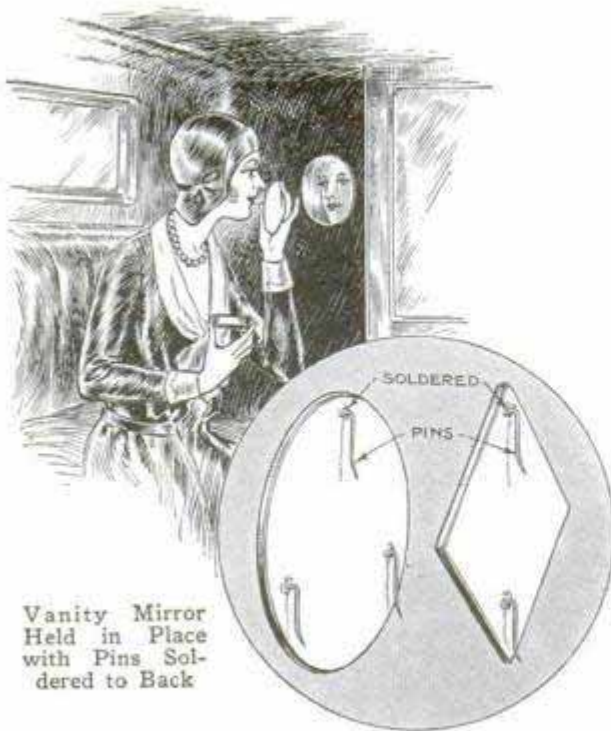


Flashlight Holder, Multiple Switchbox and Steering Knob Add to Motorist's Convenience

Three Handy Kinks for the Motorist

Spending considerable time in driving his Ford from town to town, a traveling salesman has installed a number of conveniences which he has found very helpful, three of which are shown in the drawing. The knob on the steering wheel was installed for the purpose of turning the wheel quickly when getting into a parking space. Its normal position while driving straight is at the bottom of the wheel, where it can be held by one hand. As a flashlight was handy to have in the car, a special place for keeping it was provided by attaching two spring clips to the cross-piece just above the windshield. The third feature consisted of a novel switchbox attached to the steering post, and used to operate a number of accessories. It was made from a sheet-metal container used for holding auto lamps. Small angles, soldered to the inside, were threaded to take the end of 6-32 screws, which held a wood cover in place. The switches were installed in the usual way, holes being drilled through the cover to receive them.—Myron L. Harmon, South Bend, Ind.

☛ When a screwdriver slips from the slot, dip it in fine emery and it will hold.



Vanity Mirror
Held in Place
with Pins Sol-
dered to Back

Novel Mounting for Vanity Mirror in Automobile

Lady passengers in the car greatly appreciate a mirror mounted at a convenient position on the wall over the back seat. The novelty of this particular installation consists in the method of fastening it. Pins are soldered to the back of the mirror, which must be of suitable metal to permit soldering, and after they are bent over as indicated, the sharp ends are hooked through the wall covering. The mirror can be quickly attached or detached and can be placed in almost any position desired, without injury to the upholstery.—G. A. Luers, Washington, D. C.

Nail-Polishing Kit for Mending Celluloid Articles

Besides keeping the nails in shape, a small nail-polishing kit is useful for repairing celluloid articles that ordinary glue will not hold together. The kit usually holds two small bottles and a brush. One bottle contains a thin celluloid solution and the other a cutting compound to soften and remove the celluloid solution after it has hardened. If you have broken the celluloid frame of a pair of glasses, you can repair it as follows: Soften both ends of the broken part with the cutting solution until they are very sticky, then press them together and hold them in

this position for about five minutes. Lay the frame down and allow it to dry and harden completely for about an hour. Then apply a coat of the celluloid solution over the repair, which not only strengthens it but also restores the gloss which may have been slightly destroyed by the cutting liquid. Celluloid combs, ornaments, buckles and many other articles can be successfully repaired by this simple method.—B. Moeddel, Jr., St. Bernard, Ohio.

Covers of Paraffin for Photographers' Trays Prevent Evaporation

Photographic developer and other liquids can be kept in open-top trays without any loss from evaporation by providing covers made of paraffin. First fill the tank with water to within an inch or so from the top. Then pour a $\frac{1}{8}$ -in. layer of melted paraffin on the water and let it cool. Next place a piece of $\frac{1}{2}$ -in. wood, slightly smaller than the inside of the top part of the tray, on the layer of paraffin and then pour on some more, being sure to fill the space between the tray and the edges of the wood. A small knob should be screwed to the center of the lid before the last layer of paraffin is poured on. When the latter has cooled sufficiently, separate the edges of the cover from the tank sides to permit its removal, which can be done with a razor blade. Paraffin on the sides of the tray will prevent the



Tray Covers Made of Wood and Paraffin Prevent
Evaporation of Liquid

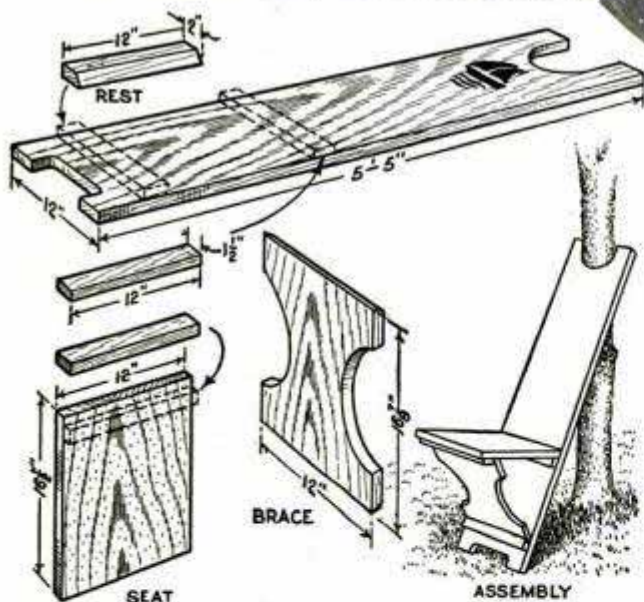
liquid from creeping and will also prevent sticking of the cover.

Lean-To Chair for Your Garden

By EVELYN JAHNECKE

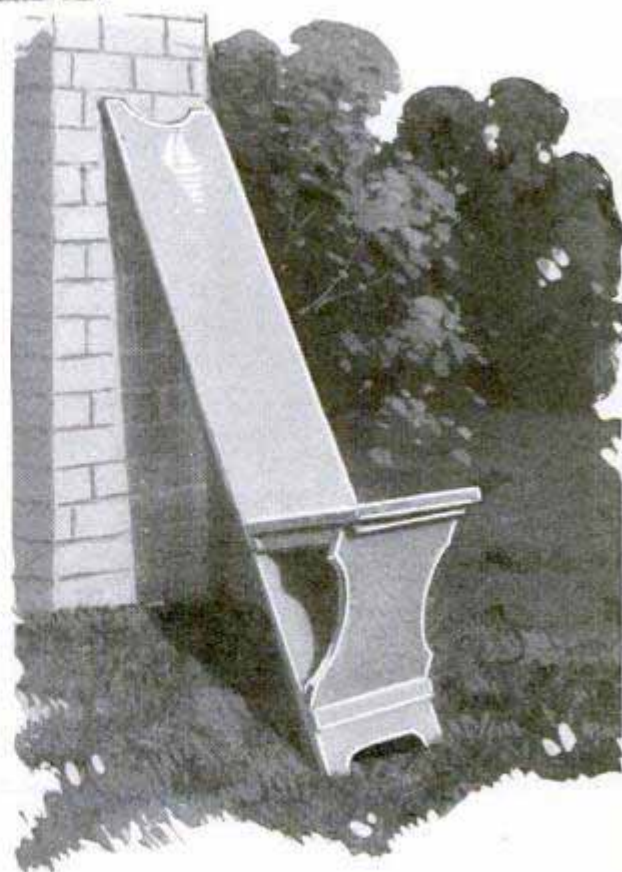
YOU can add greatly to the comfort and convenience of your garden by providing a number of lean-to chairs of the kind shown in the photos and drawing. Anyone who can handle a saw and hammer can make them, as they consist merely of a 1 by 12-in. board, about 5 ft. long, and two shorter lengths of the same

be satisfactory and durable if it is kept well painted. The construction and method of assembling the chair are clearly indicated in the drawing, two 1 by 2-in. cleats being nailed to the backrest and one to the edge of the seat, after which the parts are nailed together securely. The lower end of the backrest is recessed in the center, forming two feet on the edges, but this detail is really unnecessary. In fact, the feet have a tendency to sink into the lawn, leaving holes, which is a more or less objectionable feature. To offset this effect the feet should be as large as possible. The upper end of the backrest is notched to hold the chair in place when set against a corner or tree. After it has been completely assembled, the edges of the wood are sanded smooth, and the chair is given a coat of paint of any desired color. Stencils and striping along the edges will improve its appearance. Thin the first coats with linseed oil and turpentine to insure penetration, and be sure to use outside paint or enamel.

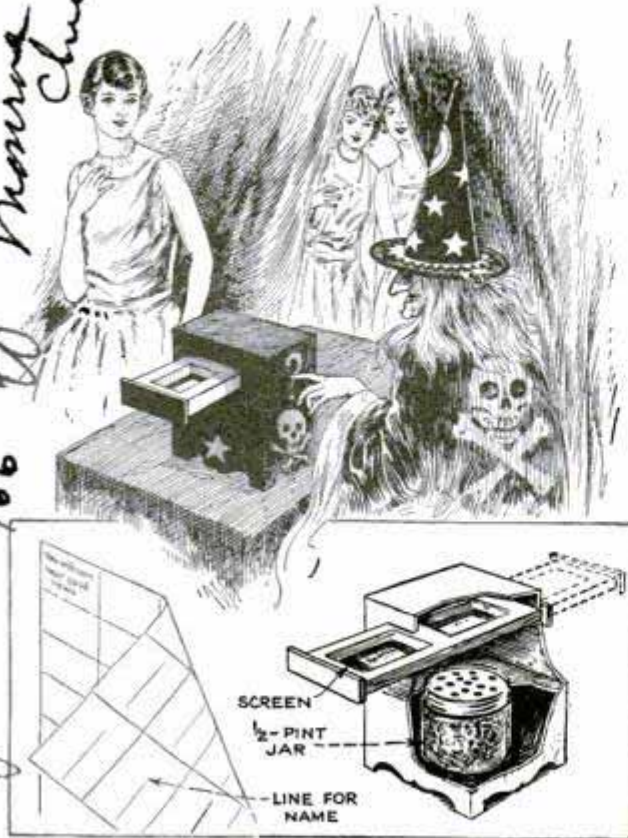


Easily Made Garden Chair of the Lean-To Type Can Be Set against a Tree, Fence or Wall at Any Angle Comfortable to the Occupant

material. The longest piece forms the legs and backrest, while the other pieces are used for the seat and brace that supports the seat. Any kind of wood will do, although hardwood will withstand the weather best. However, soft wood will



*Eugene Dietzgen Co.
166 W. Monroe Street
Chicago*



Mystic Box Tells Fortunes on Slips Bearing Participants' Names

Novel Device for Fortune Telling

Oxalid primalin (red-line) paper, placed on the market by leading blueprint-paper manufacturers, has been found an excellent source of entertainment at parties, when used in connection with the fortune-telling device shown in the drawing. Slips of the paper, which is nearly white, are first exposed or printed before the demonstration takes place, and a penciled line is made on the unexposed side of each slip. Participants who wish to have their fortune told write their names on the penciled line and hand the slip to the operator, who inserts it into the mystic box, which is actually only a container in which ammonia fumes develop the print. Two square cigar boxes are glued or nailed together and a sliding drawer, having two screen-bottom compartments, is arranged in the top box as indicated. A number of small holes are drilled in the bottom of the upper box, which should be a single layer separating both boxes. A 1/2-pt. fruit or similar jar, containing a sponge soaked with 26-per-cent ammonia, and having a perforated lid to permit the escape of the fumes, is attached to the underside of the upper box. While one slip is being written and placed in the

*Australia. Ilyes & Chernigals. Ltd
94-96 Harrington St. S. P. O. B. 941
Sydney*

empty compartment of the drawer, another slip, inside of the box, is in the process of development, which takes only a few moments. The outside of the box should be painted black and white, with appropriate figures on all sides. It is best to print a large sheet of paper with a single tracing bearing a large number of fortunes, the print being cut into slips later, after exposure.—Irvin L. Morrow, Muncie, Ind.

Canoe Backrest Provides Comfort

A comfortable backrest for the canoe can be made from an old bicycle rim in good condition, or any similar wooden hoop strong enough for the purpose. Cover one side with brown duck, stretching it tight and tacking it to the outer side. Fill the rim with cotton and pack it tight but do not overstuff it. Cover the top side of the rim in the same way with imitation leather. Trim this covering so that the edge will not project over the center of the rim. Cover the tacks and the ragged edges with trimming tape, using ornamental upholsterers' tacks. Make holes for buttons, one in the center and five or six in a circle half the diameter of the rim. In attaching the buttons pass a strong waxed twine through the eye of the bottom button, then through the backrest and the eye of the top button, and back through the backrest again. Tie the twine with a common twist knot and pull it until the buttons are tight together, then wrap the end of the twine around the button several times and tie it securely.—C. Neiper Bruce, New Castle, Pa.



Celery can be kept fresh several days by wrapping it in a wet cloth similar to a turkish towel, which is then covered with paper.

SHOP NOTES



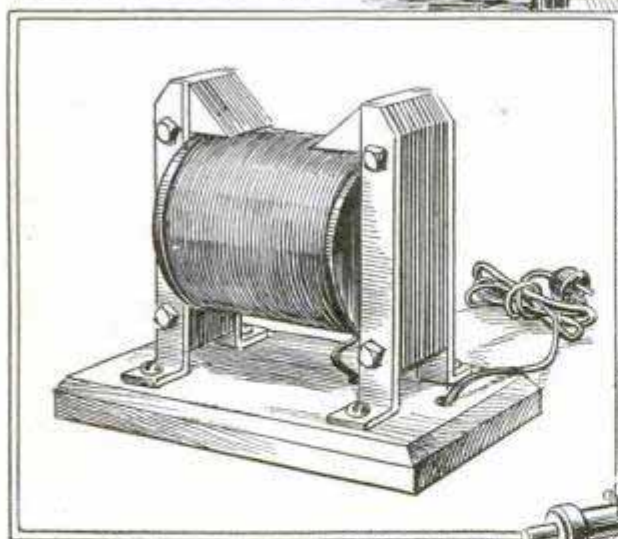
Growler Saves Time in Armature Repair

By LEMUEL HARRIS

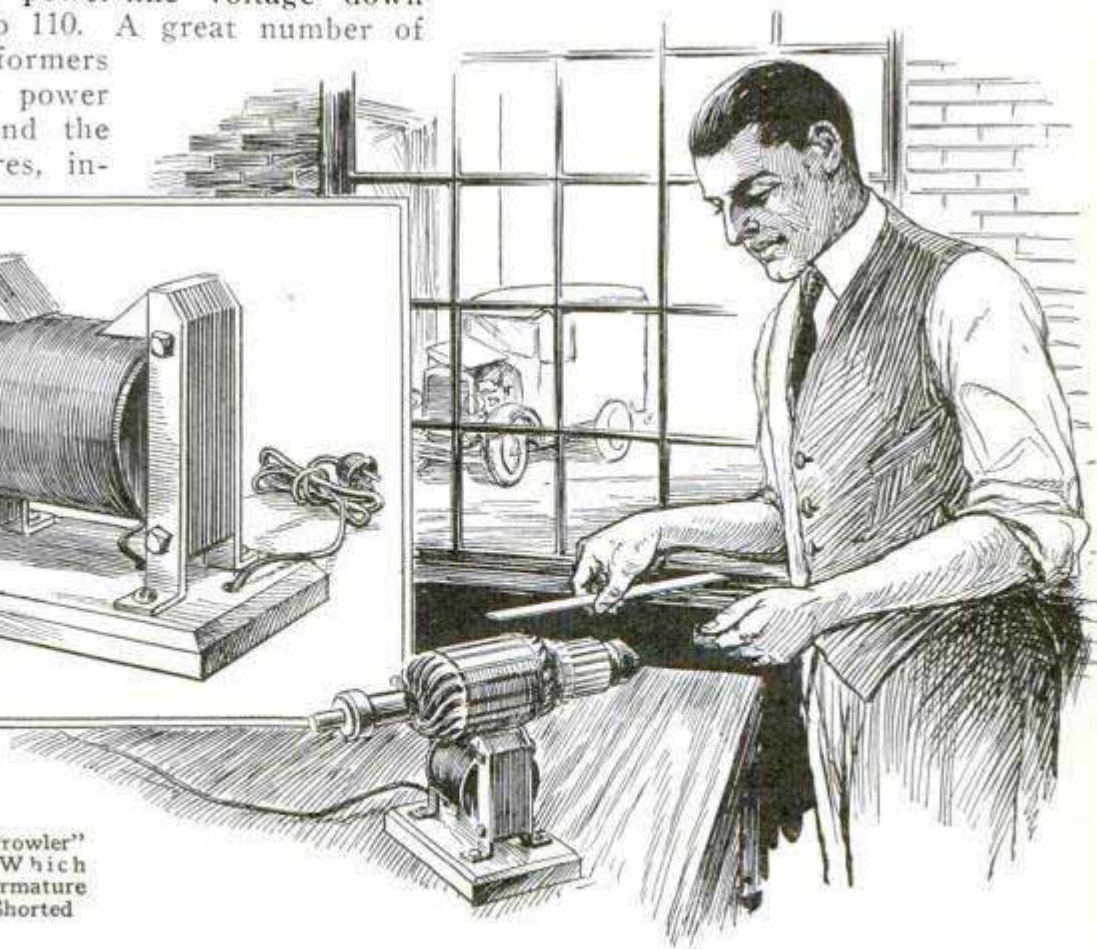
FOR locating open and short circuits in an auto generator, starter or other similar type of armature, the "growler" shown in the illustrations, which is easy to make, will be found very useful in the garage and electrical repair shop. It is essentially an electromagnet, consisting of a laminated iron core with a coil wound on the center section. The laminations used for making the core were taken from a discarded transformer found on the scrap heap of our city power company, being of the type that is commonly used for stepping the power-line voltage down from 2,300 to 110. A great number of these transformers are used by power companies, and the discarded cores, in-

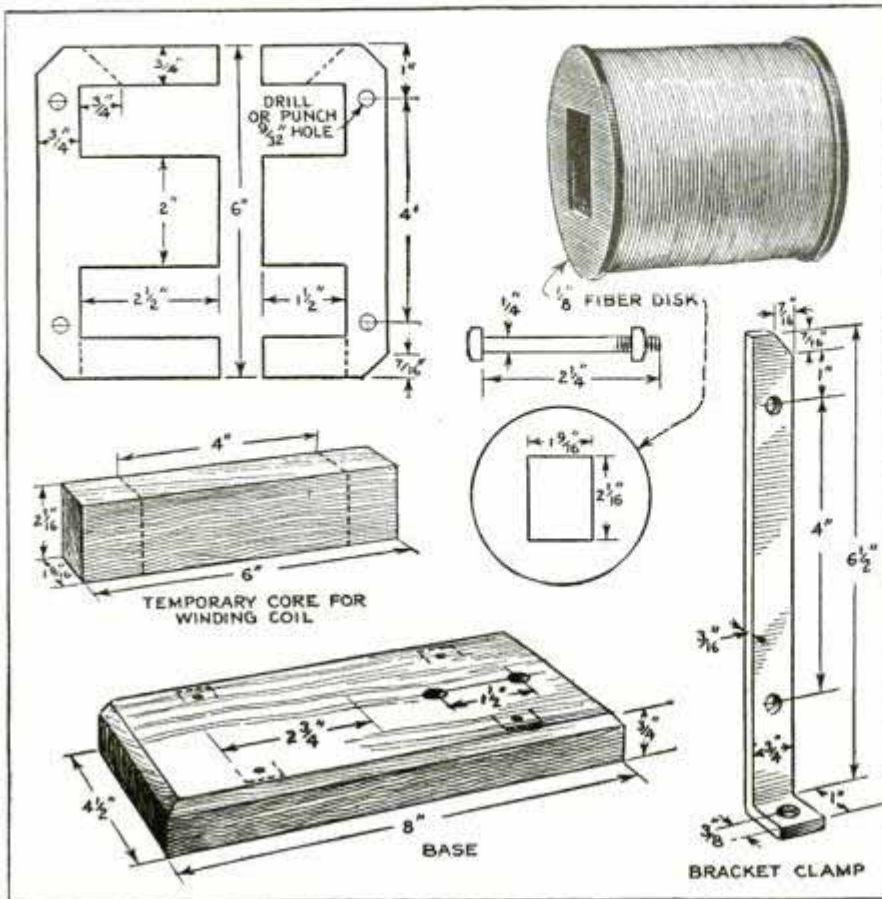
cluding the defective windings, can usually be had for nothing, the outside case being the only part that is salvaged. If, however, this type of transformer is not obtainable in your locality, one of approximately the same dimensions can be used, and the coil can be varied to fit the core, provided the same amount of wire is used. Laminations can also be cut from transformer iron to the dimensions given.

Having obtained a core of this type, remove the coil, which is useless, and take apart all the laminations, after which the



Homemade "Growler" Quickly Tells Which Coils in an Armature Are Open or Shorted





outside legs are cut off, as indicated by the dotted lines in the detail. The next step is to make the coil, which is wound on a temporary wooden form of the same size as the iron core. The wooden core, in this case, measures 6 by $1\frac{9}{16}$ by $2\frac{1}{16}$ in. Two fiber disks, 4 in. in diameter and $\frac{1}{8}$ in. thick are obtained, and a rectangular hole is cut in each, concentric with the disk. The disks should be a sliding fit on the core, and are pushed on the wooden form until they are located 1 in. from the end, leaving a 4-in. space between them in which the coil is wound. A wrapping of several layers of insulating paper, and a coat or two of shellac on the paper, are necessary before proceeding with the winding of the coil, the shellac being allowed to dry before the coil winding is begun. The purpose of this insulating wrapping is to prevent the core from coming in contact with the iron core, a precaution absolutely necessary in order to prevent the insulation of the wire from being scraped off when the core laminations are inserted, which would result in a short circuit. The coil consists of 1,000 ft. of No. 22-gauge enameled magnet wire. Both ends must, of course, be allowed to

project a few inches outside the circumference of the finished coil in order to make connections to a length of lampcord, which, fitted with a plug, can be inserted into any convenient outlet when the growler is to be used. The wire is wound tightly and as closely as possible around the core in the space between the fiber disks, and it is a good idea to keep the latter from spreading apart by driving finishing nails into the core to hold them in place, four nails on each end being sufficient. Each layer of the winding is shellacked and separated with a layer of insulating paper. When the winding is completed, it is wrapped with several layers of paper and

again shellacked thoroughly, after which a liberal wrapping of tape is advisable. The ends of the coil leads are scraped clean and soldered to the ends of the lampcord. Spaghetti tubing, employed in radio work, may be slipped over the leads from the coil before they are soldered to the lampcord, to protect them and prevent a possible short circuit.

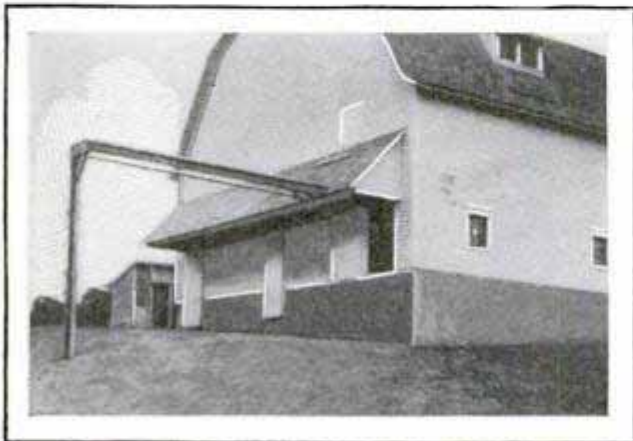
The wooden core must be carefully removed after the coil is completed, and in doing so, the fiber disks must not be dislodged. Then the laminations are inserted in the open space in the center of the coil, a long-tongued lamination on one side, a short one on the other, then a short one on the first side, and so on, the long tongues always overlapping the previous joint. After assembling the laminations, line up the edges and clamp core in a vise or C-clamp, after which $\frac{3}{32}$ -in. holes are drilled at the points indicated. Drill both holes in each side without removing the clamp, to be sure that the laminations will not be dislodged. Four bracket clamps, shown in the detail, are then made, one pair having the corner cut off on one side and the other pair having it cut off on the opposite side. Bolts, $2\frac{1}{4}$ in. long, are used

to hold the bracket clamps to the core, and the clamps are then screwed to a suitable wooden base as indicated.

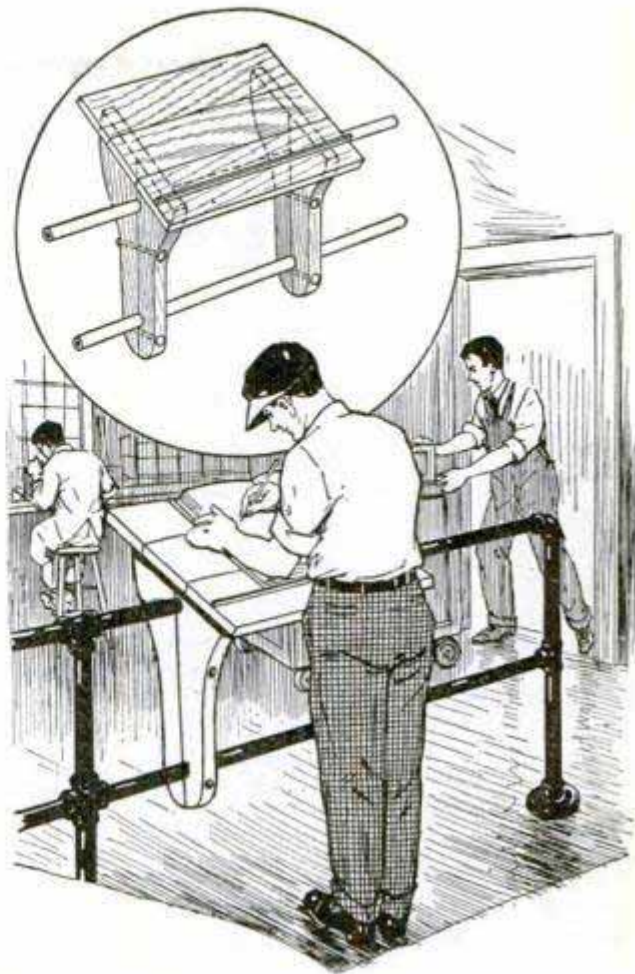
In use, the armature to be tested is laid on the growler and the current turned on. One of the armature coils will then be cutting lines of force, or magnetic flux, produced by the magnet. If the coil is in good condition, the magnetic circuit is not interfered with, and the flux flows across the poles of the electromagnet, concentrating in the armature to bridge the air gap. As the magnetic circuit is complete, the flux will not attract a thin blade of iron or steel, held close to the armature core as shown in the illustration. However, if the testing blade is definitely attracted by the armature, a coil must be open or short-circuited, and it will be the coil between the poles of the growler. In this case the blade will vibrate when held only a short distance from the armature. Each coil is tested by revolving the armature slowly between the poles and noting the effect on the testing blade.

Lean-To Roof on Barn

The illustrated lean-to roof on a barn serves the double purpose of providing shelter for stock during storms and a firm support for the extension manure-carrier tracks. The track runs through the door in the foreground and passes straight through the barn. At the point where the track meets the lean-to roof, a switch is provided and the spur track runs at right angles along the outer edge of the lean-to roof to the other end, where another turn brings the track into the barn again, parallel to the first.



Lean-To Roof on Barn Holds Carrier Track and Shelters Stock during Storm



Combination Drawing Board and Writing Desk Attached to Power-House Rail

Handy Desk Attached to Shop Rail

Arranged high enough to be convenient for a person standing, the desk shown in the drawing, which is attached to a rail, was found of considerable usefulness in a power house. The top was cut perfectly square to serve as a drawing board, on which a T-square can be used accurately when making wiring diagrams, etc. Two cleats under the top are bolted to suitable uprights made of 2-in. stock, which are clamped over two horizontal bars. Each upright is cut in half, one part being bolted to a cleat of the top, while the other half remains loose. If desired, the notches may be made a trifle larger than the diameter of the pipe so that the desk can be slid to various positions along the rail.—G. A. Peterson, Alma, Kans.

☐ When drilling a brick wall with a star drill dampen the brick; this will prevent the chipping of the brick at the surface, and will also make the drill cut faster and hold its edge longer.



Candler Fitted with a 1,000-Watt Lamp, Shows Up Hollow Spots in Potatoes

Hollow Potatoes Detected by Candling

Candling potatoes like eggs, has been found to be an effective method of detecting hollow spots, claims an Iowa merchant who specializes in providing high-grade baking potatoes. On one occasion he supplied 1,400 nine-ounce potatoes for a banquet, each one entirely free from dark centers and hollow spots. The candler consists of a wooden box, large enough to accommodate a 1,000-watt lamp and socket, attached to the bottom as shown. Two holes are cut in the top, while mirrors fitted in the box diagonally throw the full reflection of the light through these holes. To avoid any possibility of burning the top, a layer of asbestos was glued on the underside. A row of ventilation holes are drilled in the sides to permit the entrance of air which, when heated, escapes through the holes in the top. A 500-watt lamp was first tried but did not furnish enough illumination to penetrate the potatoes.

Weighing Insulated Wire to Determine Length

A storekeeper in an electrical concern was expected to supply the workmen with coils of wire approximately 100 ft. long. As there was no measuring machine, the following method was used to deal out 100-ft. lengths: A large coil was first

weighed, then 100 ft. of the wire was measured out with a tape and the coil weighed again. It was thus found that the 100-ft. length weighed $4\frac{1}{2}$ lb. By setting the large coil on the scale platform and moving the balance back $4\frac{1}{2}$ lb. for each 100 ft., the balance would drop when the right length of wire was taken from the coil.—R. C. Coram, Lynn, Mass.

Concrete Tank Has Sunshade

The concrete tank shown in the photo has a sunshade over the center to help keep the water cool during warm weather. It is made in the usual way with vertical walls and of rectangular shape, but differs in that the center section is covered by a cement slab. The tank illustrated is 6 ft. wide by 12 ft. long, and the cement slab is 6 ft. square, leaving a 3 by 6-ft. opening at each end. One precaution that is highly important when building concrete tanks is to have the foundation very firm, preferably with a footing 20 ft. wide. If this precaution is omitted the tank will settle and probably crack. If the tank is to be built on newly filled earth, it is necessary to wet down the earth and tamp it well. Driving a team over it for 30 minutes will do the job. Another method of preventing cracking of the tank due to settling is to build it on a concrete floor. A slab of concrete, 6 ft. larger than the tank on each side, will not be expensive and will absolutely prevent mud holes. This is first laid and allowed to harden thoroughly for at least a week.



Center Portion of Stock-Watering Tank Shaded from the Sun to Keep Water Cool

Reinforcing the corners of the tank with metal rods bent at right angles and laid horizontally, or with wire mesh or plaster lath, is also good practice.

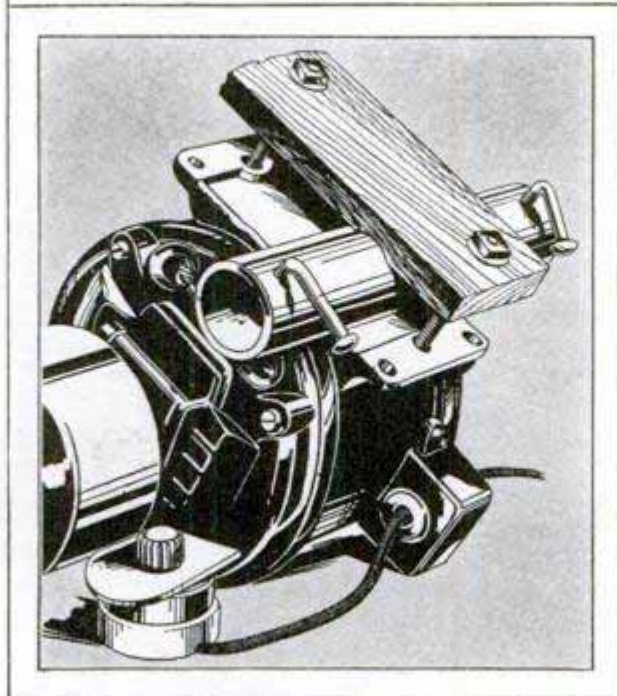
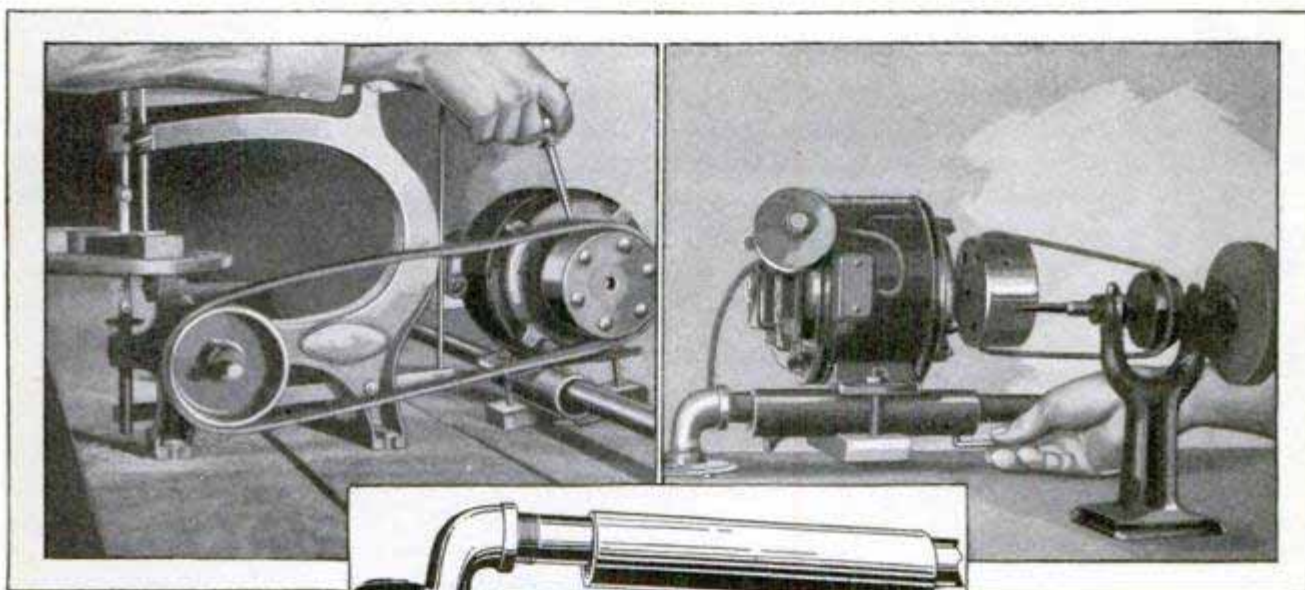
This Motor Travels to Its Work

By HENRY HOYLE

THE PROBLEM of running a number of small machine tools with the same electric motor, without employing some sort of lineshaft arrangement, can be solved with the aid of two pieces of pipe and a few standard fittings. The various tool units of the bench-top workshop are set in a row along the bench. The motor is placed at the back, and arranged so that it can be moved easily along a pipe that

about $\frac{1}{2}$ in. from the end and in line with each other, and tap them to take a standard machine bolt of, say, $\frac{1}{4}$ -in. size. Each of the bolts, which acts as a clamp screw, is bent at right angles about 1 in. from the threaded end so that it can be tightened or loosened by hand.

The pipe section is then fastened to the bottom of the motor, off center and toward the side nearer the machines to be



acts both as guide and anchorage.

From a plumber obtain a section of $\frac{3}{4}$ or 1-in. iron pipe, threaded at both ends, and long enough for the bench; two street elbows to fit; two floor plates of a size to fit the outside threaded portions of the elbows, and a piece of pipe, about 8 in. long and of a diameter sufficient to permit it to slide easily over the longer section.

The short pipe is treated as follows: Drill two holes each

operated. The method of fastening will vary, of course, according to the motor used. One suggested way is to clamp the pipe with a wooden piece, as shown. A steel bar, however, bent slightly at the point where the pipe rests, is better. The important thing is to have the mounting rigid, so the motor will not get out of alignment.

Mount the supporting pipe, with its elbows and plates attached, on

Upper Left, the Motor Drives a Jig Saw; Upper Right, Driving the Buffing Head; Below, Details of Motor Slide and Clamp

the bench, but before fastening both ends into place, slide the pipe on the motor over the support. The locking screws should be on the underside.

The motor then can be moved easily from one machine to another after removing the belt and releasing the lock bolts. It may be necessary to change the motor pulley and belt, but this is the work of a few moments. The motor, being mounted off center in relation to the supporting pipe, will tend to keep the belt tight, and this is further accomplished by the locking bolts. It may be advisable, in some cases, to add a coil spring at the back to increase tension on the belt. Another reason why the motor illustrated was placed off center, was that more clearance was provided between it and some of the power tools. A $\frac{3}{4}$ -in. pipe, $4\frac{1}{2}$ ft. long, will support a $\frac{1}{4}$ -hp. motor nicely without excessive vibration. If a longer section is used, a larger diameter is advisable.

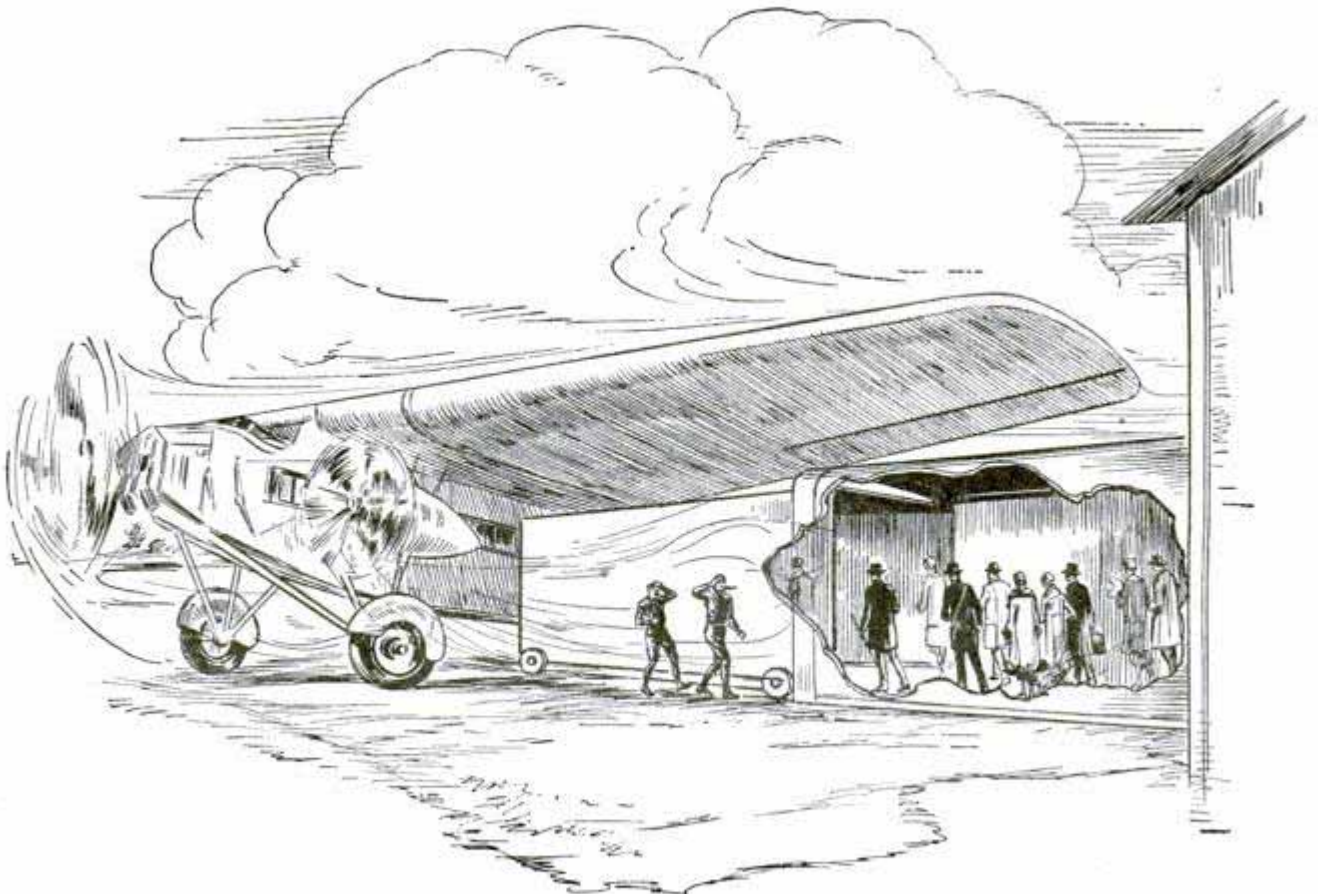
Telescoping Canopy for Airplane Terminal

Passengers embarking at a Los Angeles airport are protected from the wash of

the propellers by means of a telescoping canopy, as shown in the drawing. The plane is taxied to the loading position in front of the station and the canopy is then rolled out from the building to the door of the plane. As soon as the plane is loaded, the canopy is withdrawn. As many as five or six planes use this device in the course of an hour.

Tempering Long and Narrow Pieces of Steel Evenly

Every mechanic knows the difficulty encountered by warping when tempering a long and comparatively narrow piece of steel. One day it fell to my lot to temper a reversible shear blade, 10 in. long, $2\frac{1}{4}$ in. wide and $\frac{1}{2}$ in. thick, having three $\frac{7}{16}$ -in. countersunk holes, 4 in. apart, along its center. The job was accomplished as follows: I procured two straight pieces of common iron, $\frac{1}{2}$ by $1\frac{1}{4}$ in., having a convenient length greater than the blade of steel, and after heating the shear to a bright cherry red, I laid it parallel with and centrally on one piece, then laid the other piece opposite on top of the shear, and gripping all three pieces firmly



Large Canopy Is Rolled Out from the Station to the Plane Door to Protect Passengers from Propeller Wash

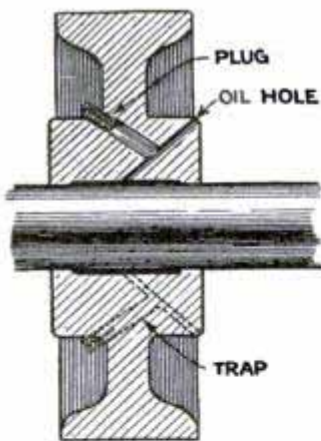
with the tongs, plunged the whole in oil. To my surprise, not only was the shear perfectly straight, but the central portion, lying between the two pieces, was toughened to such a point that it could be filed. The cutting edges were nicely tempered. —Ralph N. Geffray, Los Angeles, Calif.

Saving Fence Posts

In order to prevent fence posts from rotting below the surface of the ground, I applied creosote from time to time through a hole drilled at an angle into the post, about 1 in. above the ground. The oil, which can be poured into the hole with an oilcan, gradually saturates the wood, making it impervious to moisture. —Chauncey C. Ames, Mayville, North Dakota.

Loose-Pulley Oil Trap

A simple method of trapping the oil in loose pulleys in case the pulley happens to stop with the oil hole down, is shown in the illustration. After drilling the hole for the oil at the customary angle on one side of the pulley, drill another larger hole



into the first from the opposite direction, as indicated in the drawing. The open end is then plugged with a screw for which the hole is tapped, or merely with a tight-fitting piece of wood. —Harry Moore, Hamilton, Canada.

Swinging Crane in the Small Garage

In a small garage, where I had some work done on my car, a simple type of swinging crane was used for lifting motors to the workbench. The crane consisted of a front auto axle, one end of which was pivoted to the wall, and the other end braced by means of an overhead turnbuckle rod to permit adjustment. A specially made trolley, the construction of which is clearly indicated, was installed to ride on the axle, all the ridges being,



Discarded Auto Axle Can Be Used to Make a Crane for the Small Garage

of course, filed away. The pulley arrangement comprises two small rollers and two side plates, the latter being bolted together at three points, which makes it impossible for the trolley to come off the track. The block and tackle are hooked to the lowest bolt of the trolley. —Charles H. Willey, West Concord, N. H.

Emergency Repair on Burst Pipe

An emergency repair on a burst water pipe can be made by cutting out the defective section of the pipe with a hacksaw and slipping a length of ordinary rubber hose over the open ends, as shown in the drawing, provided hose of suitable size is available. Ordinary garden hose has been found to fit nicely on 1/2-in. pipe. Hose clamps should, of course, be used to make a tight connection. Although not intended as a permanent repair, the arrangement will stand up for a long time.





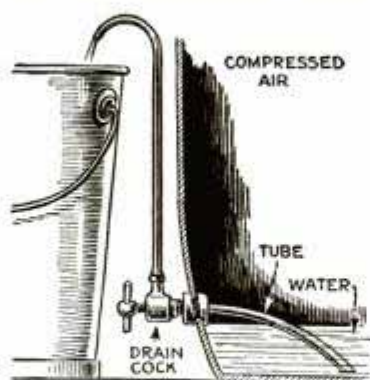
Wooden Beams Installed on Garage Floor Stop Cars from Hitting the Wall

Floor Stop for the Garage

As a means of safety to employes and also to prevent damage to fenders and bumpers, a large telephone company installed floor stops of the kind shown in its garages and warehouses. The stops consist of a 4 by 6-in. beam, to which two heavy iron rods are attached. One end of each rod is fastened to the beam while the other end is formed to an eye to fit a ring or staple set in the concrete floor.

Improved Drain for Compressed-Air Tank

On a compressed-air tank the drain cock was about 1 in. above the bottom, which made it impossible to remove all the water. Also, the cock was so close to the floor that only a shallow pan could be used. As no other hole could be drilled, owing to the position of the tank, a length of copper tubing was soldered to the inside end of the cock, bending the tubing and filing the end to a bevel so that it would fit close to the bottom as shown. Another tube was then soldered to the outside opening of the cock and extended upward so that the water from the tank could be blown into a pail.



Laboratory Stand Makes Good Workshop Tool

A ring stand, familiar to every laboratory worker, can be put to innumerable uses about the shop, home or photographic room. Such a stand can be purchased at a nominal cost from scientific supply houses, or through the local druggist.

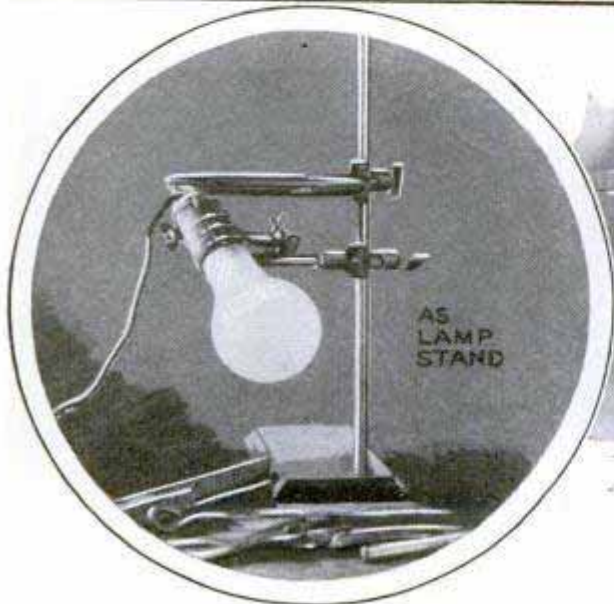
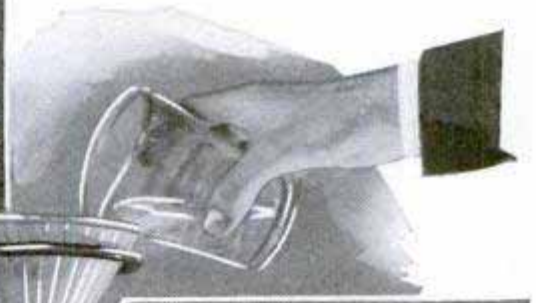
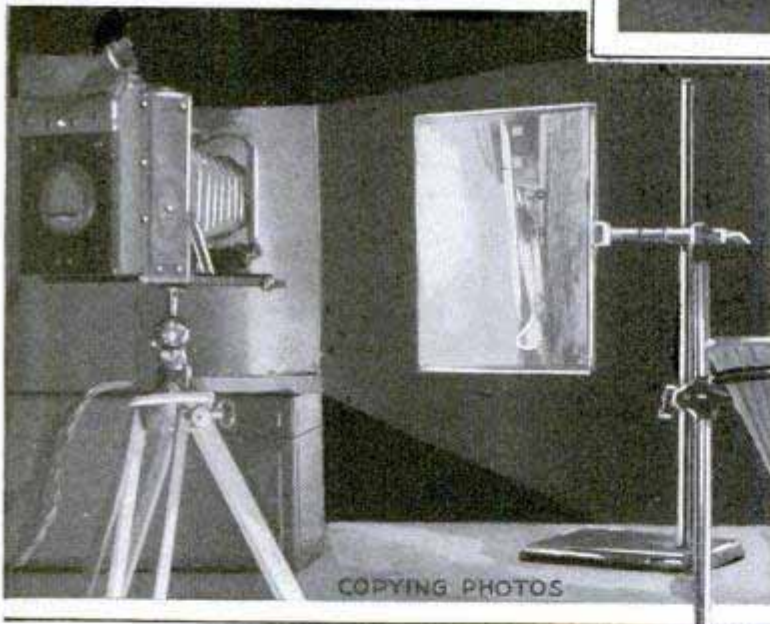
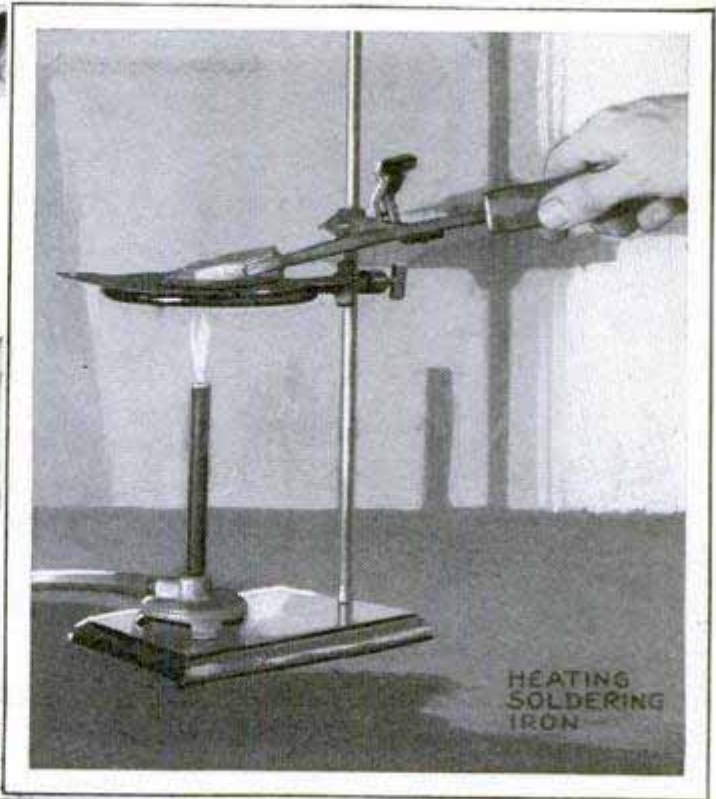
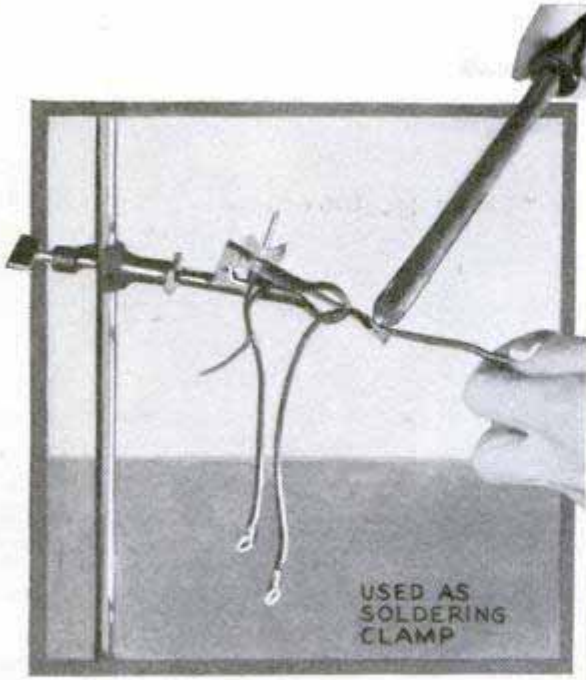
The stand should be equipped with two or three rings of various sizes, and one or two screw clamps such as that shown on the opposite page. In addition, obtain a square piece of wire gauze or screen large enough to cover the largest ring. This is used for holding vessels and other objects being heated.

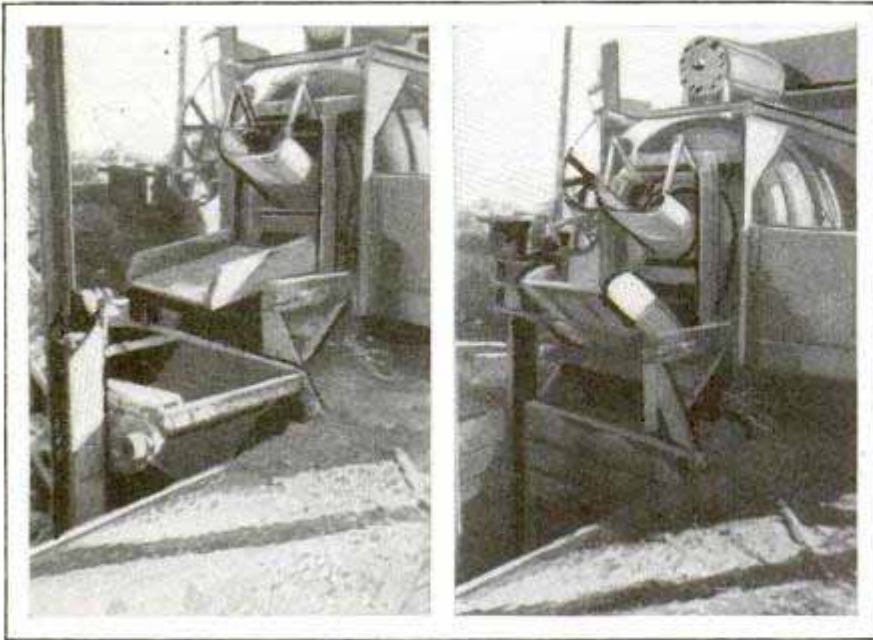
The photographer will find a ring stand a valuable accessory to his equipment. In one of the largest industrial photographic departments in the country, such a stand is used frequently for holding lights, small objects being photographed, pictures being copied, and for supporting the vignetting screen in making enlargements. The extreme flexibility of the stand and its clamps help save valuable time.

The home workshop is an excellent place for the ring stand to demonstrate its possibilities. For holding a soldering copper while it is being heated over a gas flame, an alcohol lamp or even a blowtorch, the largest ring with its wire screen is ideal. The handle of the soldering copper can be supported by a clamp or another ring.

The clamp, which was designed primarily for holding test tubes and the necks of flasks, provides a handy means of supporting an electric lamp in the proper position for illuminating exacting work. For holding small objects while being soldered, the test-tube clamp is superior to a heavy vise, and is more flexible in adjustment. If you wish, you can flatten the jaws of the clamp so that they will grip the work more firmly. Such an arrangement will be found a great convenience to the radio-set builder and repairman.

Dozens of other uses for the versatile ring stand can be discovered by the mechanic, photographer or even the housewife, who can employ it for holding strainers, funnels for bottling and filtering, and other utensils.





Pivoted Chute under Spout of Concrete Mixer Eliminates Mortar Drip

Pivoted Chute for Concrete Mixer

Installed between the spout of the concrete mixer and the bucket on a hoist tower, the pivoted chute is a simple, yet effective, part of a contractor's equipment. It does what is vainly attempted by most contractors, namely, eliminates the mortar drip from the chute into the tower pit, which fills it so that frequent shutdowns and dig-out operations are necessary. The chute, however, being pivoted on a pipe, and held down by means of a rope passing under the bucket and fastened to the tower structure beyond, tips upward as the bucket rises and holds the adhering concrete in a pocket at the mixer end of the chute, to be discharged when the next batch is ready to be released from the mixer. Anyone who has experienced the delays and consequent cost of digging out the tower hole will immediately realize the worth of this arrangement.—Harlan H. Edwards, Claremont, Calif.

Hard and Soft Lathe Centers

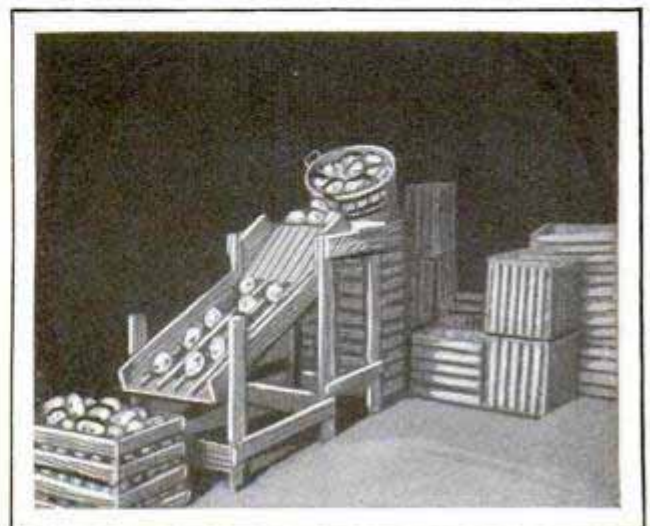
Lathe centers for metal working are made of tool steel and finished hard or soft according to the work. For the tailstock, the center is hardened after turning it up to the proper taper, and finished smooth. It is drawn to a light-brown color on the point. There is never need for a soft center for the tailstock. For the headstock, both hard and soft centers

are advisable. In case the lathe has a hollow spindle, and rods are run through the hole, the center is frequently removed and replaced. Even though the center and its hole are kept clean, a replaced center rarely runs perfectly true on the point. When a job requires great accuracy, this center must be turned up true each time it is set in the headstock spindle; consequently the life of such centers is very short. If a lathe-center grinder is available, the center can

be made hard and ground true instead of turning it. It is economy to keep a hard center for the headstock and use it on jobs that do not require great accuracy.

Potato Sorter for the Farm

Sorting potatoes by hand is a slow task, which can be eliminated by using the sorter shown in the photo. Strips of wood are nailed lengthwise to a wooden frame, which is set at a slight angle. The distance between the strips should be such that the smaller potatoes fall between them into a container placed underneath, while the larger ones slide down into a crate for shipment. Several sorters designed for various sizes of potatoes can be made if desired.



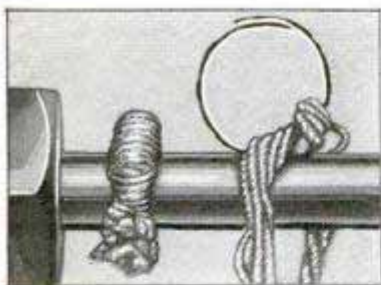
Homemade Potato Sorter Which Saves Considerable Time and Money

Sharpening a Lawn Mower

When a lawn mower is working unsatisfactorily, it is often caused by the cutting edge of the revolving blades not touching the stationary cutting blade at all points. To correct this fault, at least temporarily, set the mower on a bench or some place where it is convenient to work on it, and rub the edges of the cutting blades with a black marking crayon. Turn the blades so that the crayon will be rubbed off at points where good contact is made. Carefully file these places down, using a small file so that you can readily follow the bevel of the blade. Cover the filed portions with crayon again and repeat the operation until the blades touch at all points.—Blair L. Gilbert, Chicago.

Good Piston-Rod Swab Core

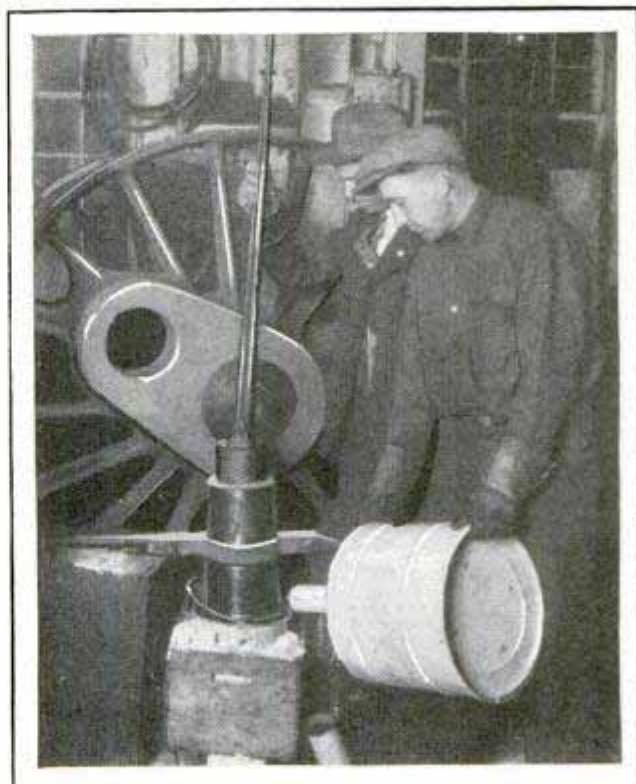
Small piston-rod swab cores are usually made of a piece of tin or wire, which is bent, wrapped with wicking and then slipped on the rod. They serve the purpose, but in time cease to hug the entire circumference of the rod. A better swab consists of a piece of clock spring, bent to the curvature of the rod, but a trifle larger, allowing enough space for the wicking. Wrap it with a solid ring of the wicking and slip it over the rod as shown in the photo, pulling the wicking over the spring ends, which slip by each other. This swab will always remain in contact with the rod; the wicking will shrink from wear, but it can be replaced easily.—Frank W. Bentley, Jr., Missouri Valley, Iowa.



Use of liquid air to shrink steel pins for insertion in the thrust arms of locomotive drivewheels may mean a large saving in the overhaul and repair of locomotives. The pins, made .0001 in. larger than the holes into which they are to be inserted, are ordinarily forced into place by a pres-

Liquid Air Used in Shrinking Steel Pin on Locomotive Drivewheel

sure of about 900,000 lb. By pouring liquid air on the pin, however, it can readily be inserted by hand, owing to the shrinkage caused by the intense cold. Liquid air has been used to some extent for similar purposes, but never before on such large pieces of steel, according to those who are testing the method in the shops of the Spokane, Portland and Seattle railroad.—Leonard H. Delano, Portland, Oreg.

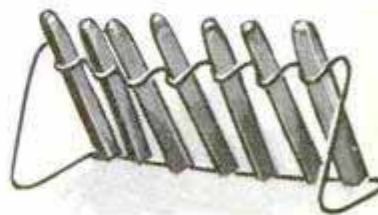


Liquid Air Used to Shrink Oversize Pins to Fit Drivewheel Cranks

sure of about 900,000 lb. By pouring liquid air on the pin, however, it can readily be inserted by hand, owing to the shrinkage caused by the intense cold. Liquid air has been used to some extent for similar purposes, but never before on such large pieces of steel, according to those who are testing the method in the shops of the Spokane, Portland and Seattle railroad.—Leonard H. Delano, Portland, Oreg.

Wire Rack for Small Stamps

When using small stamps, one or more generally have to be used repeatedly, which may involve more or less confusion, especially if the stamps are laid haphazard on the bench. It is a good idea to use a small wire rack for holding them in orderly arrangement. Such a rack can be made by bending a length of wire to the shape shown, the top part being crimped to hold any number of stamps. The stamps are placed in the rack with the ends pointing toward the user, so that he can readily pick them out.



CUTTING THE

by W. Clyde Lamme



THE MANY forms of the cabriole leg, unlike the common turning, add to the furniture of which they form a part the grace of long, sweeping lines. This type of leg, with variations, is adapted to a considerable range of cabinet design, and is not at all confined strictly to the Queen Anne period. The principal interest it holds for the worker is perhaps that quality of professional feeling which even the simpler forms of the cabriole leg impart to a piece of homemade furniture. The methods described in this article for making cabriole legs are not the orthodox ones of the large factory, but they will

be found quite practical for the small shop and the individual worker.

The drawings show three variations of the cabriole leg, those at A and C, Fig. 5, being more typical of the so-called Queen Anne design. The three shown are easiest to saw out and form, and in building up the stock for these designs, it is possible to effect an economy of material over that of the more elaborate shapes. A small hand saw makes it comparatively easy to cut these designs, in fact the more simple forms of the cabriole leg may be sawed out and finished in less time than is required for the turning of a leg on the lathe.

The first step is the building up of a piece of stock sufficiently large to take the design of the leg. As parts of the finished leg will be slender, the wood used must be close-grained and strong, such as maple or birch. These two are especially good, as it is possible to get a close imitation of either walnut or mahogany by careful staining. In Figs. 3 and 4, detail A, a finished leg suitable for a long davenport table, an ornamental stand or occasional table is shown, while detail B, Fig. 4, shows the method of building up the stock, and how the design of the leg is laid out on one side.

It should be carefully noted at the beginning that the same design must be laid out on two adjacent faces of the stock. The two front faces of the leg are most conspicuous in the finished work, yet all four faces will show to some extent at certain angles of view, especially in the case of the table-length leg.

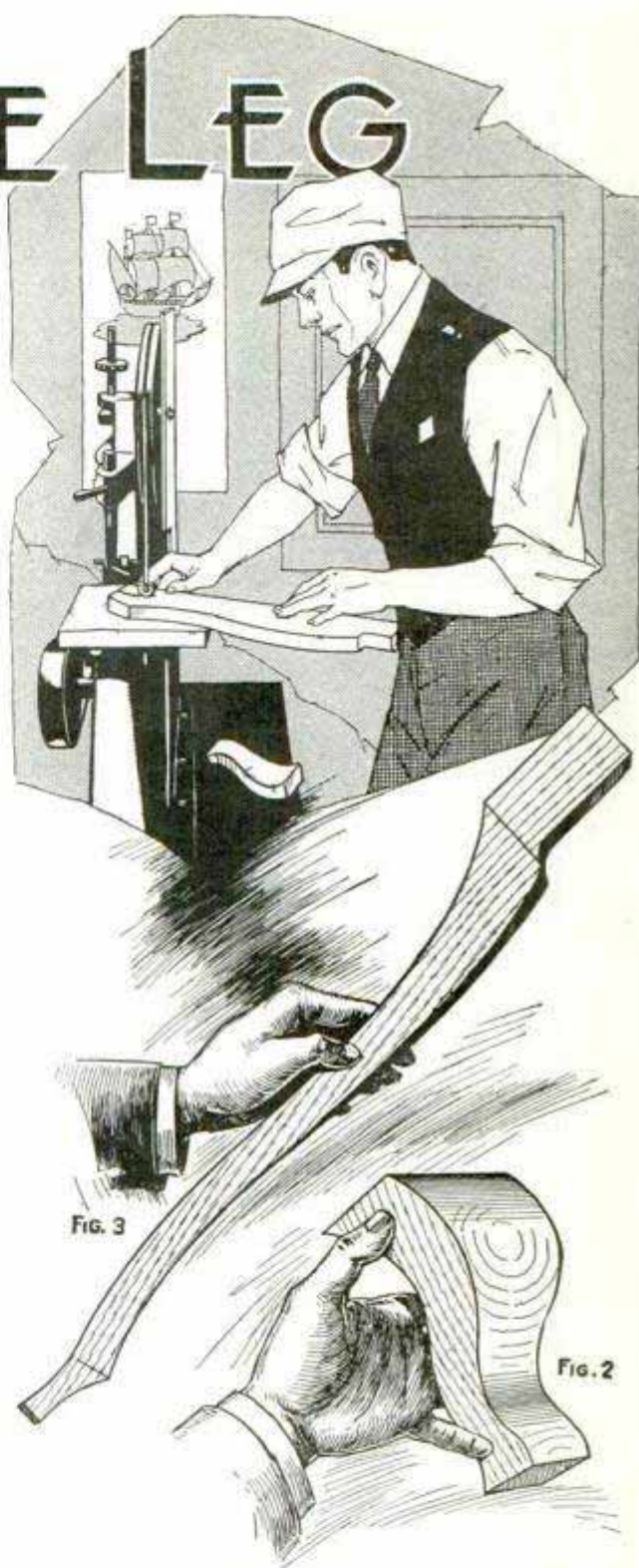
The leg design shown in Fig. 4, A and B, cannot essentially be classified as the Queen Anne type, yet its outline is made up of practically the same curves which bring it within the scope of that known as the cabriole design. The stock for the leg A, Fig. 4, is ripped to $3\frac{3}{4}$ in. in width from $1\frac{5}{16}$ -in. maple or birch (this stock is

CABRIOLE LEG

commonly $1\frac{1}{4}$ in. in thickness), and the three lengths shown are cut to 29, 26 and 5 in., respectively. When building up the stock for a leg such as this, which must withstand considerable strain, a perfect glue joint is of the first importance. Plane the joining faces with the jointer plane or on the jointer, if one is available, and try each of the joints for true fit before gluing. Use hot cabinet glue if possible, and watch that the clamps draw the joint tight throughout its length. Allow plenty of time for the glue to harden before doing any more work on the pieces.

While the glued-up stock for the legs is drying, make the template shown in Fig. 6 from a piece of $\frac{3}{8}$ -in. plywood. Rip the piece first to 5-in. width and 29-in. length. The principal curves for the three leg designs are shown in Fig. 7, laid out on 1-in. squares. As an aid to accuracy, the curves should be laid out on a piece of stiff cardboard. Cut out on the lines, and use this to transfer the curves to the template. After the curves have been laid out in this manner, saw to the line on the band saw. This template is, of course, for the one leg design shown at A, Fig. 1. The curved edge at the left, Fig. 6, is the front face of the leg, while that at the right in the same drawing is for the back. The dotted lines C, Fig. 3, indicate a guiding strip, $\frac{1}{2}$ in. wide, tacked to the underside of the template in the position shown. D shows a second guiding strip, $\frac{7}{8}$ in. wide and about 9 in. long. This holds the template in line while marking out the back faces. This done, set the template on the work and lay out the four faces for sawing. Note carefully before sawing that the layout is made correctly, two adjacent faces marked for the front leg design or curve and the same curves on the two back faces, using, of course, the back curve of the template. Make sure of this before sawing, to avoid unnecessary waste of built-up stock.

To do curved sawing through stock of this thickness, it is essential that the band-saw blade be in first-class condition and



correctly tensioned on the wheels. Use a $\frac{1}{4}$ -in. blade, and adjust the upper wheel so that the blade runs in the center of the tread; then position the guides so that the blade runs true. It will not do to have the blade bent out of line by the upper guide. Adjust both upper and lower guides so that they bear only lightly against the back of the blade. Lastly, do not draw the blade more than reasonably tight over the wheels. It is best to take up the slack in the blade first, then turn

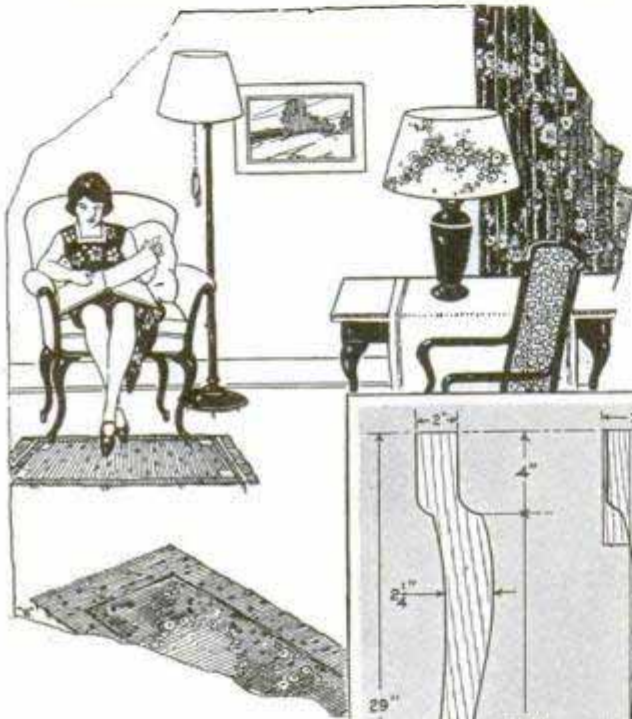
the band wheels one or two revolutions by hand and finally give the tension screw about one full turn. High tension of the blade does far more harm than good, as it causes the bearings to run under heavy pressure, adds to the load through unnecessary friction, and is apt to cause early breakage of blades. Unless the blade is in good condition, no degree of tension will correct its tendency to "run" in the cut. If necessary get a new blade.

Clean off all drops of glue that may

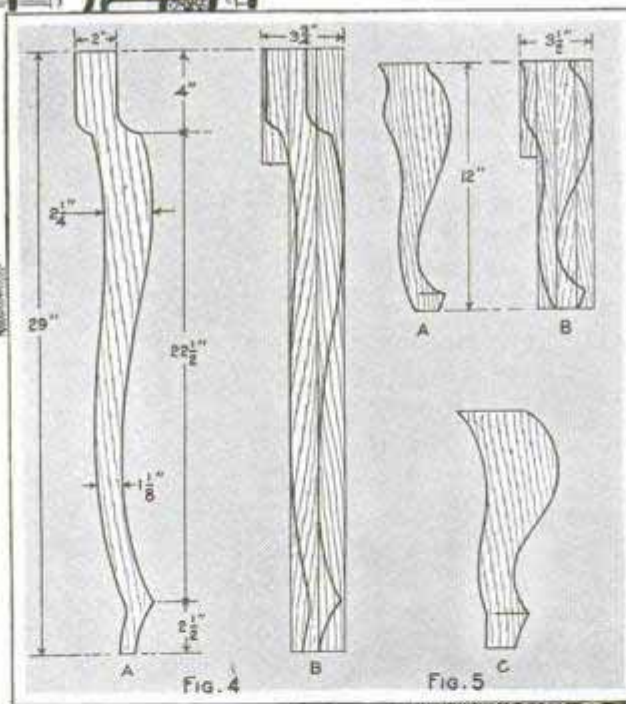
or the other of the work be inadvertently raised slightly during the cut, it is apt to cause the blade to bind solidly in the wood, and the resulting sudden stop is almost certain to kink or damage it beyond repair.

The short 5-in. block on the one side of the glued-up stock should be held with the face up and both the adjacent sides cut off. Brad both these waste pieces back in place. In this way, the necessity of holding this uneven side on the table will be avoided. When sawing the short-radius curves, give the blade plenty of time to make the cut. Crowding causes undue heating and rough work.

The corners of a table-length leg of this design are generally left square, although the square projection above the "knee" is sometimes rounded on the face corner. All marks of the sawing must be carefully worked off either by sanding or with a sharp spokeshave, the latter tool working very well on the long curves. Where this tool is used, set the cutter to take the lightest shaving possible, to prevent chattering. Even up all four edges, being particular to take out any slight irregularities in the curves and to remove all the saw marks. Any rough places left will give trouble in getting a good finish in keeping with the rest of



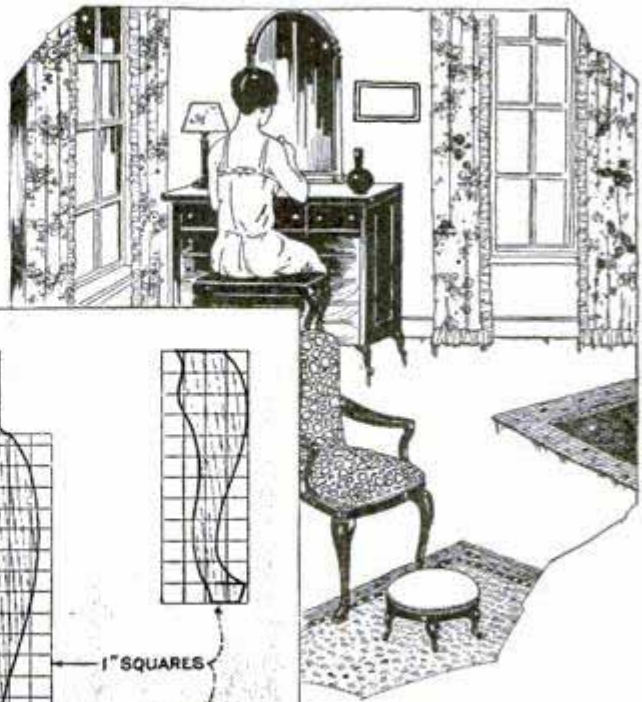
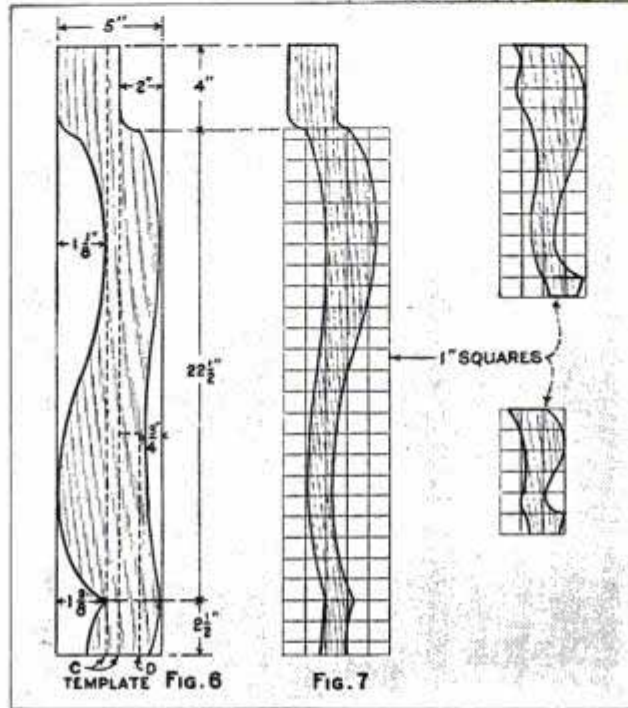
have been forced out at the edge by clamping, and plane the edges of the stock true should there be a slight projection of the edges. When sawing, follow the line closely and do not crowd the saw, as this will cause the blade to heat. With one side cut off, tack the waste piece back in place with one or two small brads, taking care that the brads are driven so that the saw will not strike them when making the second cut. See Fig. 1. The object in nailing back the waste piece after each cut is to obtain the flat supporting surface. Although it can be done, of course, it is not best to trust to the curved surface as a bearing on the band-saw table. Should one end



the project. If the leg is for a table, the top end is carefully squared on the adjacent back faces and mortised to take the rails which support the top.

The other two designs, A and C, Fig. 5, are laid out, sawed and finished in essentially the same manner as described for the first. The one at A is rounded on the outside or facing corner. Where a 4-in. projection is left above the knee to take the mortises for rails, this design is excellent for an upholstered radio or fire-side bench. It is by no means limited to these two particular projects, however, and it may be made longer or shorter, with or without the square top, and will thus be adaptable to a variety of individual shop projects.

The shorter leg



chances to be cross-grained. The waste piece must always be tacked back on the face from which it was cut (Fig. 1), and before the sawing is done, all four faces of the stock

should be carefully squared up to obtain a true bearing on the band-saw table. A leg of this design is generally fastened by means of a long wood screw or a dowel screw, as is done on the footstool shown, using glue on the joint faces.



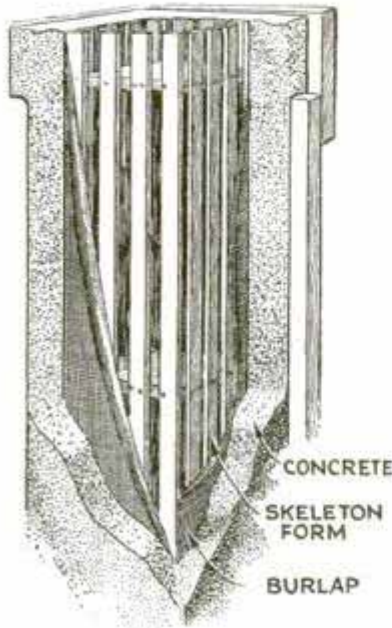
shown at C, Fig. 2, is excellent for a footstool, and the picture of the upholstered footstool on page 1050 is an example of the use of this simple form of the cabriole leg. It is hardly necessary to make a template to lay out this design on the stock, as the curves are so simple and the work so short that it may be laid out accurately with a piece of cardboard cut to the approximate curves. A short leg like this, however, is sometimes more tricky to saw, especially where the wood

Rubber Cushion for Sandpaper Block

When using sandpaper on a block for finishing the surface of woodwork, I find that a wrapping of rubber, cut from a piece of inner tube, forms a cushion that prevents the sandpaper from slipping and also from wearing out quickly along the edges of the block. Both the rubber and the sandpaper are cut to fit over the bottom and sides of the block, which should be of such size that standard pieces of sandpaper can be torn in halves or quarters, thus eliminating waste. If desired, the rubber can be permanently glued to the block. Owing to the friction between the rubber cushion and the sandpaper it is not necessary to grip the latter very tightly.—Horace Lemaster, Maryville, Mo.

Inside Form for Concrete Chimneys

Cracking of concrete chimneys, due to the expansion of the inside wooden forms



which absorb moisture from the concrete, is a frequent occurrence, which can be prevented by using the type of form shown in the drawing. It consists of a framework made of lath, tacked to the edges of square or rectangular pieces of 1-in.

wood as indicated. Burlap is stretched over the surface of the lath. Obviously, this is much better than the ordinary method of using 1-in. boards for inside forms.—H. H. Siegele, Emporia, Kans.

Feeding Moist Air to a Carburetor

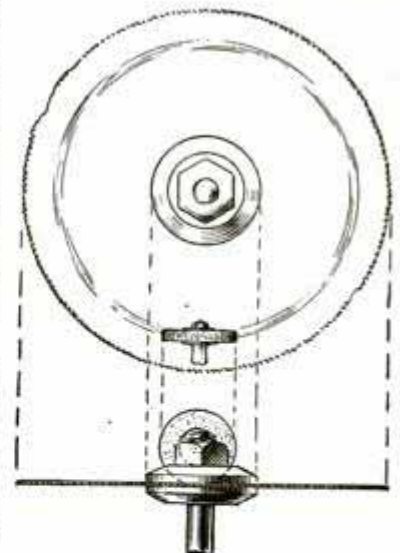
Finding that the carburetor of the automobile I was driving gave better results in wet or damp weather, I made an attachment to feed moist air to it to produce the same results at other times. A sleeve of fine wire netting, 4 in. long, was made to fit tightly over the auxiliary air intake, about $2\frac{1}{2}$ in. The screen was covered with an ordinary round lampwick and the whole then shielded with a sleeve of thin sheet iron, to hold the wick in place and to force the air to be drawn through the front opening. The base and burner of an old oil lamp were obtained, and the base filled with water and fastened to a bracket on the motor. The wick of this burner was attached to the wick in the sleeve. The lampwick siphoned the water to the other wick, thus keeping it constantly damp, and the air drawn into the auxiliary air intake absorbed a portion of the moisture before entering the carburetor. The wick in the lamp base can be raised out of the water in damp weather. The evaporation of water is so

slight that it is only necessary to fill the lamp base once in about three months. With this arrangement, the motor shows but little carbon deposits, while formerly I had to scrape carbon every three months.—Walter Broeker, Chicago.

Restoring Crippled Circular Saw

In a planing mill, it was desired to restore a crippled saw by reducing its diameter a couple of inches and filing new teeth. The cutting was done with a small motor-driven emery wheel, the edge of which was fed against the side of the saw as shown. The saw was mounted on a swing cut-off saw frame, and the swinging arm was blocked up so that it could not move out of position. Then the emery-wheel stand was advanced to the cutting position, two hardwood strips, nailed to the saw bench, serving as guides. Both saw and emery wheel were revolved, and the emery wheel fed against the saw surface under moderate pressure until the cut was nearly through. Then the pressure was applied very lightly, the saw being stopped and examined at short intervals to determine whether the wheel was coming through. At the first signs of this the saw was removed from the arbor and the final cut

made with a cold chisel. The reason for not cutting through the saw entirely with the emery wheel was to avoid possible injury to the worker. The saw was then taken over to a larger emery wheel and swung from a pivot to



dress down the ragged edge. The pivot was arranged so that it could be advanced until all thin places had been removed from the edge of the saw. After this, new teeth were laid out and ground, filed and set in the usual manner. During the grinding operation care was taken to avoid heating the wheel too much and

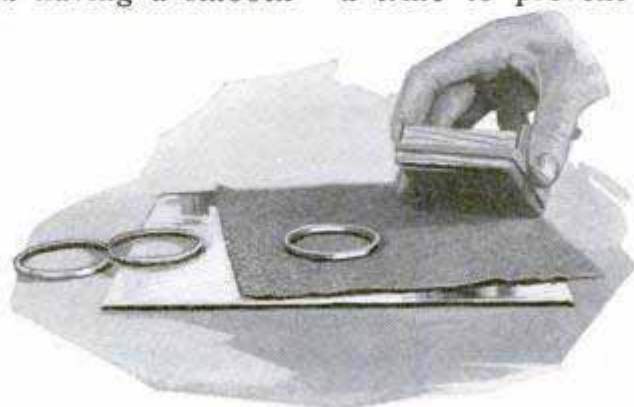
thereby ruining its temper. It was found best to take a small bite between each tooth and go around several times until the grinding was completed. In laying out teeth for a rip saw, the pitch line on the front of the teeth, when extended toward the center, should be tangent to a circle, half the diameter of the saw struck concentrically on it. Also, they should be filed perfectly straight across the face and slightly beveled on the back.

Quick Method of Cutting Iron Conduit

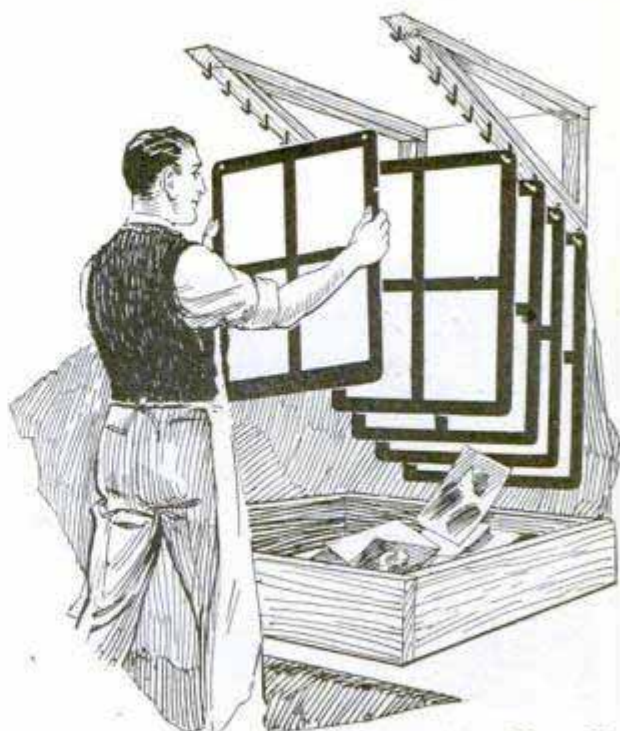
Nearly all electrical workers use a hacksaw for cutting conduit, as it makes a clean cut, leaving no inside burr like a pipe cutter. I have found, however, that much time can be saved, when the conduit is larger than 1 in. in diameter, by making two-thirds of the cut with a three-wheel pipe cutter and finishing with a hacksaw. Besides, if you do the work in this way, you will have a cut that is perfectly straight and at right angles to the pipe, something almost impossible by using the hacksaw alone.—James E. Noble, Toronto, Can.

Dressing Down Piston Rings

Where extreme accuracy is not necessary, or possible to obtain, lapping piston rings is often done by rubbing them on a sheet of emery cloth or paper, which in turn is laid on a piece of glass or other smooth surface. If the rings are held with the fingers, the pressure is unequally distributed, causing the ring to be dressed down unevenly, and, besides, the sharp edges of the rings make this method a painful one. It is much better to take a small block of wood having a smooth surface over which a piece of rubber, cut from an old inner tube, is stretched, a rubber band being slipped over the edges to keep it in place. This distributes the pressure evenly on the ring, and insures a comfortable finger grip.



Small Rubber-Covered Block Holds Rings Rubbed over Emery Cloth



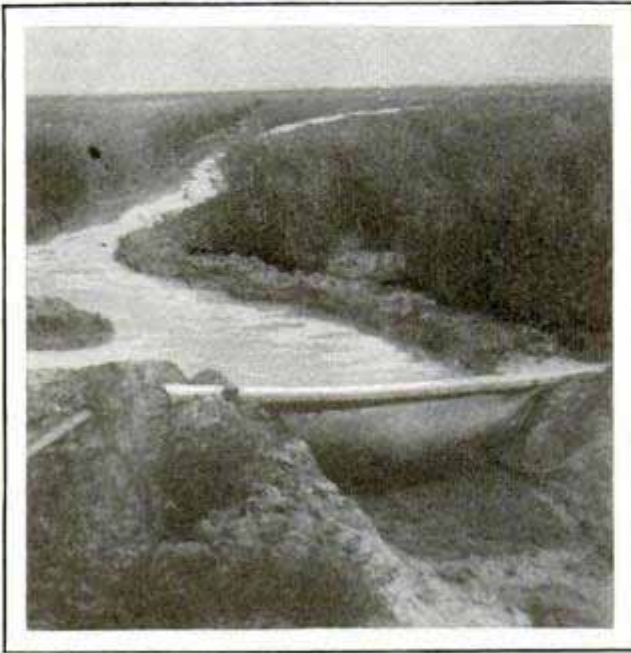
Ferrotyping Plates with Corners Rounded Are Hung Up on Hooks, the Box Below Catching the Dry Prints

A Few Ferrotyping Kinks

Photographers who have to make a large number of glossy prints can save time and money by adopting the following kinks: First, cut off the corners of the ferrotyping plates to a radius of about 1 in., which will prevent the corners from battering and from scratching. Next, drill or punch two holes at one end, close to the edge so that the plates can be hung up as shown in the drawing, a number of L-hooks being used for the purpose. When cutting the corners round, and when drilling, care should be taken not to break the enamel. The L-hooks are driven into the diagonal member of a bracket, as shown. If desired, a straight horizontal bracket can be used, but in this case the L-hooks will have to be bent over a trifle to prevent the plates from slipping off. A large wooden box placed under the hanging plates will catch the prints as they come down. To hasten the drying process, a gentle draft of warm air may be driven between the plates.—W. F. Willis, Los Angeles, California.

Canvas Sheet Diverts Irrigation Water

With its top edge fastened to a plank, a canvas sheet of sufficient size can be used



Canvas Sheet Has Been Successfully Used as Dam in Small Irrigation Ditches

for diverting irrigation water from relatively shallow field ditches as shown. The canvas should be a trifle larger than the cross section of the ditch so that the sides and bottom can be pulled upstream a few feet. The plank is simply thrown across the ditch, the canvas lowered to the bottom, and some earth thrown on the edges and bottom to hold it in position. It will not be dislodged easily, as the current is scarcely noticeable in these ditches.—Ivan E. Houk, Denver, Colo.

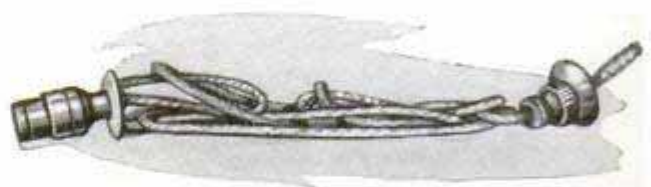
Chisels Made from Power Hacksaw Blades

In the home workshop occasions often arise when only a chisel of a certain width can be used, necessitating the possession of a number of chisels, which is rather expensive, especially in view of the fact that each one is perhaps not used more than once or twice a year. However, this problem can be solved at a negligible cost by making the tools from used power hacksaw blades. These can be had for nothing or bought in almost every machine shop and in many large garages. Otherwise, new 12-in. blades, which cost about 10 cents each, can be obtained from any well-stocked hardware store or from a mail-order house. Break the blade in two by

putting it in a vise and hitting the blade a sharp blow with the hammer close to the vise. Two chisels thus can be made from each blade. Grind off the teeth on an emery wheel and taper it down very gradually to the width required. For an inch from the cutting edge, the blade should not taper at all. Grind the edge at a bevel of about 25°. If you have a chisel-sharpening attachment on your stone, this is a comparatively easy matter, although it can readily be done by hand. The longer the bevel on the cutting edge, the easier the chisel will work and the easier it is to hone it. It is very important that you dip the blade in water frequently while grinding, as it is thin and heats quickly. Excessive heating will, of course, remove the temper. Hone to a keen edge on an oilstone, being careful to hold the blade at the same bevel that it is ground. The slight malleability of the metal at the end of the blade where the hole is, provides an ideal handle that will stand countless hammer blows without chipping or showing any ill effects.—Roger C. Dickey, Salem, N. H.

Metal Disks Protect Fittings on Extension Cord

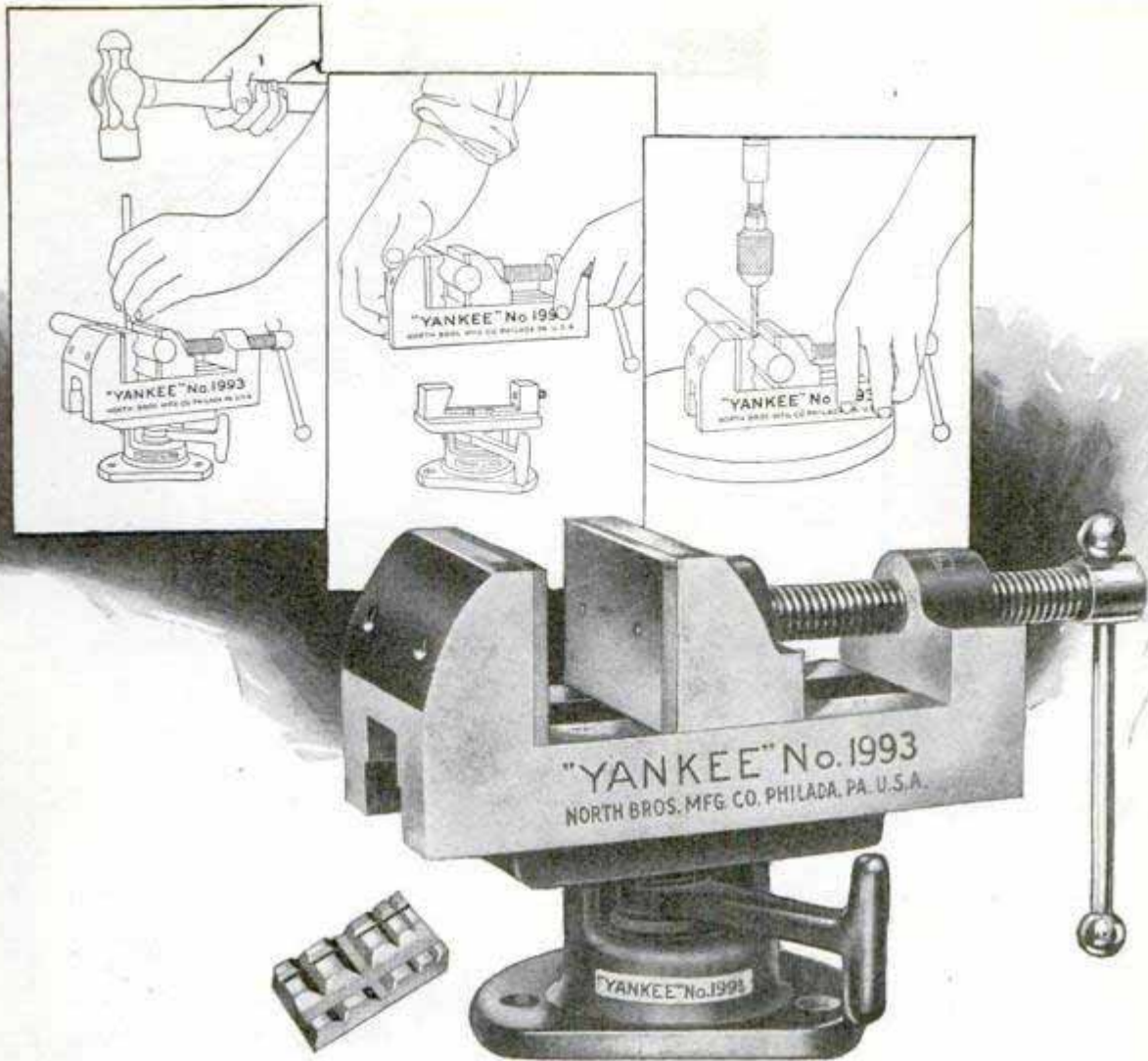
It takes only a slight bump to break the hard-rubber fittings on extension cords, but they can be protected by equipping them with heavy sheet-metal disks, as shown in the photo. The disks are drilled and slipped over the cord before connecting the latter to the fitting. Care must be taken to remove the burrs and



Sheet-Metal Disks on Extension Cord Protect Hard-Rubber Fittings

file down the edges of the holes in order that they may not cut through the insulation of the cord.—W. L. Ruden, Davis, California.

☞ When a small pipe connection or a petcock becomes so worn that it leaks, never solder the joint, but tin the entire length of the threads, and the leak will stop.



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"Now I can have a Chris-Craft!"—Instantly the thought will spring into thousands of minds upon reading this announcement: A 17-foot Chris-Craft priced at \$1295! A moderate down payment will now place in your hands the finest motorboat of its size in the whole world. ✓ ✓ ✓ Chris-Craft ownership, long a source of pride to those who can afford anything they want, is now within reach of the family of moderate income. ✓ ✓ ✓ Continually increasing leadership, multiplied sales, and new economies, make it possible for Chris-Craft to offer this 17-foot luxury craft at \$1295. ✓ ✓ ✓ A marvelous boat it is, true Chris-Craft in every inch of its gleaming mahogany hull, Chris-Craft in its staunch seaworthiness, Chris-Craft in its speed and complete safety. Chris-Craft quality is evident in its luxurious cushions, in the automobile type steering, starting and lighting devices, horn and windshield. Its full-powered dependable motor, its sturdy double-planked bottom and its marvelous control are typical Chris-Craft characteristics. ✓ ✓ ✓ True Chris-Craft it is, full brother to the magnificent Chris-Craft Yacht itself, and equally the envy of all beholders. To thousands who have dreamed of some day owning a Chris-Craft this announcement will mean dreams come true. See your Chris-Craft merchant today. Buy early. Make certain of delivery for a full season of outdoor joy. Write for catalog describing the entire fleet of 25 Chris-Craft models.

CHRIS SMITH & SONS BOAT COMPANY

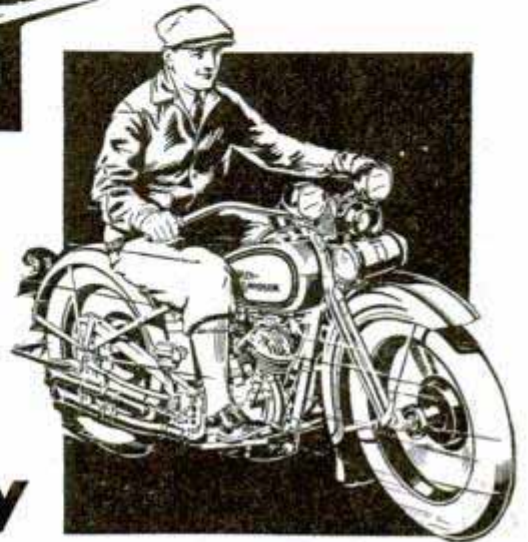
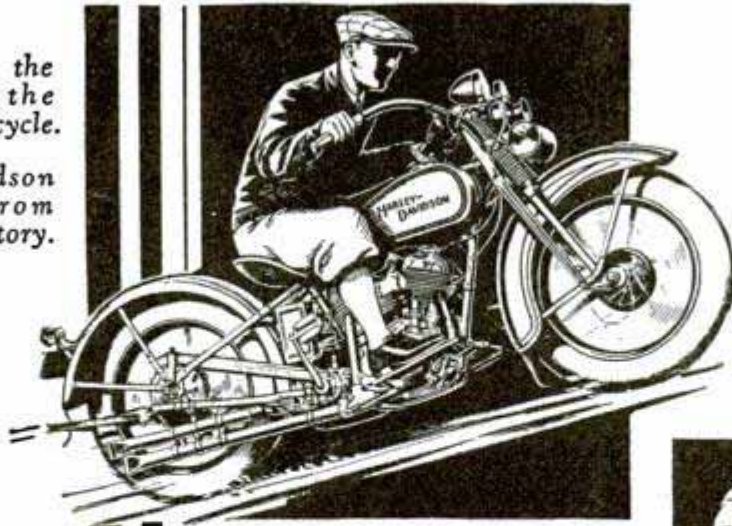
226 Detroit Road, Algonac, Michigan

New York Showrooms: 1 West 52nd Street at 5th Avenue

Chris-Craft
World's Largest Builders of
Mahogany Motor Boats

Shown here is the
"45 Twin" — the
ideal solo motorcycle.

Harley-Davidson
prices range from
\$260 f. o. b. factory.



THE THRILL OF THRILLS

— any way
you look at it!

MOTORCYCLING — the thrills of a dozen sports in one! A mount that responds instantly to every whim — now streaking down the highway — now zooming over a towering hill — now just purring along a winding by-road. A mount to be proud and fond of—not just transportation.

Answer the call of the Open Road with your own Harley-Davidson. What a glorious way to start the Summer! What a vacation you'll have this year! And the trips, the tours, and the week-end outings with the jolly Harley-Davidson bunch! Cost? So little you'll scarcely notice it — for a Harley-Davidson is easy to buy, and costs only a penny or two per mile.

Let your nearest Harley-Davidson Dealer demonstrate the wonderful "45 Twin" shown here, and the other 1930 models. Ask about his Pay-As-You-Ride Plan.

Ride a
HARLEY-DAVIDSON

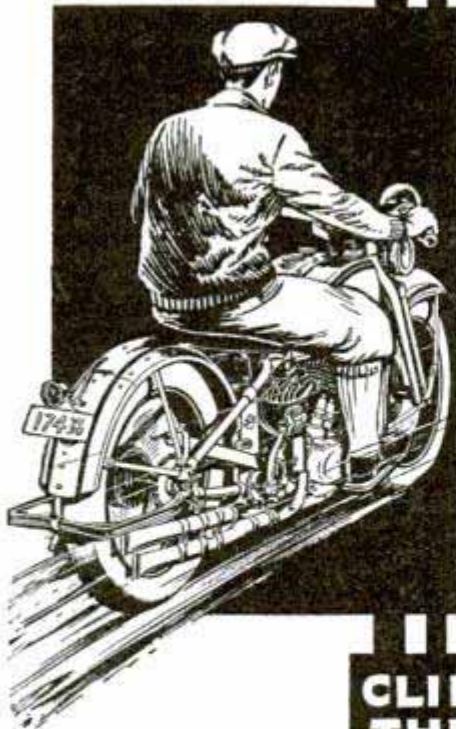
HARLEY-DAVIDSON MOTOR COMPANY
Dept. P., Milwaukee, Wis.

Interested in your motorcycles. Send literature.

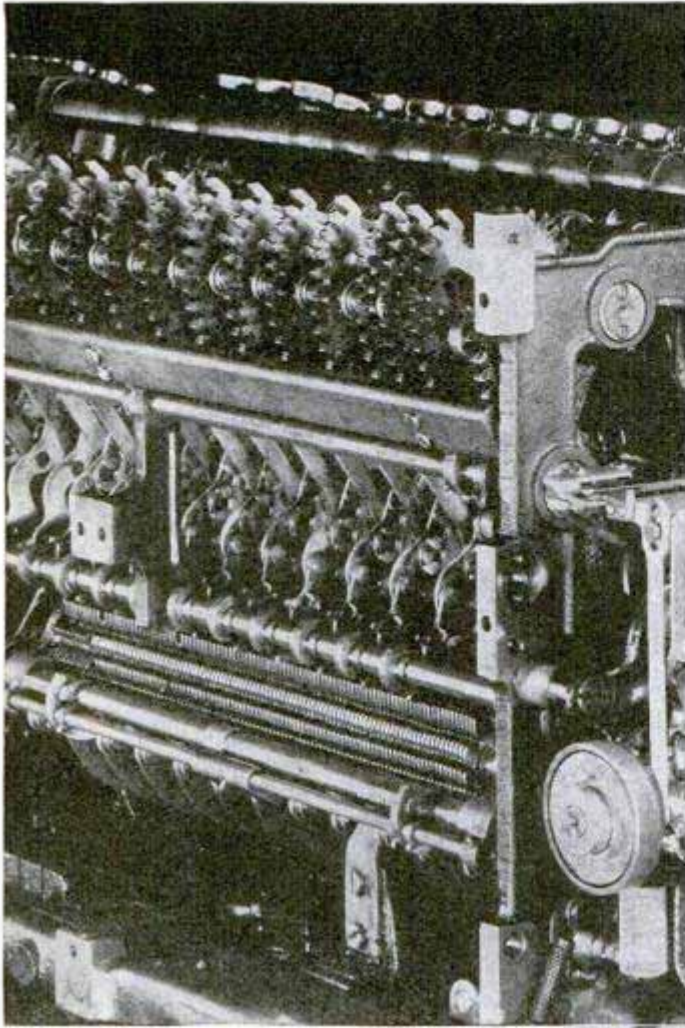
Name.....

Address.....

My age is 16-19 years, 20-30 years, 31 years and up,
 under 16 years. Check your age group.



**CLIP
THE
COUPON**



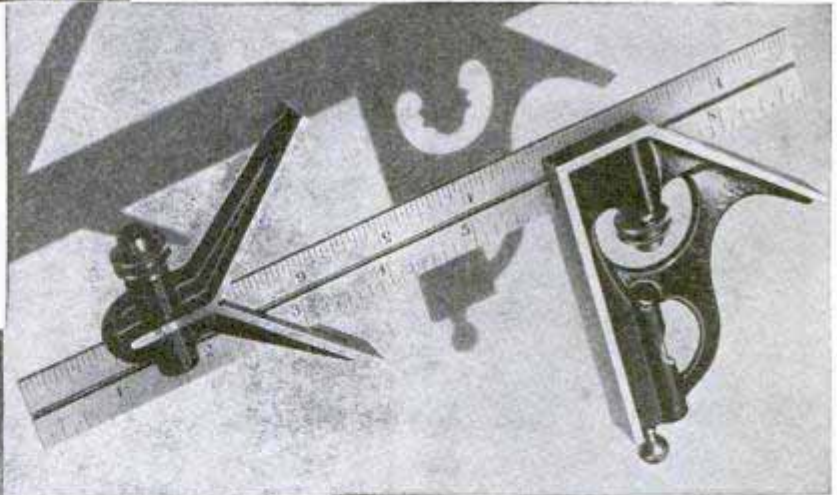
This Metal Brain Never Slips

In hotels and banks and offices—wherever figuring progresses beyond the pad-and-pencil stage—a new bookkeeper is at work. A steel-memored bookkeeper that carries as high as thirty totals in its head, adding or subtracting as entries are made, printing items and totals, descriptions and dates, in one operation, on bills and vouchers and record forms.

Tireless, performing its unbelievably complex jobs at a lightning clip, the accounting machine is a creature of accuracy. Most of its thousands of parts are made to accuracies of 0.001" and less—accuracies attainable only with the finest precision tools—tools like Starretts.

In serious work, or in your home work-shop, your hands will borrow added skill from Starrett Tools—the tools that master machinists prefer. Send the coupon for your free copy of the new Starrett Catalog No. 25 AP."

Mechanism of the National Cash Register Co. Accounting Machine. Below: Starrett Micrometer No. 230, typical of the precision tools used by master machinists. Right: a tool that belongs in every kit, Starrett Combination Square No. 33 with Center Head—8 handy accurate tools in one—another of the more than 2500 Starrett Tools described and illustrated in the new Starrett Catalog No. 25 "AP." Send the coupon today.



THE L. S. STARRETT CO., ATHOL, MASS.
Please send me my free copy of Starrett Catalog No. 25 "AP."

NAME

ADDRESS

CITY STATE

50th Anniversary of Starrett
Tools 1880—1930

Use Starrett Tools

This Summer . . . Motor on Water at Motor Car Speed

These Electrically Started Outboards take you anywhere—LOGS, ROCKS, SNAGS, SHOALS—nothing can stop their tilting propellers

YES, cutting the waves at motor car speed, not only in waters already navigable, but through shoals, lakes, and winding streams, too full of obstructions or too shallow for inboard motor boats to venture.

All these are now unlocked to camping, fishing, cruising and exploration by these new, fast, invincible craft—Johnson Complete Outboard Motor Boats—powered by silent Sea-Horses.

This year they offer electric-starting optional on models "32," "24," and "16." New Vacturi Carburetor increases speed by 200 to 300 r. p. m.—reduces fuel consumption 20% to 30%.

New principle of alternately firing cylinders in new Sea-Horses "4" and "12" brings effortless starting by doubling the number and intensity of the sparks. They have quiet Underwater Exhaust and Full Pivot Steering—so you can maneuver quickly or reverse instantly.

Sea-Horses—undisputed speed champions—hold more official records than all others combined.

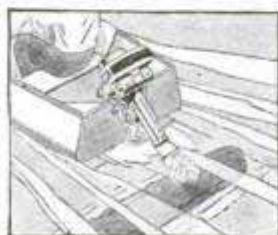
Matched to Sea-Horse motors come the new Johnson Fleet of luxurious boats—smart colors and revolutionary seamless watertight Sealite construction 50% lighter in service, 35% stronger than usual construction and guaranteed to outlast it.

New type electric-starting Aquaflyer starts, steers, and throttles like a motor

JOHNSON Matched UNITS SEA-HORSES & BOATS



Propeller tilts automatically on striking obstructions and passes over them.



Partial Payment Terms

car—combines speed and beauty of a costly inboard—yet interior has 30% more usable room because motor is located outboard in a covered stern-hatch.

Get Catalog. Send your address at once for free beautiful color-illustrated Boat and Motor Catalog with prices, and descriptions of all models.

All dealers carry first-aid service parts. Sales and service stations in all parts of the country.

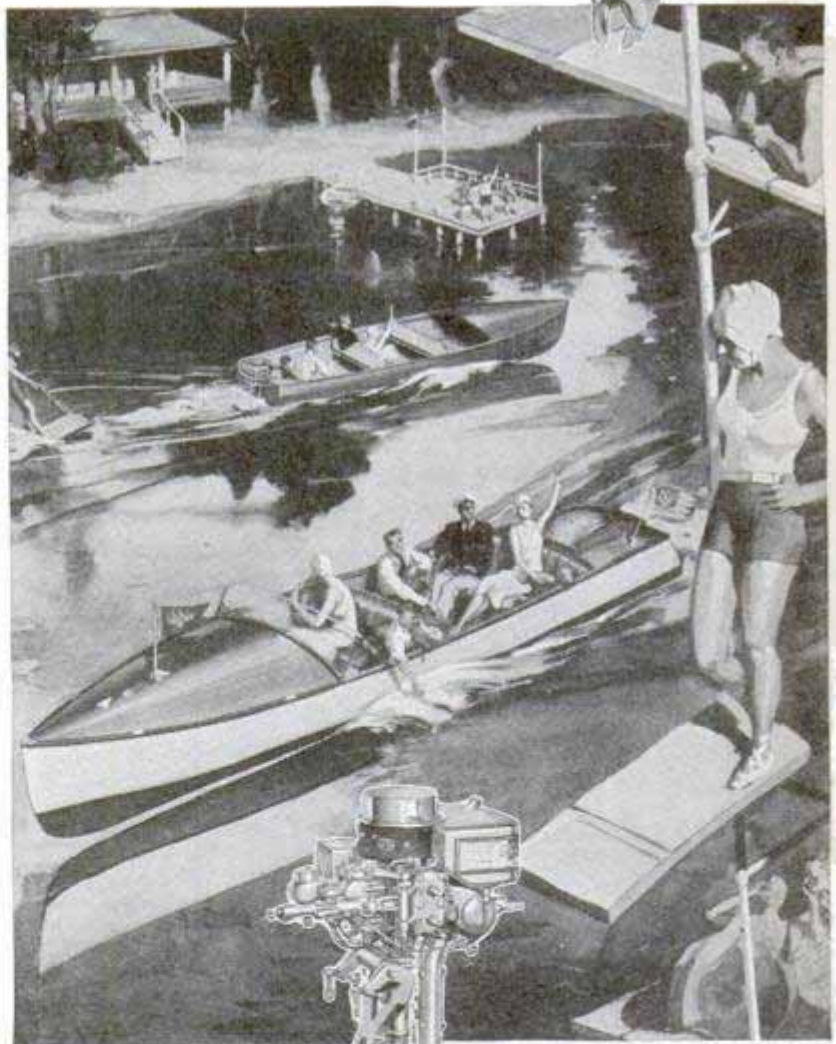
JOHNSON MOTOR CO., 2491 Pershing Rd., at the Lake, Waukegan, Illinois. . . . In Canada: Canadian Johnson Motor Company, Ltd., Peterboro, Ontario. . . . World's Largest Manufacturer of Outboard Motors and Matched Units



Sea-Horse "4"

\$160

Other Sea-Horses \$125 to \$395, f.o.b. factory.

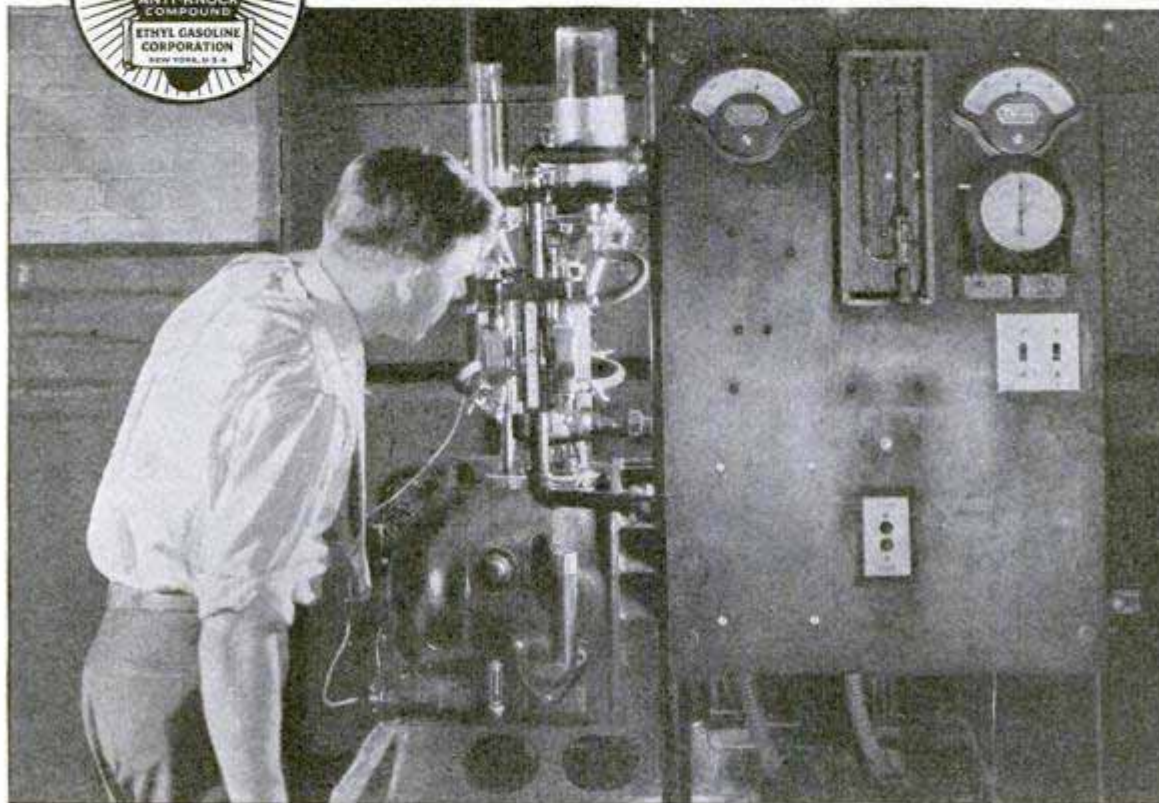


Electrically started Sea-Horse "32"

Class D, 4 cylinders—the monarch of outboards \$395. Others \$125 upward. Boats \$145 upward. All prices f. o. b. factory.

Johnson 20-ft. Aquaflyer Family Runabout in the foreground, with electric-starting Sea-Horse "32," \$1065. In the distance, Johnson 15-ft. utility B Boat. Complete with Sea-Horse "12," \$470.

Why Ethyl is more than "good gasoline"



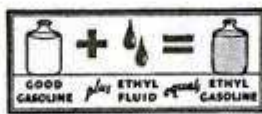
Scene in an Ethyl laboratory where chemical and engine tests are made to insure the quality and anti-knock rating of Ethyl Gasoline.

IN Ethyl Gasoline you get two things your motor needs; good gasoline *plus* the Ethyl anti-knock compound developed by General Motors Research Laboratories to make gasoline a better motor fuel.

When an oil company is ready to mix Ethyl Gasoline, a sample of the base gasoline to which it proposes to add Ethyl fluid is sent to one of the Ethyl laboratories where the sample is tested for purity, volatility, etc. Further tests with engines determine the exact amount of Ethyl fluid needed by this particular gasoline to meet the anti-knock standard of the Ethyl Gasoline Corporation. Afterwards, at the refinery

(where all mixing is done) sensitive measuring devices insure that the right amount of fluid actually goes into the gasoline. Samples of the finished Ethyl Gasoline are then sent to the Ethyl laboratory for final testing before the fuel is offered for sale to the public.

Any pump bearing the Ethyl emblem represents quality gasoline of anti-knock rating sufficiently high to "knock out that 'knock'" in cars of ordinary compression and to develop the additional power of the new high-compression models. Ethyl Gasoline Corporation, Chrysler Building, New York City



Knocks out that "knock"

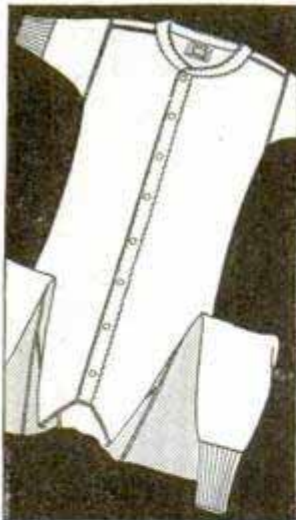
THE ACTIVE INGREDIENT USED IN ETHYL FLUID IS LEAD

© E. G. C. 1930

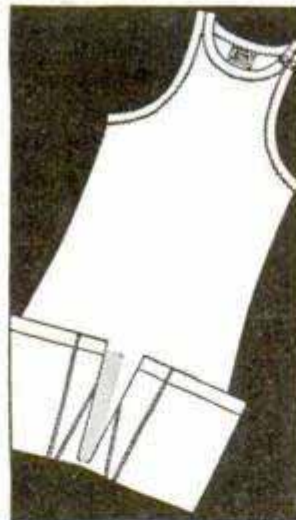
ETHYL GASOLINE



At left: \$1 Samsonbak Athletic Union Suit with patented tug-of-war belt. Others from 75c to \$2. At right: Hanes Shirt and Shorts, 50c, 75c, \$1 the garment. Shirts of combed cotton, mercerized cotton (Durene) and white or colored rayon. Shorts in white and smart new color effects.



Men's Elastic-knit Lightweight Union Suits from \$1 to \$1.50. Long or short sleeves, three-quarter or ankle length.



Knit Athletic Union Suit—shoulder-button style—made of fine combed yarn, knitted to comfortable measurements. \$1.

HANES HAS PRICED UNDERWEAR LUXURY

SO LOW

EVERY MAN CAN AFFORD IT

COMPARED with a new Straight-Eight, the first horseless carriage always turns up a good laugh. But for real mirth, for that ultra-modern feeling, gaze on a pair of red flannels. Men, man's underwear has come a long way. And the P. H. Hanes Knitting Company has helped push it up a lot of hills and over many rough spots.

Millions of men now wear HANES Underwear. They are sure it is the finest that little money will buy. They know that whatever the style, it is always cut full-sized to exact measurements, that it is made of soft, comfortable materials, expertly finished, and that it will wear as only such fine underwear can.

Get your favorite style for summer now, and there's the same low-priced luxury for your boys. If your regular store can't show you the complete line, write to P. H. Hanes Knitting Company, Winston-Salem, N. C.

HANES UNDERWEAR

FOR MEN AND BOYS



FOR EVERY SEASON



"The Saw Most Carpenters Use"

The two handiest saws for the home work-shop are the 26-inch 8-point for cross-cutting, and the 26-inch 5½-point for ripping. You will need these on almost every job. The popular "D-8" Lightweights cost \$3.45.



Files for the Wood Worker

Disston Cabinet Files (fine teeth) for smoothing and finishing wood surfaces, easing tight doors and drawers, etc. Disston Wood Rasps (coarse teeth) for rough and fast cutting, enlarging holes, etc. Half-round 8" Cabinet File, 65c. Flat 8" Wood Rasp, 50c.



Files for the Metal Worker

Every kind, size and style. A Disston 8-inch Mill File, bastard cut, is fine for sharpening axes, lawn mowers, garden tools, and general work in home and shop. Excellent for finishing metal surfaces. 25 cents each.



Handiest of All Small Saws

Disston Back Saw, with fine teeth and stiff back, enables you to do smooth, accurate cutting of mitres, grooves, in doing cabinet work, etc. No. 4, 12" size, 3" under back, 14-point, costs \$3.00.



For only 25 cents, in coin or stamps (35c in Canada), Disston will send you, promptly, post-paid, the new Disston Stronghold Saw File Handle and a Disston 6-inch Extra-Slim Blunt Saw File, and with them "The Disston File Chart," which embodies latest information on use of files. Mail coupon, and buy later from your dealer.



Accept This Offer from Disston

The Greatest of All Saw Files
and the New Disston Strong-
hold Saw File Handle, both for **25c**

To introduce *quickly* the new Disston *Stronghold* Saw File Handle (illustrated at the right in about half actual size) we will send you, postpaid, this new file handle and a Disston Special Extra-Slim Blunt 6-inch Saw File for the price of the file alone—25 cents. The file handle, regularly sold for 15 cents, is our gift to you.

This handle is a special shape and size, made for saw filing. It is the same as those used by the saw filers in the Disston Saw Works. It lessens wrist-strain, is comfortable in the hand, gives you better control of the file and insures more accurate work. Its shape and size alone would make it your favorite.

But this handle also has a new and patented feature that means a lot to you. A coiled spring-steel ferrule holds the tang of the file *always tight*, preventing slipping. You can remove and replace the file easily without injury to the handle, which may be used repeatedly.

A Better File in a Better Handle

And you already know that the Disston Special Extra-Slim Blunt Saw File is the finest file that money can buy. Special cut, plenty of bite, cuts fast and true. Extra-slim, so you can see where and how you are cutting. Parallel sides, no taper, for a level, uniform stroke. Made of Disston Steel, the world's great cutting steel from Disston's own steel works, this file outlasts two ordinary files.

Be one of the first to use the new Disston Stronghold Saw File Handle. Get your first one from us on this special offer and afterward buy them from your dealer. Mail the coupon with 25 cents, stamps or coin. (In Canada, 35c.)

Ask for Disston! Not only files, but also Circular Saws, Band Saws, Hand Saws, Hack Saws and every other type of saw for hand or machine work, sold by dealers everywhere.

*This offer good only
until July 1, 1930*

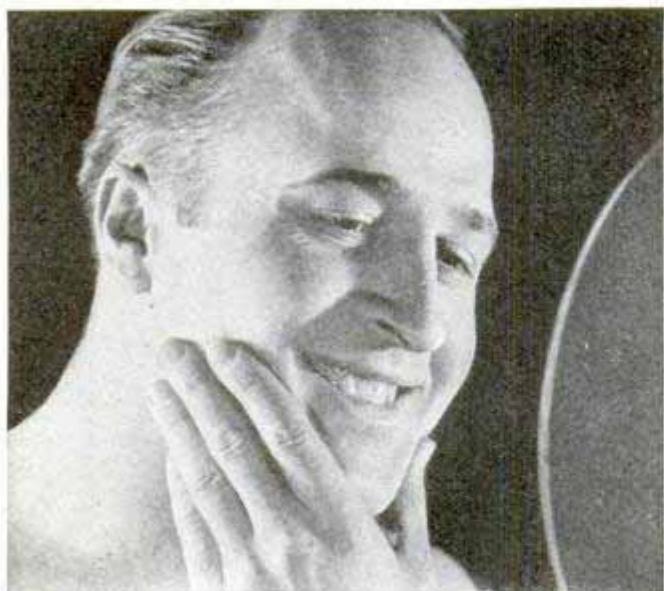
DISSTON

Makers of "THE SAW MOST CARPENTERS USE"



Henry Disston & Sons, Inc., Philadelphia, U.S.A.
(In Canada, Henry Disston & Sons, Ltd., Toronto)
For 25 cents, enclosed (in Canada, 35c), send
Disston Stronghold Saw File Handle, Disston
Saw File, and "The Disston File Chart" to

Name and Address.....



WANTED men with tough beards

To learn, at our expense, a new shaving method that brings 5 new comforts. 86% of those who try it never go back to old ways.

GENTLEMEN: This is a direct challenge to men who are hard to shave. Men whose stiff, stubbly beards make shaving a hardship. Who, in getting a close shave, leave the skin irritated and burning. For these men we have a message . . . and a challenge.

If you will mail the coupon below we will show you that shaving troubles are unnecessary. For Palmolive Shaving Cream, now used daily by 86% of all the men who ever tried it, is the answer to your prayer.

A 7-day test will convince you better than any words of ours.

PALMOLIVE RADIO HOUR—Broadcast every Wednesday night over WEAJ and 39 stations associated with The National Broadcasting Co. 1888

7 SHAVES FREE

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Palmolive, Dept. M-838, P. O. Box 375 Grand Central Post Office, New York City.

.....

(Please print your name and address)



Mackinac Island . . .
Niagara Falls

America's two famous summer haunts whose very names mean pleasure!

A fast, trim D & C fleet cruising the Great Lakes links Buffalo (55 minutes from the Falls) and Mackinac Island with Chicago, Detroit and Cleveland.

Plan your vacation *now!* . . . to visit one or both of these noted places . . . to enjoy a luxurious D & C voyage. You'll spend long - remembered days.

DAILY SERVICE	1 WAY	R. T.
Detroit-Buffalo	\$5	\$10
Detroit-Cleveland	\$3	\$5.50

3 SAILINGS WEEKLY

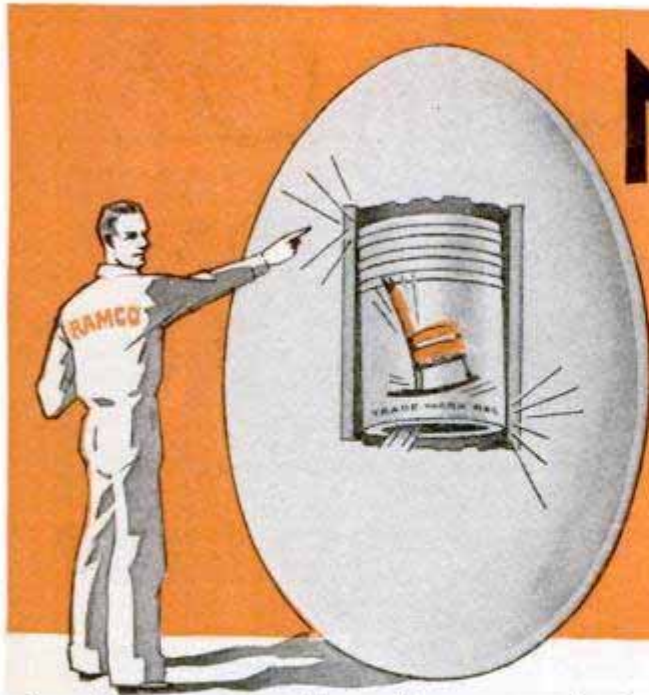
Fares include meals and berth

Detroit-Chicago	\$31	\$52.50
Detroit to Mackinac Is.	\$15	\$26.50
Chicago to Mackinac Is.	\$16	\$27.50

☞ Tickets, reservations from any authorized tourist agency. ☞ Liberal Stop-over Privileges. Autos Carried. Send today for illustrated "Vacation Days". Address E. H. McCracken, P. T. M., 11 Wayne St., Detroit, Mich.

DETROIT & CLEVELAND NAVIGATION COMPANY





NOW!

PISTON ROCKING CAN BE STOPPED

and thousands of miles added
to the life of your motor

Amazing new-type piston ring prevents constant beating of pistons against cylinder walls and thus eliminates real cause of piston slap, oil pumping, wasted power and big repair bills. Puts new-car pep and power into old motors at surprisingly low cost. Note special introductory offer to readers of Popular Mechanics.

If you could look thru iron and steel and see what's happening inside your motor every time you drive your car, no one would ever again have to urge you to put Ramcos in your motor *right now*.

For you would see heat, friction and wear at their deadly work. You would see the crankshaft rotating at lightning-like speed, hurling the pistons against the cylinder walls with tremendous force—hundreds of times every minute.

And you would realize that this constant rocking, knocking action could mean just one thing—*wear!* Wear on pistons! Wear on piston rings! Wear on cylinders!

Is it any wonder that both cylinders and pistons soon lose their original roundness and become oval in shape? That piston rings cease to seal the space be-

tween the piston and the cylinder? That pistons become so loose you can hear them slap against cylinder walls? That oil is pumped up into the combustion chamber? That power blows away?

Ramcos stop and prevent piston rocking

Obviously, ordinary snap rings can't permanently correct these common motor troubles, because they do not centralize and control piston action. The Ramco Replacement Piston Ring, on the other hand, takes hold of the piston, centralizes its action and prevents it striking against the cylinder walls.

The Ramco Replacement Piston Ring is far more efficient than any other ring, because its exclusive design is based on the proved engineering fact that the piston ring must adhere to the cylinder

wall at all points with equal pressure. Actually, it's "a ring within a ring."

The outer ring is made of soft gray iron without tension or spring, so that it will flex readily into irregularly shaped cylinders. The inner ring used with it provides the proper sealing pressure at all points. This inner ring takes hold of the piston, keeps it centralized and prevents it from striking against the cylinder wall. It exerts the exact amount of pressure necessary to properly seal the cylinder without scraping or dragging.

This preserves the cylinder wall and prevents it from wearing out of round. This pressure is provided thruout the entire life of the motor, because the Ramco inner ring is made of special analysis steel which is not affected by highest motor temperatures.

Special Introductory Offer

If your dealer or garage-man does not carry Ramco Replacement Piston Rings, tear out and mail the coupon below. By return mail, we will send you complete details of the remarkable Special Introductory Offer we are making to readers of Popular Mechanics. We will explain how you can *quickly stop* and *permanently prevent* piston rocking, oil pumping, piston slap, power loss and compression loss—at a surprisingly low cost. Tear out the coupon and mail it NOW!

DEALERS! GARAGE-MEN!

Ramco Replacement Piston Rings enable you to give your customers a first-class, permanent motor repair at surprisingly low cost. Millions are now in daily use in passenger cars, busses, taxicabs, and tractors. Thousands will be sold in your community this year. If you want to triple your repair business, write now for complete details of the Ramco Ring and the Ramco dealer proposition. Give Jobber's name.



RAMCO

REPLACEMENT PISTON RINGS

(REG. U. S. PAT. OFF.)

MAIL COUPON

RAMSEY ACCESSORIES MFG. CORPORATION

3694 Forest Park Blvd., St. Louis, U. S. A.

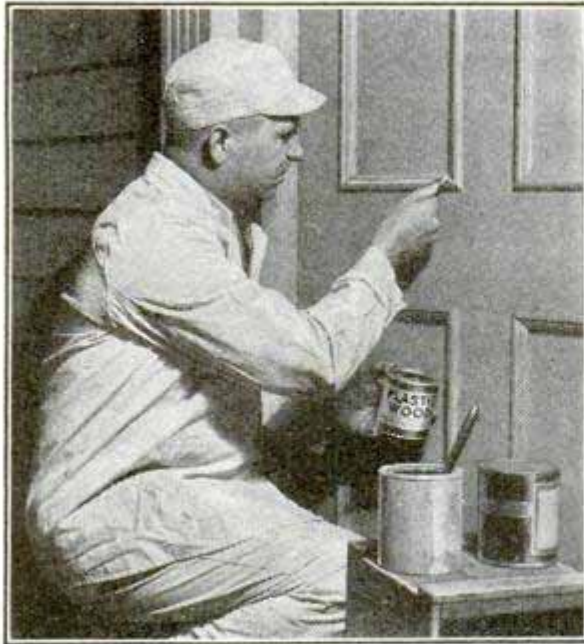
Please send me FREE illustrated literature describing how Ramco Replacement Piston Rings stop and prevent piston rocking and oil pumping; also details of Special Introductory Offer. I drive a

(Name of Car) (Year Built) (Model) (No. Cylinders)

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

Dealer's Name.....

Dealer's Address.....
(DEALER'S NAME SHOULD BE GIVEN) P.M. 6-30



He uses
PLASTIC WOOD
REG. U. S. PAT. OFF.

The painter knows the value of Plastic Wood as a filler in any good job. The carpenter knows the strength it gives for sealing corners and intricate construction. The cabinet maker appreciates the finish possible where Plastic Wood is used for renovating antique furniture, and in high grade cabinet work.

For the home, Plastic Wood is a household repair product for everyone. It handles like putty, hardens into wood, adheres lastingly to any clean, dry surface, takes paint, varnish or lacquer perfectly, is waterproof and grease-proof—for use indoors and out. To soften Plastic Wood use Plastic Wood Solvent.

Plastic Wood in Colors

Many stores now carry Plastic Wood in tubes in varied wood colors—mahogany, oak, walnut, ebony, etc., as well as the natural wood color and White Tile Cement.

Handles
Like
Putty



Hardens
Into
Wood

Tube 25cts.—1/4 lb. can 35cts.—1 lb. can \$1.00
At Hardware and Paint Stores
ADDISON-LESLIE CO., 428 Bolivar St., Canton, Mass.

Thompson
BEATS
the World
on **BOATS**
CATALOG
FREE!



OUTBOARD MOTOR BOATS—For Every Purpose and Every Purse—The very fastest and most seaworthy V Type, V Bottom and Sled Type Boats for family use, and a strictly up-to-date line of Step Plane Racing Models to choose from.

Rowboats \$48.00 and up—

The 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. Choice of many distinctive color combinations.

20 ft. Motor Boats—

With or without Engine. Fast, handsome six passenger craft at money-saving prices.

CATALOG FREE — SAVE MONEY — ORDER BY MAIL
Please state the kind of boat you are interested in (35)

THOMPSON BROS. BOAT MFG. CO.

213 Ann St. PESHTIGO WISCONSIN (Write to Either Place) 113 Elm St. CORTLAND NEW YORK

BOYS GET THIS! PLANE FREE!

A remarkable gift for only 1 hr. of work. Silver Arrow cabin model plane. All metal body, gold propeller and red wings of selected Balsa. Length 17 inches, wingspread 22 inches. Weight 2 1/2 oz. Will absolutely fly. Thousands shipped daily. You too can have one FREE on our special plan. Write N. 11 Iroskeen 91 Bowery, N. Y. City.

Make Your FORD Into The "ACE"

GET READY FOR SPRING—BUILD YOUR ACE NOW—Famous sure-fit RED-I-KUT life-size patterns and picture instructions show how you can easily convert your Ford into this Fast, Saucy, 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 new manual of distinctive sport car patterns from \$5.50 up—“RKO” Steel “Sving-Lo” Irons, Tops, Windshields and many special necessities. ORDER RIGHT NOW and get real thrill.



KUEMPEL COMPANY, 121 Kuempel Bldg., GUTTENBERG, IOWA

Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized STEEL WIRE TRAP. Write for our FREE TRAP OFFER and Bargain Catalog. \$1 Box of our famous Fish Bait FREE to introduce our traps. WALTON SUPPLY CO., 3502 JUNIATA AVE., ST. LOUIS, MO.

Auto Seat Covers \$2.95



Special Price Offer
AGENTS Make \$20 a Day
Write orders fast for this excellent Quality line Auto Seat Covers. Amazing value—quick sales. Cash daily. We deliver. Write for handsome Free Leatherette Sample Outfit. Quality Sales, Dept. 616, 1834-36 North Ave., Chicago

An Astonishing' Discovery

What Chief Long Lance learned from a worn moccasin and what it means to athletes

"WHEN we were boys," writes Chief Long Lance, "our famous warriors told us that the tireless strength of their feet and legs was most important in hunting and battle. Famous modern athletes will tell you the same. Our moccasins were made to give our muscles freedom to develop. Get rid of the stiffness of ordinary shoes and your strength and agility will take care of itself. Put your natural energy into developing your muscles—not fighting your shoes."

THE CHIEF has always worn sport shoes without high heels for a very common-sense reason. The natural method of walking is barefoot, he said to himself, with the heel no higher than the rest of the foot. If you put something under the heel you get a shorter "lift" every step you take. That unnatural, short "lift" means that certain muscles in the foot and calf are being neglected. He knew by instinct what doctors tell us, that every muscle needs exercise because we depend on them to hold the delicate bones in the foot in proper shape.

Furthermore, the Chief always "operated" on his old-fashioned sneakers before he wore them.

This is how it came about. One day he happened to be looking at the bottom of his moccasin. The worn part was shaped like Figure 1. It was similar to the track made by his bare foot—or any normal, healthy foot—on the ground. Then he looked at the sole of his sneaker. It had a shape like Figure 2, a different shape, you see.

He thought to himself, "When my sneaker is worn—the

Then he remembered that when he stepped on a rolling log or a loose rock, he always threw his weight where he felt the firmest support. He saw that the firmest support of a worn sneaker (Figure 3) was just where it oughtn't to be—under the arch. He saw that if he kept putting his weight on his arch instead of putting it on the "barefoot tread" (Figure 1) he might end up by getting flat feet.

So he took a razor blade and chopped away that useless and dangerous section of the sole under the arch.

When he put on his sneaker he made an astonishing discovery. Not only was it safer to wear, but the whole shoe was more limber, more flexible. Taking away that extra chunk of rubber made it easier to rise on his toes every step he took. He knew at least that all his muscles were getting the exercise they needed to make him light and fast on his feet.

Think what that discovery means to an athlete or to a boy who hopes to be one. And remember the Chief Long Lance Shoe is the only sport shoe you can get that is made with the "barefoot tread" design.



Figure 1

Figure 2

10 Special Features of Chief Long Lance Shoe

- 1 Unique Indian Design
- 2 Dodging Pivot
- 3 Emergency Brake
- 4 Whirling Pivot
- 5 Barefoot Tread
- 6 Easy-flexing Shank
- 7 Non-Skid Heel

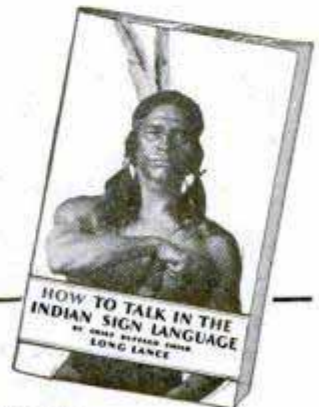


Figure 3

Dear Bill—

Read this story of these new shoes. I just got a pair and it seems I can run faster and walk easier already. These pages are from a booklet by Chief Long Lance. You better get it yourself so we can talk the sign language together. It'll be mighty useful when we're scouting and don't want to make a sound. And when you've got the shoes, too, you won't get tired so soon. We'll have some real fun this summer if you get that booklet now
Yours Jim

TAKE JIM'S TIP and get this big 32-page booklet, too. Let Chief Long Lance teach you the silent language of Indian warriors. It's all in the booklet with over 80 pictures—and the story of the Chief's shoe. too! Send for it now!



Goodrich

Sport Shoes



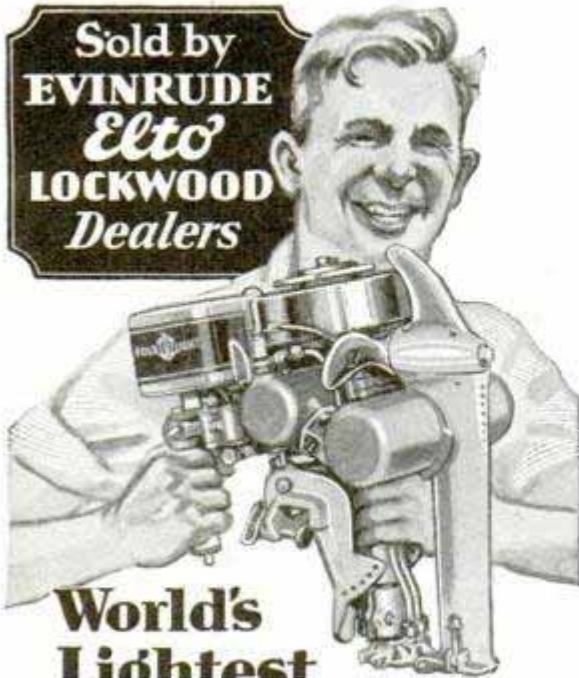
The B. F. Goodrich Rubber Co. 4M
Akron, Ohio

Enclosed find 10¢ in coin or stamps.
Please send me "How to Talk in the Indian Sign Language" by Chief Buffalo Child Long Lance.

Name.....

Address.....

Sold by
EVINRUDE
Elto
LOCKWOOD
Dealers



World's Lightest Twin Outboard!

HERE'S the boat motor that all outdoor America is talking about. As "stowable" and compact as a traveling bag—it *f-o-l-d-s*, as shown, to only 11½ x 13¾ x 17 inches. Weighs only 29 pounds—world's lightest twin outboard. Powerful, too — its 2¾ horse power giving efficient speeds on family and fishing boats, etc.

FOLD-LIGHT

Steering handle folds down to form a comfortable carrying handle. Twin cylinders, of course, for smooth performance — with an individual silencer for each. Operates 2½ hours on a gallon of fuel. Self steering feature. First to minimize vibration by cushioning power head in rubber. Gas tank in front, thus easier to fill. Automatic circulation of oil to main bearings. The sensational light weight outboard of all time—no other, at any price, compares with it in handiness or putting so much power in so little space.

Write for Catalog.

Outboard Motors Corporation
Ole Evinrude, President
5561-27th Street
Milwaukee, Wis.



WHEN THIS BOAT COMES PUT-PUT PUTTING HOME . . .

THERE'LL be a warm frying pan ready. For it's a sure bet there'll be fish to fry when you go in a motor-driven "Old Town." You motor in an "Old Town" to your favorite spot . . . you're there in time for the fishes' breakfast . . . and they're back in time for yours!

"Old Towns" are wonderfully fleet and sturdy craft. Durable—built for heavy loads, but easy to handle. With Sponsons if you like. Free catalog shows and prices many models—rowboats, dinghies, all canoe types; big, fast, seaworthy, all-wood, outboard boats for family use, and speedy step-planes. Write today. Old Town Canoe Co., 1146 Middle St., Old Town, Maine.

"Old Town Boats"



Capstan

DANDY MODEL PARTS

Flying Cloud Figurehead of white metal, mighty neat, ready to set, for only 40c. Capstan, polished brass, 1/16" to 1/8" scale, 40c. Mail 10c for booklets "How to Paint Ship Models" and "Revised List of Blueprints Wooden Warships, Merchant Vessels, Fishermen, etc." Latest catalog a dime.

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SILVER ACE

"Robin"

Convertible Seaplane



LIFE at camp or seashore is lacking without this newest and most beautiful of all our famous flying models.

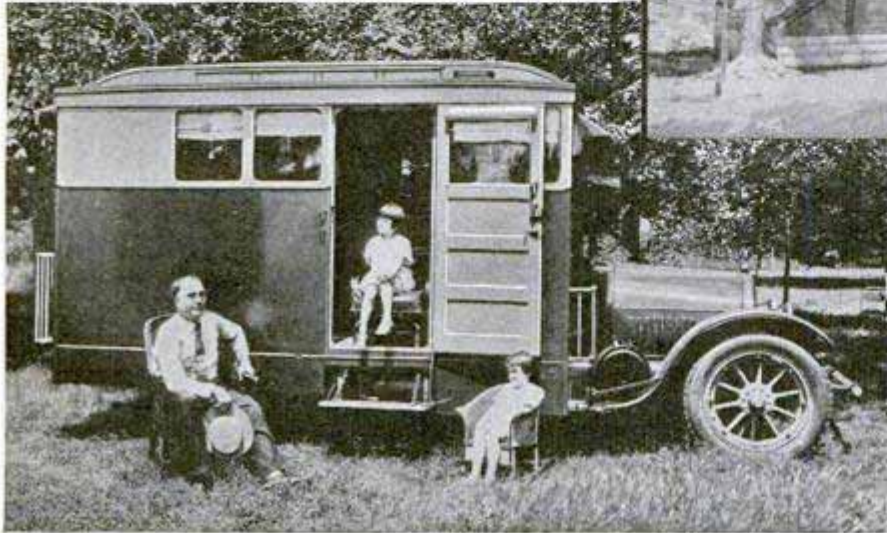
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AERO MODEL COMPANY

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This
vacation cabin ➔
this
vacation on wheels



—both are made of Presdwood

What a thrill you get building a cabin in the woods, or a bungalow on wheels; and how easy the job becomes when you use the broad grainless wood boards of Masonite Presdwood. Proof of this is supplied by H. E. Varney, among thousands of others, in his attractive vacation cabin (reproduced above) in the Wrightwood Mountains of California; further proof is supplied by R. D. Anderson of Youngstown, Ohio, who used Presdwood to build the touring bungalow, also shown here.

Builds boats and signs

Presdwood is highly resistive to moisture and warping. It builds rowboats, bath houses, speedboat decks, roadside signs, boat houses and safety water wheels for use at lake resorts. Like natural wood, Presdwood is usually painted when exposed to the weather, or can be varnished to bring out the natural warm color tones and beautiful burlled appearance of this grainless wood.

For interior application Presdwood is often used without special finish of any kind. It provides beautiful paneling for modern homes and apartments; makes cottage partitions, bedroom screens,

tool chests, dish cabinets, clothes closets, shelving and boxes for supplies.

Presdwood lines concrete forms for office buildings, factory warehouses, schools, dams, bridges and swimming pools. Because Presdwood leaves no grain or knot marks, the broad concrete surfaces require no hand smoothing. Labor costs are drastically cut and the resulting concrete becomes both smoother and stronger.

Manufacturers find that Presdwood adds strength and beauty to their products at the same time that it lowers the cost. This grainless wood does not crack or splinter, can be nailed near the edge without splitting, and is easily handled on band saw or punch press. It reduces waste to a minimum and is liked by the workmen as well as the management.

Send for sample and booklet

Production executives or vacation "fans," experienced builders or home mechanics, will find valuable information in the Presdwood Booklet. The booklet and a sample of Presdwood are sent to you FREE on receipt of the coupon. Just clip and mail it NOW.

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PRESDWOOD
Made by the makers of
MASONITE STRUCTURAL INSULATION
REG. U.S. PAT. OFF.

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ONLY an old and trusted friend would venture to speak so frankly.

A new pipe, or an old one carefully broken in with Sir Walter Raleigh's favorite smoking mixture, changes everything. And why shouldn't it? Sir Walter is milder and more fragrant. And it has the body and flavor found only in the finest of Burley, skillfully seasoned and blended. What more could we offer any pipe smoker? What more could he ask?

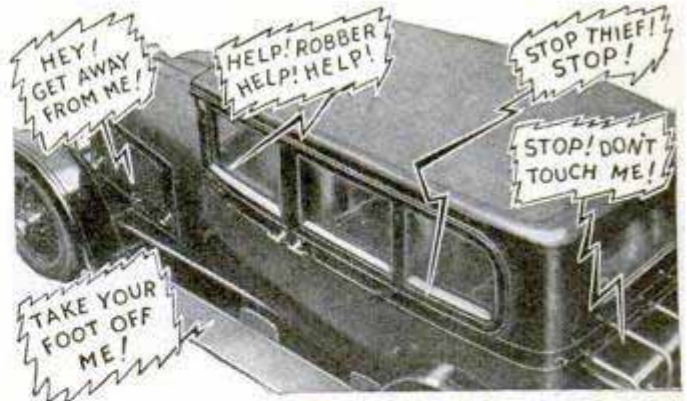
TUNE IN on "The Raleigh Revue" every Friday, 10:00 to 11:00 p. m. (New York Time), over the WEAJ coast-to-coast network of N. B. C.



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 (Hint No. 5) It's not true that a thick "cake" makes a sweet pipe. A heavy cake makes a hot smoke. A cake is necessary, but in a pipe, as in a car, too much carbon makes heavy, hot going. A thin cake makes the coolest smoke. Send for our free booklet, "How to Take Care of Your Pipe." Brown & Williamson Tobacco Corporation, Louisville, Kentucky, Dept. 81.

Discovered How Good a Pipe Can Be

IT'S 15¢—and milder



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A DIRTY garage floor is as bad an eyesore as a dirty car.

Ordinary concrete is porous. Oil sinks in and makes ugly spots, and appearance is also marred by the dust that grinds loose at dry places. This dust gets into the air after sweeping, and also is injurious to car finish and working parts.

By mixing Smooth-On No. 7 into the top layer when laying the floor, you get a permanently smooth, dense, iron-hard, non-abrading, impervious surface that sheds water, absorbs no oil, is easy to keep spotless and stays spick and span.

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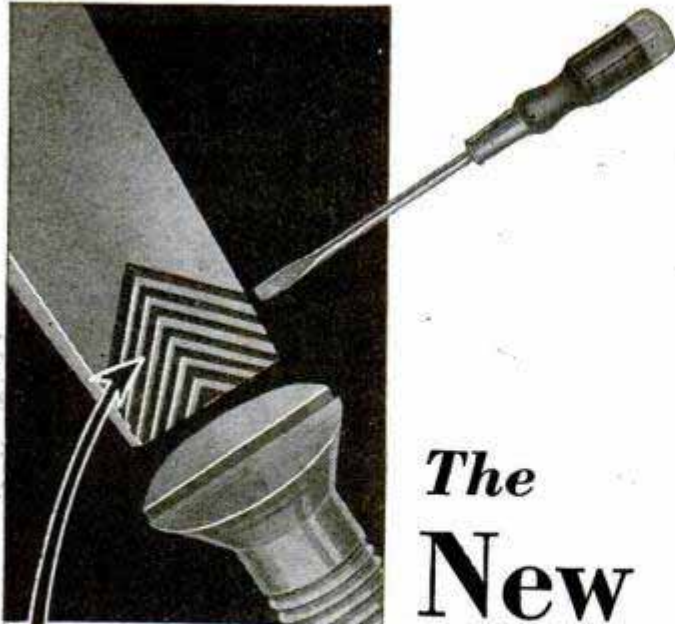


Smooth-On No. 7 is sold in 5-lb. cans and 25- and 100-lb. kegs. If your dealer will not supply you, write us direct.

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Pat. U. S. A., Dec. 8, 1929, No. 1,738,406

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TRADE MARK

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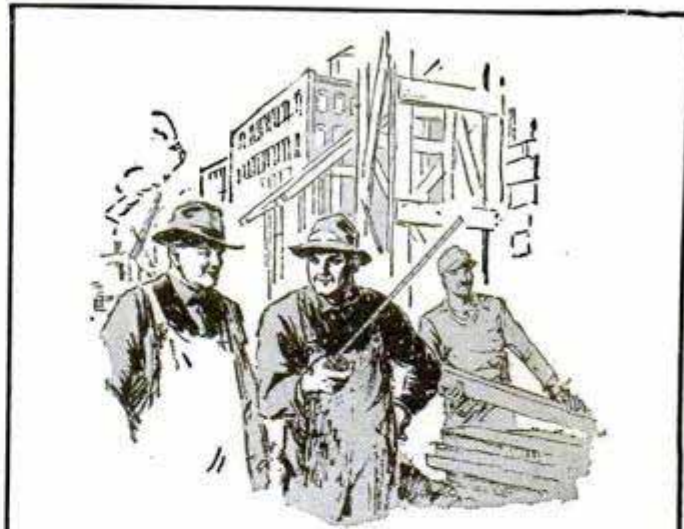
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Nothing to loosen, nothing to break—the unique webbed handle affords an excellent grip and provides maximum strength without weight or bulkiness.

Heads specially hardened to prevent chipping; blades hardened all the way through. Furnished in three sizes, 3/4, 1 and 1 1/4 in. Black lacquer finish with red head. Ask your hardware dealer for Crescent wood chisel No. 175.

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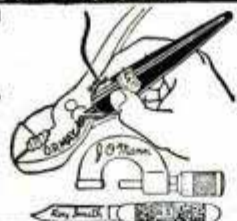
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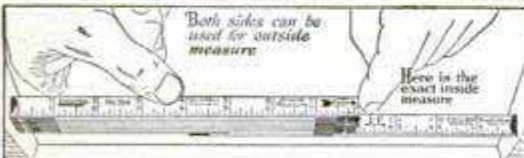


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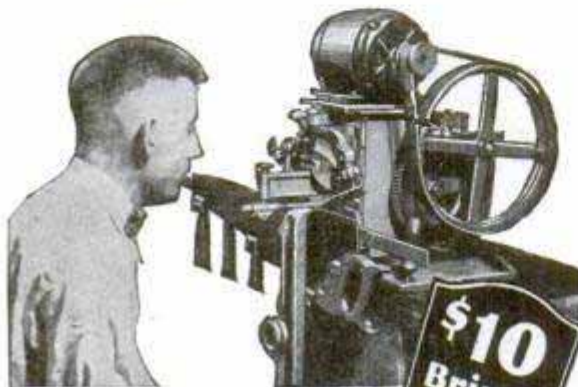
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If you want to add from \$10 to \$35 a week to your present earnings, here is your chance. Many men are making good money filing saws on the Foley Automatic Saw Filer. Everett Myers writes, ". . . I banked \$161.66 in one month which was accomplished in spare time. . ."



Easy and simple to operate. No eye-strain. Adjust the saw in the machine and turn on the power—it files automatically.

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FREE PLAN will help you get started. Get in on these easy profits. Don't delay—start NOW!

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Please send me FREE PLAN on how to start my own saw filing business with the Foley Filer.

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PARKS CABINET SHOP SPECIAL



16" band saw, 6" jointer, 8" Circular rip and cross-cut saw. Complete with motor.

\$290

DOUBLE YOUR INCOME—WITH A PARKS!

There's a first-class opportunity to make more money right in your own neighborhood with this sturdy Parks combination woodworker. Turn your idle time into pay time—equip your shop with a Parks Cabinet Shop Special.

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Good Woodworking Machines since 1887.
Canadian Factory: 338 Notre Dame East, Montreal

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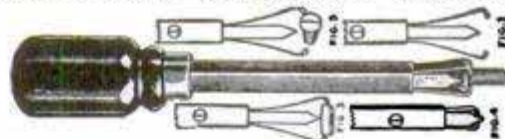
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THIS MAN IS MAKING \$4.00 to \$6.00 an hour!

SHARPENING LAWNMOWERS in Spare Time With the "IDEAL" LAWNMOWER SHARPENER Man, Why Don't You Do That?

You've got the chance—the same chance as W. T. Moore, Twin Falls, Idaho, who made \$1200 net profits in 90 days—the same chance as Walter Wever, Middletown, N. Y., who made \$1000 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, Little Rock, Ark., writes that his "Ideal" Sharpener earned enough in 18 months to pay for itself and \$1857.00 worth of additional machinery.

Our Free Book Tells You How— these men and many others have made themselves independent—built substantial, permanent, BIG PAYING businesses with this Ideal Sharpener. Send for this book today—It's Free.

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Sell Gibson extra fine men's made-to-order all-wool suits at \$23.50 and \$31.50, direct to wearer. Biggest values—Most liberal commissions, with bonus, to producers. **Frequent opportunities to get own clothes at no cost.** We deliver and collect. 6x9 cloth samples—over 100 styles—complete outfit in handsome carrying case furnished FREE to ambitious men who are willing to hustle. Write today.
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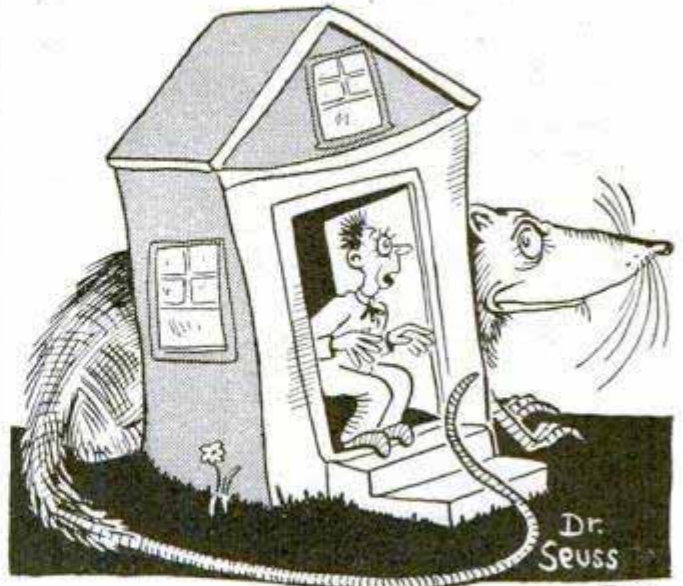
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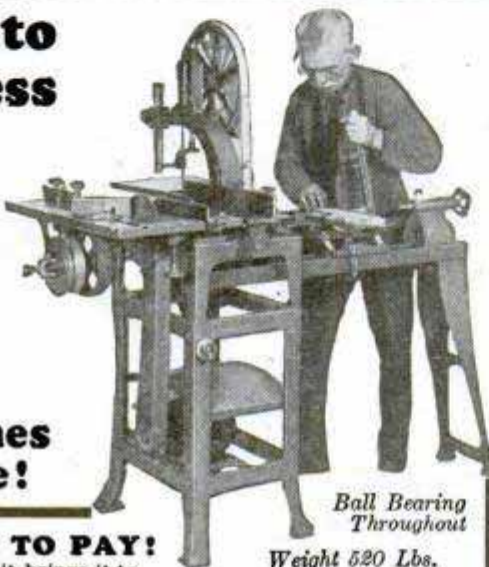
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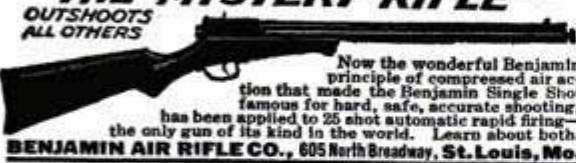


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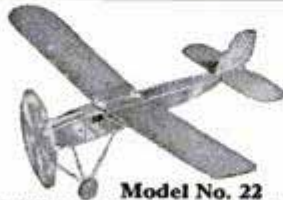


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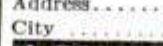
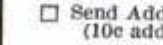
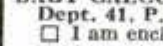
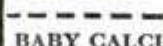
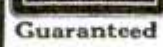
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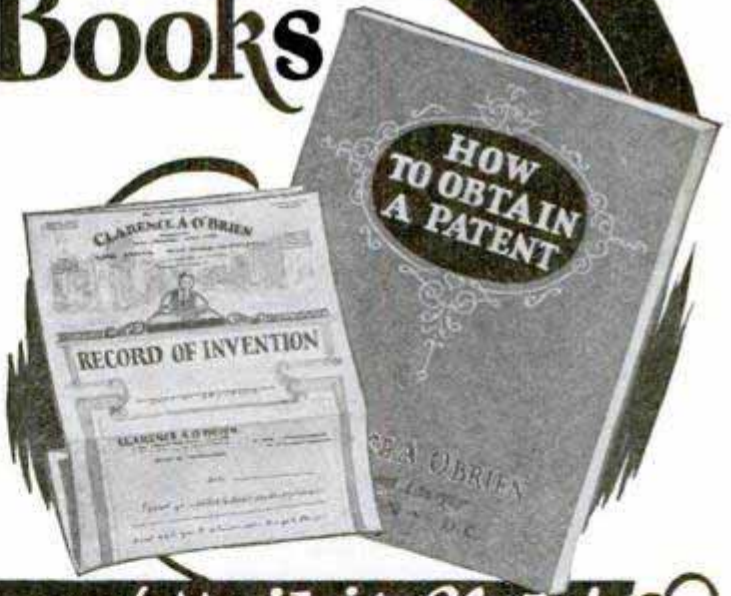
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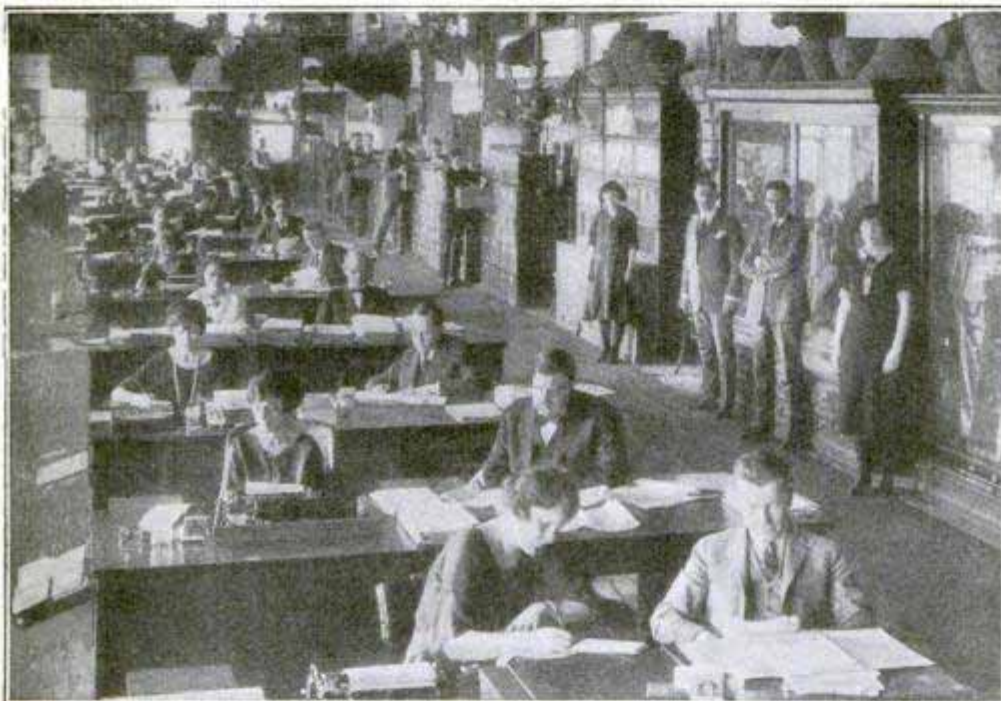
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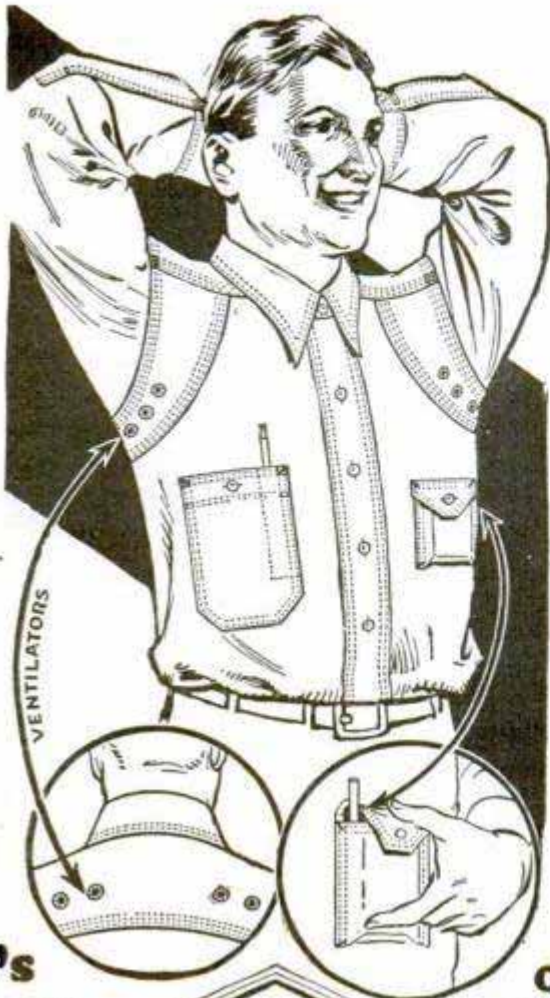
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| | 12. Every Garment Guaranteed to Give Satisfaction. |

Every Big Yank is triple-stitched, thread-riveted; guaranteed not to rip. Most good dealers everywhere can show you this new Big Yank. Ask to see this sensational shirt value. If by chance he can't supply you, send \$2.00 and we'll send you two shirts, postpaid.

RELIANCE MANUFACTURING COMPANY
212 WEST MONROE STREET
CHICAGO, ILLINOIS

START A BUSINESS - HOME - MANUFACTURING



200 to 500% PROFIT!

Fascinating and easy work making permanent ornamental products in all colors and shades. Over thirty beautiful designs for porches, gardens, lawns, cemeteries, estates. Big returns. Spare time, part time, or full time.

SELL ON SIGHT

Browning, of Texas, sold 245 pieces for \$965 as a side line. Ocean City, N. J., people paid Young \$3,750 for 1,000 flower boxes. Nelson, of Miss., sold 550 for \$1,650. Mueller of Ohio, sold 2,700 for \$8,700. Note average cost and selling prices of these beautiful modern pieces.

\$80 and up starts you. Molds and equipment shipped on trial. Expand from earnings. Don't let someone else beat you to this fast-growing, exclusive business. Send for free book and facts today.

Colorcrete Industries
570 Ottawa Ave.,
Holland, Michigan



START IN BASEMENT - GARAGE OR FACTORY



MODEL SHIPS

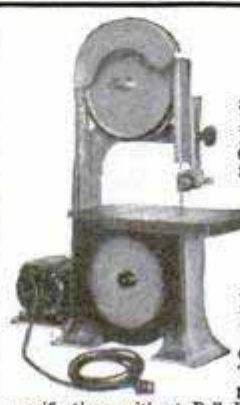


We can supply construction sets and all sorts of parts such as semi-finished hulls, blocks, desdespes, special flags, anchors, steering wheels, capstans, figureheads, blue prints, books, etc., for building real fine scale models of the Flying Cloud, Constitution, Spanish Galleon, Mississippi River Steamboat, Sovereign of the Seas, Mayflower and many others. Also special construction sets for racing sail 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 only 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. G, MINEOLA, N. Y.



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 catalogue.
J. B. WELCH, Dept. B, 724-31st St., Milwaukee, Wis.



The CARLISLE \$49.50 12" BANDSAW

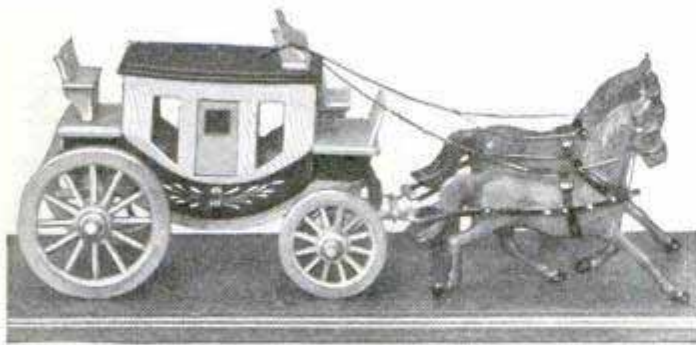
Complete as illustrated ready to operate from any light socket with 1/4 H. P., 110 V., 60 C., A. C., Motor and Extra Bandsaw Blade. Table Top will tilt from 0 to 45 degrees with Ball Bearing Guides. Shipping weight 155 lbs. \$39.50 without Motor, F. O. B. Millville.

8" COMBINATION SAW OUTFIT \$45

Complete F. O. B. Millville with Ball Bearings, 1/4 H. P. Double Shaft Motor. Base 28" long by 8" wide. Table Top 18" by 12". Will Rip, Crosscut, Bevel, Grind, Mitre, Groove, Sand, Mortise, Tenon and Polish. Everything complete ready to plug in any light socket. Same specifications without Ball Bearings, with 16" by 12" Table Top—\$40.00. Saw Table only with Combination Blade and 1/4 H. P. Motor \$30.00. Order direct or through your Hardware Dealer.

Catalog Free in which these outfits are clearly pictured. Also contains Bench Lathes, Complete Workshop, Etc. Every Machine built for real work.
CARLISLE MOULD WORKS, Inc., MILLVILLE, NEW JERSEY

You Can Build this \$100 Coach Model for \$6.48



We supply all the parts, cut to fit and ready to put together, for the beautiful coach model pictured above. When you have completed placing the parts, by following the few simple instructions that come with each kit, you will have a very attractive model of the old colonial stage that in early American history was the connecting link between cities of the original states. This early reminder of how our forefathers traveled should grace the mantelpiece or radio of every American home. Its decorative quality, as well as its historical and romantic background, will make you proud of your achievement in building it.

Our Guarantee If the model parts do not satisfy you, return them to us and we will cheerfully refund your money at once.

HISTORICAL COACH MODELS, Inc.

2206 Fairmount Avenue
PHILADELPHIA, PENNA.

HISTORICAL COACH MODELS, Inc.,
2206 Fairmount Avenue, Philadelphia, Pa.

Sirs: Please send me the parts, cut to fit and ready to put together, for the above coach model. I will pay the postman \$6.48 plus a few cents postage. Foreign orders to be accompanied by check or money order.

Name.....

Street or R. F. D.....

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

BLUEPRINT READING For the Building Trades

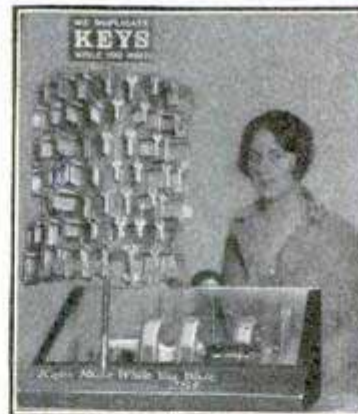


Every man who is ambitious to learn the last detail of blueprint reading will want this new book which is thorough, complete and up-to-the-minute. Written in a clear, non-technical manner. An ideal working tool for apprentices, teachers, students, carpenters, bricklayers, etc.

Over 100 pages — 50 plans and illustrations.

Cloth—Price \$1.25 postpaid

Popular Mechanics Press
Room P 6
200 E. Ontario St. Chicago



ESTABLISH A FUTURE and a permanent business

This girl took in \$98.30 the first week and her sales are more now.

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Be independent and let us teach you how.

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407 East Fort St. Detroit, Mich.

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How to raise rabbits, guinea pigs, milch goats, silver foxes, ferrets, white rats, white mice, dogs, cats, pigeons, pheasants, bantams, canaries, bees, frogs, mushrooms, ginseng and golden seal for profit. Practical 250-page book with 120 illustrations. Will be sent C. O. D. When postman hands you the package, pay him \$2 plus the postage.

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20 cabinet woods \$1.00 ONLY 200

Sets labeled and postpaid. All kinds of lumber, squares, panels, veneers and inlay woods.

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Auto mechanics, garages—in fact most anyone can easily get into profitable arc welding business with equipment that's sure to earn tremendous profits. Hobart Constant Arc Welder starts you on road to success with practically no expense on your part.

COSTS ONLY \$40 MONTHLY—30 DAYS' TRIAL

Hobart Unitrol Dial eliminates all guess work, you can weld faster, easier and more securely at lower current cost with Hobart. Write today for complete details and be the first in your community to cash in on this profitable business.

HOBART BROTHERS

Box M-601

TROY, OHIO



Make Your VEST POCKET BRING YOU \$400. A MONTH



Brand New

An article that arouses instant curiosity. Quickly demonstrated and conveniently carried in vest pocket. Protection for everybody against robbers, criminals, morons, vicious dogs, etc. yet it is not classed as a weapon, because absolutely harmless.

"Sold 17 First Day Out"

writes Hansen of Northern Illinois. Hayes of Miss. writes "Sold my first dozen in five hours. Send 3 Doz. C. O. D. at once." Agents make \$2.55 on each sale. Big extra profits on quantity. Prospects everywhere—men, women, banks, theatres, merchants, etc. You should close at least 40%.

Looks Like A Fountain Pen

INSTANT TEAR GAS PROTECTION

WITHOUT INJURY TO ANYONE

Two Tear Gas Cartridges Free

with every gun. You make 20 cents each on every extra cartridge sold.

Exclusive Territory still open. Especially attractive proposition to men controlling force of salesmen. Send Coupon for details regarding How to get Free Demonstrator, etc.

Women are not afraid to use the Atlas Gun. Great protection for women ever invented. 500 Atlases recently ordered by banks in one territory alone.



ATLAS TEARGAS FOUNTAIN PEN GUN

Atlas Tear Gas Co., Chicago, Ill. Ogden Park Station, Dept. 56

Gentlemen: Please send me particulars regarding your Fountain Pen Tear Gas Gun agency. Also tell me how I can get a Demonstrator and two cartridges Free.

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OAKS' CARD MIRACLES



Complete box of our most popular card tricks. Easily performed with instructions for each trick. Box contains Disappearing Spots, Hindoo Cards, Phantom Cards, Pick It Out Cards, Satan Card Tricks, Educated Card Dice Trick, Knock-out Cards, Diminishing Card Trick and Wonderful Ace Trick. If purchased separately would cost \$1.00. Special complete, only 50c.

Send 10c in American stamps or coin and our 1930 catalogue, Deluxe Edition, containing 302 pages of all the latest tricks and novelties, will be sent to you. We are the largest dealers in tricks of all kinds in the world. Order from this advertisement or send for our catalogue today. FREE—Our large die box trick when you have sent in orders amounting to \$25 within one year.

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With these bills it is easy for a person of limited means to appear prosperous by flashing a roll of them at the proper time. By peeling off a genuine bill or two from the outside of the roll, the effect created will be all that can be desired. Prices, postpaid: 50 bills 20c; 150 for 50c, or \$3.00 thousand postpaid.

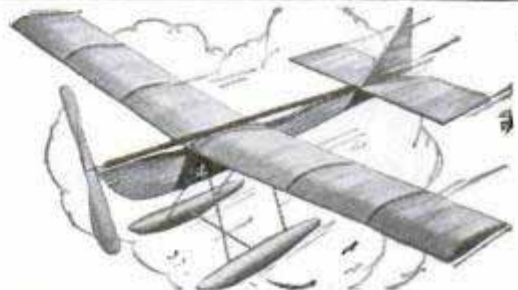
FIRE-EATER

A great trick by which you appear to breathe fire from mouth. Quite harmless. All necessary apparatus sent complete for only 30c, postpaid.



OAKS MAGICAL COMPANY

Dept. 814 Oshkosh, Wisconsin



Build and Fly this New Ideal "CONDOR"

Plans for Model Airplanes 25c each

- Floyd Bennett Monoplane
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- DeHaviland BiPlane
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- Cecil Peoli Racer

The latest idea in Featherweight Models: 22 in. size and weighs only 3/4 oz. Simplified, advanced design; all Balsawood construction; adjustable wings; adequate power for long flights; interchangeable landing gear; easy, quick construction. Get the \$1. CONDOR—Construction Set . . .

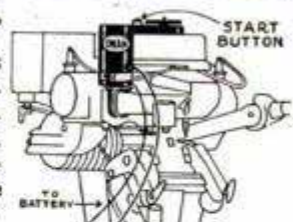
Ask your Dealer, or Order Direct. (Postage 15 cents extra) Catalog of Parts, Fittings, Supplies 5 cents for Model Builders . . .

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26 West 19th Street New York

Electric Self-Starter

For All Models of Outboard Motors

Install it yourself! Uses 6 volt car or radio battery; spins engine 300 revolutions per minute; weighs 12 lbs. Have an Up-To-Date-Motor for a little added cost. Starter complete with fittings \$35.00. Write for details.



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\$93 the First WEEK



"I worked 6 days, 6 hours a day, and made \$93 selling the new Stay-Prest Trouser Pressers."
J. W. VARNER, Iowa!

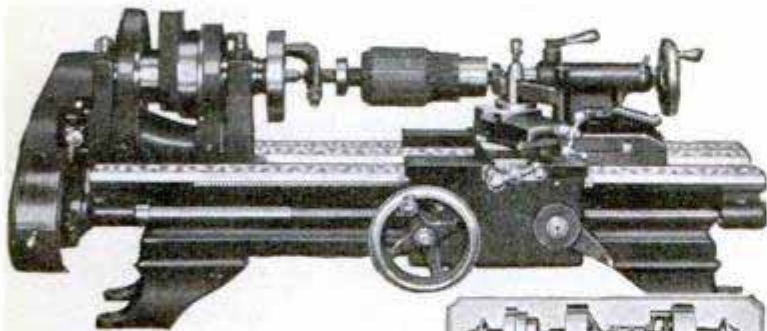
With this great invention all men can have freshly pressed trousers every morning and save \$50 a year. It puts a knife edge crease—takes out wrinkles—removes knee bag. Easily used in just a few seconds. Nothing like it. Well made, looks rich. Retail \$2.50. Big value. Every man wants one or more. A real fast seller and big repeater with 40% profit. Men and women are cleaning up big. Ten easy sales a day net you \$10. Almost sells on sight. Make big profits—others do. Jack Ames \$24 in four hours. Randie sold 25 first day. Mary Roberts made \$10 one evening. Others enjoying big profits in full and spare time. So can you. No risk. We start you.



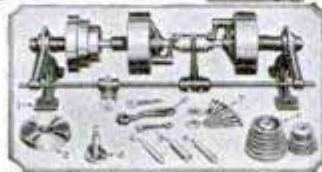
FREE sample outfit with special offer. Write quickly for offer, plan and territory.
Stay-Prest Co., Dept. C-57, Central Park Bldg., Cincinnati, O

New Model SOUTH BEND LATHES

BACK GEARED SCREW CUTTING PRECISION LATHES



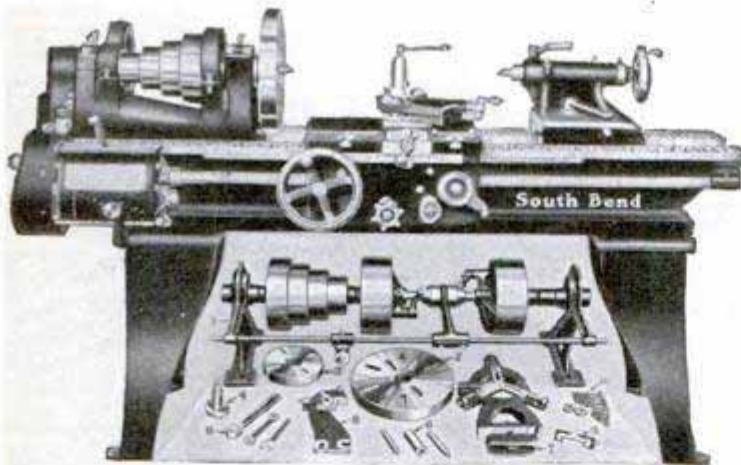
9" x 3' New Model South Bend Jr. Back Geared Screw Cutting Lathe (weight 375 lbs.). A precision Lathe for the Tool Room, Machine Shop, Electrical Shop, Repair Shop, Service Station and for quantity production of small parts in manufacturing plants. Complete with countershaft and equipment..... **\$169**



Other Sizes of this Lathe

Size	Shipping weight	Countershaft Drive	Horizontal Motor Drive
9" x 2½' Jr.	350 lbs.	\$163	\$248
9" x 3½' Jr.	400 lbs.	175	260
9" x 4' Jr.	425 lbs.	182	267
9" x 4½' Jr.	555 lbs.	190	275

Easy payments as low as \$11.41 a month, if desired



16" x 8' New Model South Bend Lathe—back geared, screw cutting, quick change gear. Most practical lathe for Tool Room, Repair Shop and Service Station. Size enables you to handle 90% of all Lathe work. Suitable for heavy production work in manufacturing. Contains all latest South Bend improvements. Weighs 2035 lbs. Complete with countershaft and equipment, price..... **\$817**

Prices of Other Popular Sizes

Size	Shipping weight	Countershaft Drive	Silent Chain Motor Drive
11" x 4' Quick Change	725 lbs.	\$359	\$498
13" x 5' Quick Change	1110 lbs.	443	602
15" x 6' Quick Change	1550 lbs.	543	720

All sold on easy payments if desired

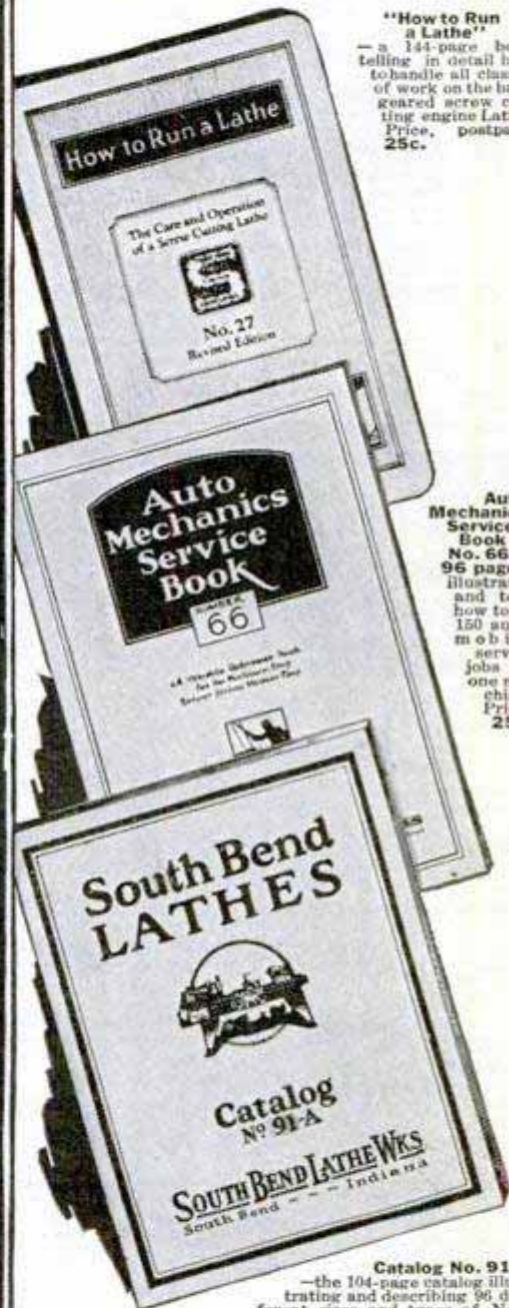
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SOUTH BEND LATHE WORKS

622 E. Madison St., South Bend, Ind., U.S.A.

Lathe Builders for 24 Years

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"How to Run a Lathe" — a 144-page book telling in detail how to handle all classes of work on the back geared screw cutting engine lathe. Price, postpaid, 25c.

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

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18-Karat
Solid White
Gold Diamond
Ring as Low as
\$15.00

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SOLD DIRECT—CASH OR CREDIT

At One-Half Regular Retail Price

RING SENT FOR EXAMINATION FREE

Look prosperous—nothing succeeds like success. Diamonds are symbolic of success and prosperity. You can easily wear one of these sparkling blue white diamonds set in artistically designed rings of 18-karat solid white gold. Diamond ring sent on Free Examination. Compare with that of any other jeweler's. Wear the ring 10 days FREE. If not satisfied return at our expense.

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**New
Invention**
Offers You
\$95 Weekly
UP TO



Ash-Pak—The Safety Cigarette Holder—Guards the Burning End of Cigarettes. Positively Prevents Ashes From Falling, Sparks From Flying.

Smokers and housewives the nation over are responding to Ash-Pak. Salespeople are making sensational earnings. Ash-Pak, safe, sanitary, adds to smoking pleasure. Sells for only \$1.00 retail. You make 100% profit. Prospects everywhere—smokers, wives buy several at a time—business offices buy in quantity lots—auto drivers buy on sight. Absolutely no competition. No experience or selling ability needed—sells itself. Fastest seller on the market.

GET YOUR ASH-PAK FREE

Our liberal selling plan offers you your Ash-Pak FREE; also many other startling features. Your sample will be an amazing money-maker for you. Simple to use, easy to sell. Send today for FREE Ash-Pak offer and selling plan.

Mail
Coupon NOW!

Amazing offer to salesmen shows the way to tremendous profits. No risk, no obligation. Grab this opportunity today.

THE NORLIPP COMPANY
588 W. Congress Street, Dept. C-6
CHICAGO, ILL.

THE NORLIPP CO., Dept. C-6,
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Gentlemen: Send me without obligation full particulars of how I can get my ASH-PAK FREE and other features of your selling plan.

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STREET.....
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\$6120 EARNED BY MR. CHAI SELLING OUR PENS

"I can honestly say that I have earned average \$60 weekly for the last two years selling those pens." Joseph Chai, Ill.

MONEY BACK IF NOT PLEASED

No. 1 self-filling fountain pen, as illustrated has stylo point.
SEND ONLY

39c

SELLS FOR \$1.25

GUARANTEED A LIFE TIME



Writes and looks like a 57 pen.
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SPORS IMPT. CO., 430 Main Street, LESUEUR CENTER, MINN.



Schieber OIL TRAP for Model "A" FORDS

Stops the oil from splashing through the breather pipe. Saves Oil. Keeps the motor clean. Simply insert in filler cap as shown in cut. Positively stops oil splashing but does not stop air circulation. Will pay for itself over and over again in oil saved and in keeping motor clean. Will last a lifetime.

AGENTS

Every new Ford owner needs one. Will gladly pay \$1. Prices, each 50c; 3 for \$1; down \$3. **Send 21 for 3.**

SCHIEBER MFG. CO., Inc.
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Electrify Your Radio for

With Townsend "B" Power Unit. Over 150,000 in use. Hooked up in a few moments. Use same tubes—no changes. Better reception—distance. Send name and address for details, Proof and Free Trial Offer.

TOWNSEND LABORATORIES, 715 TOWNSEND ST., CHICAGO, ILL.



Build a Ship Model at Home



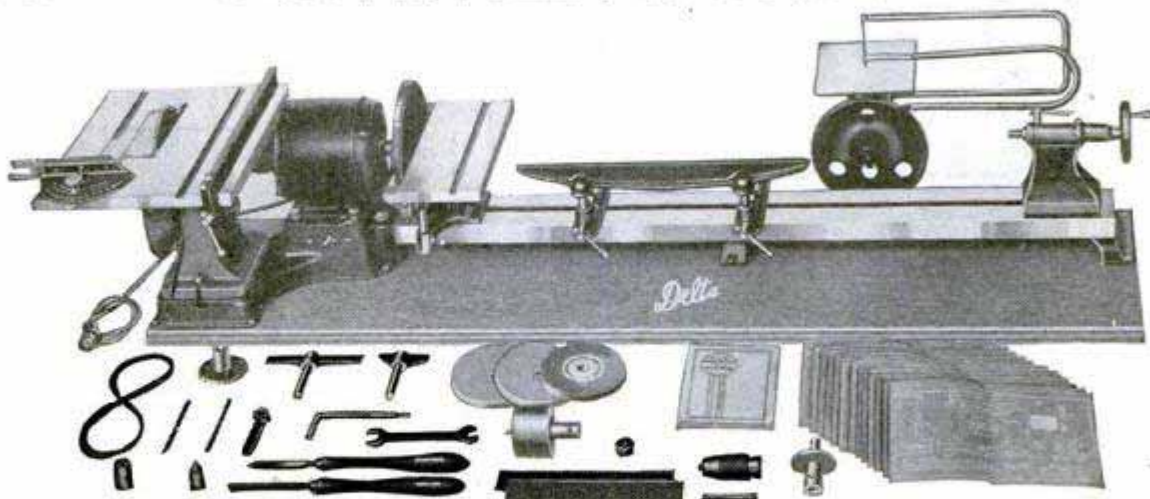
It is a wonderful fascination and a beautiful decoration for your mantel, radio cabinet or it may be used in any part of the home. We have parts for the following models:
SANTA MARIA \$4.98; LA PINTA \$4.98; MAY-FLOWER \$4.98; CONSTITUTION \$6.98; FLYING CLOUD \$6.98. All F. O. B. Perkasio plus a few cents postage.

These models are sold in knock down form. All parts are cut to fit and ready to assemble. They will be sent anywhere in U. S. C. O. D. Money order or check must accompany all foreign orders.

Write for free illustrated catalog

MINIATURE SHIP MODELS, INC.
Dept. RT-6 Perkasio, Pa.

Make Your Own SUMMER FURNITURE



with "Delta" Woodworking Units

Blueprints

\$1 We will be glad to furnish our complete set of 10 Working Blueprints of Summer Furniture upon receipt of \$1.00.

Making things out of wood is so easy and quick with this practical, efficient, "Delta" equipment. Saves time, eliminates hard work, and produces better results. Wonderful fun, splendid relaxation as a hobby. A good money-maker too, either full or spare time. "Delta" machinery quickly pays for itself. Complete "Delta" line includes 4" Jointer, Circular Saws, Wood-Turning Lathes, Jig-Saws, Band Saw, Moulding Cutter, and numerous other items of interest to woodworkers—all at astonishingly moderate prices.

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Send coupon for FREE illustrated literature showing new 1930 Delta line. Also full details of EASY PAYMENT PLANS and 10-DAY TRIAL OFFER. Mail coupon to Dept. A-630.

DELTA SPECIALTY COMPANY, Dept. A.630
Division of "Delta Manufacturing Co."
1661-67 Holton St., Milwaukee, Wis.

Please send me FREE illustrated literature describing 1930 model "Delta" Woodworking Units. Also details of 10-Day Trial Offer and Easy Payment Plans.

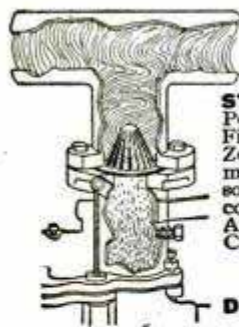
I enclose \$1.00 for set of 10 Summer Furniture Blue Prints.

Name

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EVERY MAN CAN SELL ZENITH WHIRLGAS CARBURETOR ATTACHMENT

Earn \$150.00 Weekly and More SAMPLES FREE with order



STOPS GASOLINE WASTE. More Speed. Power. No Carbon. Super-Charges the Gas. Fits all cars. Zenith Whirlgas Carburetor Attachment saves motorists many gallons of gasoline. Thousands sold. Motorists and garages buy. Exclusive contract; big pay. Also Zenith Speed Heads. 8-12 Valve System Chevrolet, Fords, T & A. Write for Catalog, Discount Sheet.

ZENITH MFG. CORP.
Dept. E, 1456 13th Street, Milwaukee, Wis.
Sales Managers and Salesmen Wanted.

MOTORCYCLES

Wonderful Bargains



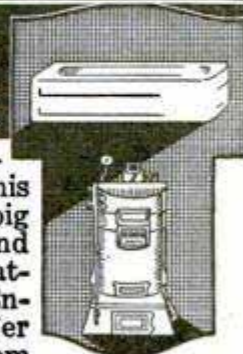
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Send 10 cents for Bulletin A.
Motorcycles shipped to all parts of the world

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Our NEW EASY METHOD enables any handy man to install his own heating and plumbing at a big saving. Material is cut to fit and tools are loaned for installing heating plants and plumbing. Our Engineering Department will offer complete specifications free from your sketch. Sketch blank and latest catalog mailed on request. **10 YEAR GUARANTEE.**



OVER 50 YEARS **HARDIN-LAVIN CO.** EST. 1876
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FLY THIS COMBAT MONOPLANE!



This realistic copy of a military monoplane is an unusually graceful flyer. Wing-spread 18 in. Weight only 7/8 oz. Will take off by own power and fly over 80 ft. Markings in red and blue. Can be built in 2 hrs. without tools. Construction set includes 6-in. aluminum propeller with shaft, 1/4 in. disc wheels, wood struts, rubber band motor and all other parts, with clear directions. Complete set, packed in un-

breakable container, only \$1.00, postpaid in U. S. and Canada. Order today. Satisfaction or money refunded.

The MIDLAND MODEL WORKS, Chillicothe, Ohio
(We cannot make C.O.D. shipments. No retail catalogue issued.)



Pays for Itself—No Expense to You

Start a Money Making Business of your own. Mechanics, Filling Stations, Repair Shops, Garages and Battery Stations are all making BIG MONEY with HB 8 Hour Battery Service. Recommended by the leading car and battery makers. Constant Potential lets you give a better charge than the other fellow in one-third the time, and at a saving of 30% to 50% on current. Anyone can operate. Check coupon below for full information on how to get started in this money making work.

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Pays for Itself—Brings a Big Profit Besides

Only \$16 Monthly

30 DAYS' TRIAL AT OUR RISK

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CAR WASHER

The best paying work in automotive field today is 20 minute car washing. Puts you above competition — eliminates all drudgery! Users report \$100 weekly profits. Liberal trial, easy terms. Savings in labor and material over other methods will easily pay for it.

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Portable Paint Spray does the work of five brush painters. You get four men's wages as profit. Paints Cars, Houses, Garages, Barns, Furniture. No experience necessary to operate. Check coupon for trial offer and terms.



Paint Spray

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Free Air Service costs you only \$12 monthly for a few months. Fully Automatic day and night service will draw customers to your shop as well as operate your air tools. Check coupon for full details without obligation.

Only \$12 Monthly

HOBART BROS., Box M 60, Troy, Ohio

Hobart Brothers, Box M 60, Troy, Ohio. Send me complete information on the items I've checked—your thirty-day trial offer—easy payment terms—information on how HB equipment will increase my earnings.

- HB 8 HOUR BATTERY CHARGER
- HB TEST BENCH
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- HB AIR SERVICE
- HB CAR WASHER

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

\$10,000 PERFORMANCE

Build it for \$199

In the new HEATH PARASOL. 10c in stamps or coin for large illustrated booklet.



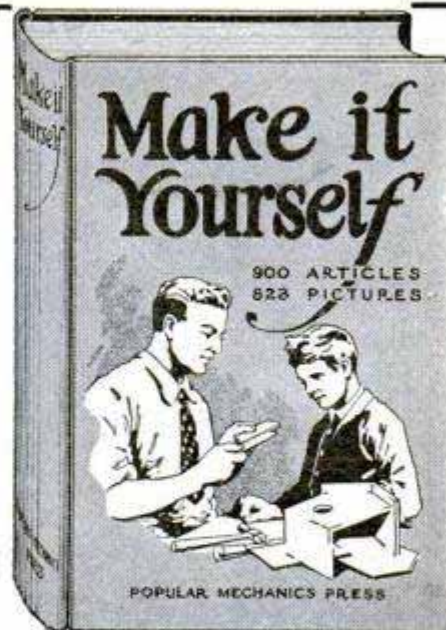
9975 Ready to Fly

HEATH AIRCRAFT CORP.

1721-29 Sedgwick St.

Dept. P-6

Chicago, Ill.



For Your Home Workshop

You should have a copy of this book recently published by Popular Mechanics entitled

Make It Yourself

The home mechanic, whether young or old, amateur or professional, will take pride and delight in making many of the things described therein.

Both father and son will find fascination and an association of interest in making useful and ornamental articles for mother to admire upon their completion.

900 Articles All Different

There are attractive ship models, a great variety of toys that operate themselves by means of an ingenious application of mechanical principles, novel amusement devices for indoors and outdoors, for both water and land, unique designs in furniture for children, scores of useful appliances for the home, things of beauty and utility for lawn and garden, etc.

Special articles instruct the amateur mechanic in the care and use of tools, special tools for special purposes, how to read and use plans, how to solder, the making of a handy work bench, cuts, joints and methods in woodworking, automobile repairing, installing radio equipment, house wiring, fixture hanging, working in glass, leather, metal, celluloid, lathe work, utilizing parts of old machines to make equipment that would be expensive to buy, etc.

Some of the Articles:

- Tools for the Home
- Mechanic
- Ship Model Maker's Tools
- Build Your Own Ship
- Model
- Ship Model Plans
- Water Sprite
- Puzzles
- Crazy Clown
- Walking Wampus
- Winter Toboggan Slide
- Colonial Bric-a-Brac
- Merry-Go-Twist
- Wiggling Pup
- Black Cat Bench
- Christmas Toys
- Skating Whirligig
- Venetian Swing
- Bird Houses
- Monorail Coaster
- Writing Cabinet
- Workbench
- Tea Wagon
- Radio Apparatus
- Lawn Canopy
- Camp Car
- California Cooler
- Musical Instruments
- Hedge Trimmer
- Homemade Baseball Game
- Small Turbine Motor
- Tools from Sewing Machines
- Small Valves
- Bench Lathe
- Auto Glare Shield
- Seesaw Merry-Go-Round
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Stories of Stars who were not "Born" but "Made"—No. 4

He won his own game

Yet in prep school, this famous college pitcher couldn't even make his class team

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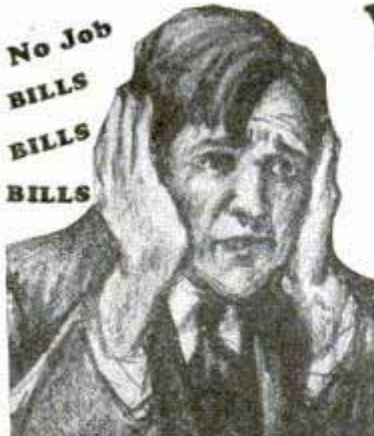
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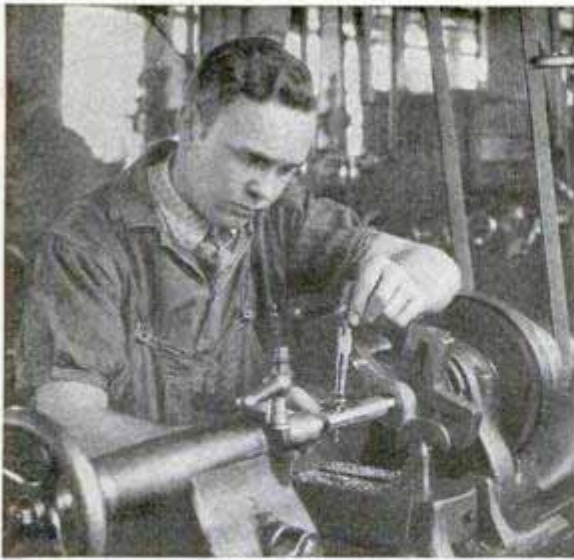
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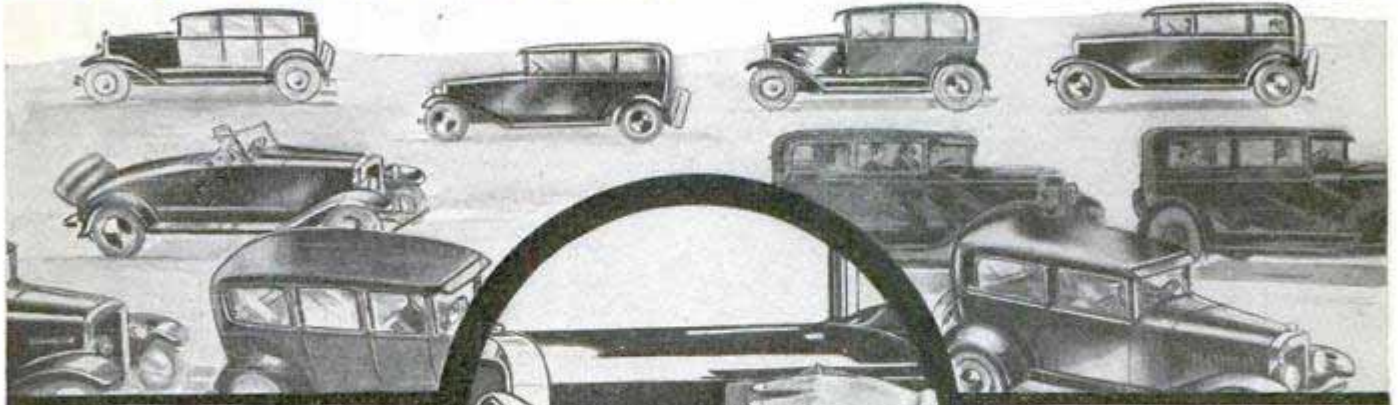
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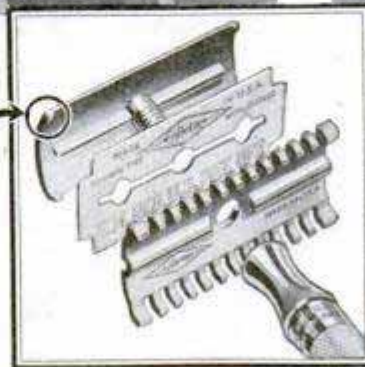


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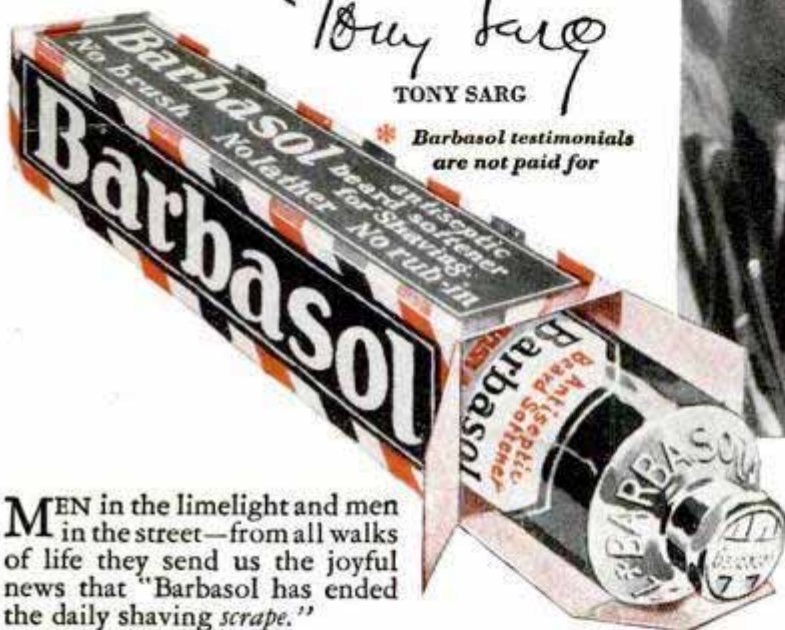
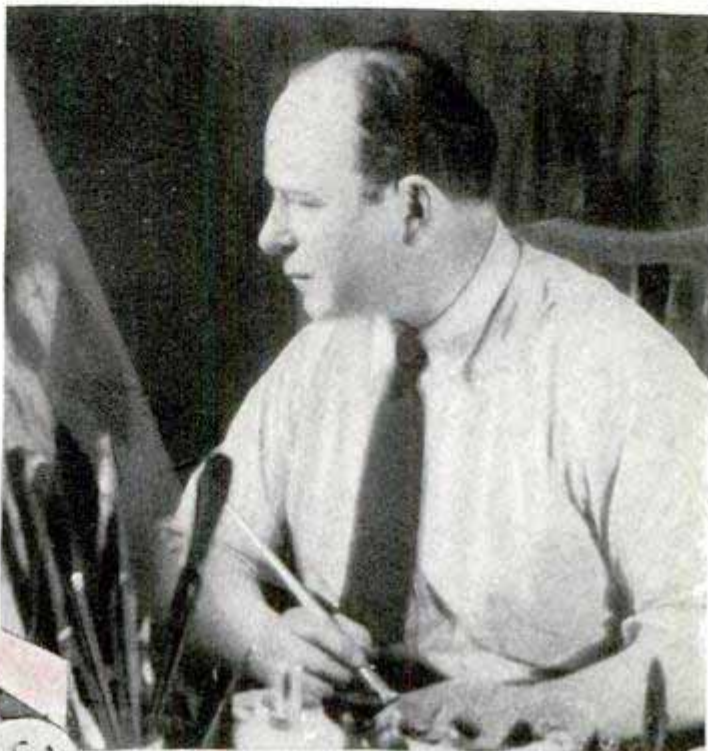
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