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# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

REG'D. TRADE MARK, GREAT BRITAIN, NO. 40428



### "BALLOON BIRDS"

Latest Air  
Game

SEE PAGE 518



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# ROAD SHOCK!

*the steering gear takes  
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The grinding friction of crushing pressures, severe impacts and road shocks that the steering gear is forced to carry would destroy this vital element without effective lubrication.

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# Record Breaking Money Maker

2,500 Dozen Sales in First 6 Weeks

## Brings Prosperity to These 2 Men!

Now you can know the whole truth about the amazing new food sensation advertised in Popular Mechanics last month. CORN Chips have taken the country by storm—swept other fried foods into the background and given the public's taste a new thrill—already operators are wiring and 'phoning success reports from all parts of the country. "Corn is King," and KING korn CORN Chips are piling up unheard of sales records—bringing phenomenal profits to local operators everywhere. Read these exciting stories of success and learn how you can cash in, too!

**L**EE DERRY and his old friend, Roy Zahringer, saw so much in this startling proposition that they quit their jobs, invested \$150.00 in the CORN Chip business and at the end of six weeks, had sold 2,500 dozen bags of this new Prosperity Product. They got back their original investment, paid themselves salaries—moved into bigger quarters—and put a substantial profit in the bank. Every single sale was made through dealers. They appointed over 700 dealers in the first three weeks and then found the proposition so good that they ELIMINATED the 200 dealers who were only selling a dozen bags a week. 500 dealers—each one selling two dozen bags a week, or more. Is that a business? Is that a record?

### Others Report Success

Lambert of Chicago sold 1,896 dozen bags the first six weeks. Took in \$1,011.20 in cash. Another Chicagoan sold 200 dozen the first week. Carlquist started three weeks ago. Now has 230 dealers handling bag sales, in addition to bulk business to bars and saloons. Never before has the food industry seen such a breath-taking, overnight success and big companies already are bidding for exclusive rights.

### You, Too, Can Cash In

The big companies are not going to have this product. Instead, we are appointing local manufacturers in every community in the United States. Here is an opportunity for thousands of men who are tired of fluctuating incomes—men who are able to recognize an extraordinary opportunity—wide-awake, aggressive men who want to see their energy and enthusiasm produce the greatest possible results in the shortest possible time. Ordinarily, a proposition

**KING korn CO., Dept. K-510**  
54 W. Illinois St. CHICAGO, ILLINOIS

### QUICK FACTS

**H**ERE, briefly, are the high spots of this thrilling new business that will create "fortunes" for those with the vision and foresight to get in on the ground floor now.

1. Corn Chips are new—tasty—delicious—different. They have all the appeal of a novelty, yet fill the place of a staple. They are big repeaters. They look like a sparkling face—their taste is like nothing you have ever tasted before. They have the salty tang of a potato chip, but none of the oily after-taste. They have the crunchy crispness of sea foam. They have the subtle, delicate, delicious taste of Corn. They are the color of sparkling yellow sunshine. No wonder they have swept into the market as an overnight success. No wonder people are saying, "Corn is King."
2. Stores handle your entire output for you. You simply manufacture and sell your output at wholesale.
3. One machine can cook enough CORN Chips in a day to sell for \$42.00 at wholesale.
4. A protected product and a protected process. Only our licensees can make or sell under our Patents applied for. Hence, no cut-throat competition.
5. Good all seasons—summer or winter—North or South.
6. Big profits to be made in smallest town or biggest city.
7. Absolutely no experience needed to be successful.
8. No expensive equipment needed. Your whole investment can be earned back the first week.

This is truth; not fiction—fact; not theory. To the best of our knowledge, no other business in America offers one-tenth the opportunity for profit and independence.

as big as this would require the purchase of expensive equipment. But, in this case, you can go into this business for an investment of less than \$150.00.

### \$100 a Week

Here's a proposition that you can make to fit your

ideas of a business. If you want a one-man business in a small town and are satisfied with \$75.00 to \$100.00 a week, here it is for you. And you can run it from your kitchen at home. If you live in a big community where you want to develop big tonnage, you can expand this business just as rapidly as you care to, by hiring unskilled labor to do the work while you call on dealers and build up the business. And the beauty of it is this: You don't invest \$1,500 or \$2,000 on a gamble. Instead, with our small standard equipment, you start on a "shoe-string" and build up as your profits accumulate.

### No Cut-Throat Competition

If any Tom, Dick or Harry could come into the field and manufacture this product, big companies would jump in and cut prices to such an extent that there would be no profit in the business for anyone, but, since both the raw material and the process of cooking it are fully protected by application for Letters Patent now pending, it means that only our licensed operators will be able to sell CORN Chips. That means that they will be able to maintain prices and thus keep up the big margin of profit.

### Act Quickly—Facts Free!

To all who are interested, we request permission to mail an unusual and complete presentation. There is no time to lose. Today this proposition is new. Tomorrow it will be a little older—next week a little older still. So get the facts without a moment's delay. It's the newcomers who always reap the richest rewards. The coupon printed below will bring you all the facts without the slightest cost or obligation. Send us your name and address today—at once, and be the first in your community to reap the rich rewards to be paid to KING Korn operators.

KING KORN CO., Dept. K-510,  
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Tell me quick how I can start a KING Korn Business, for less than my first week's potential profits. I am not under any obligation to purchase equipment or start this business, but, if it interests me after investigating the facts you send, I have, or can get, enough money to start.

This One



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## FRIEND AND NEIGHBOR

CLOSE to those who live in small towns, and farther out upon the farms, is the helpful service of the telephone operator.

In the truest sense, she is both friend and neighbor. Ties of kinship and association bind her to those whose voices come across the wires. Through her switchboard pass many messages that are important to the life and business of the community.

Bright and early in the morning she puts through a call that helps a farmer locate a drill for sowing oats. Another connection finds out if Jim Thomas, "over near Bogard," is feeding a bunch of calves and needs any shelled corn. Another gets the latest price on heavy hogs for Bill Simpson.

Through the day she aids in calling a doctor for Mrs. Moore, whose baby is ill. Plugs in an emergency call

that sends an ambulance east of town. Puts through a long distance call for Bob Roberts, whose boy attends the state college. Then, through the night, stands ever ready to help those in need.

Constantly in her mind and activities is one fixed, guiding purpose . . . "Speed the call!" And the further thought that she serves best when she serves with courtesy and sympathetic understanding.

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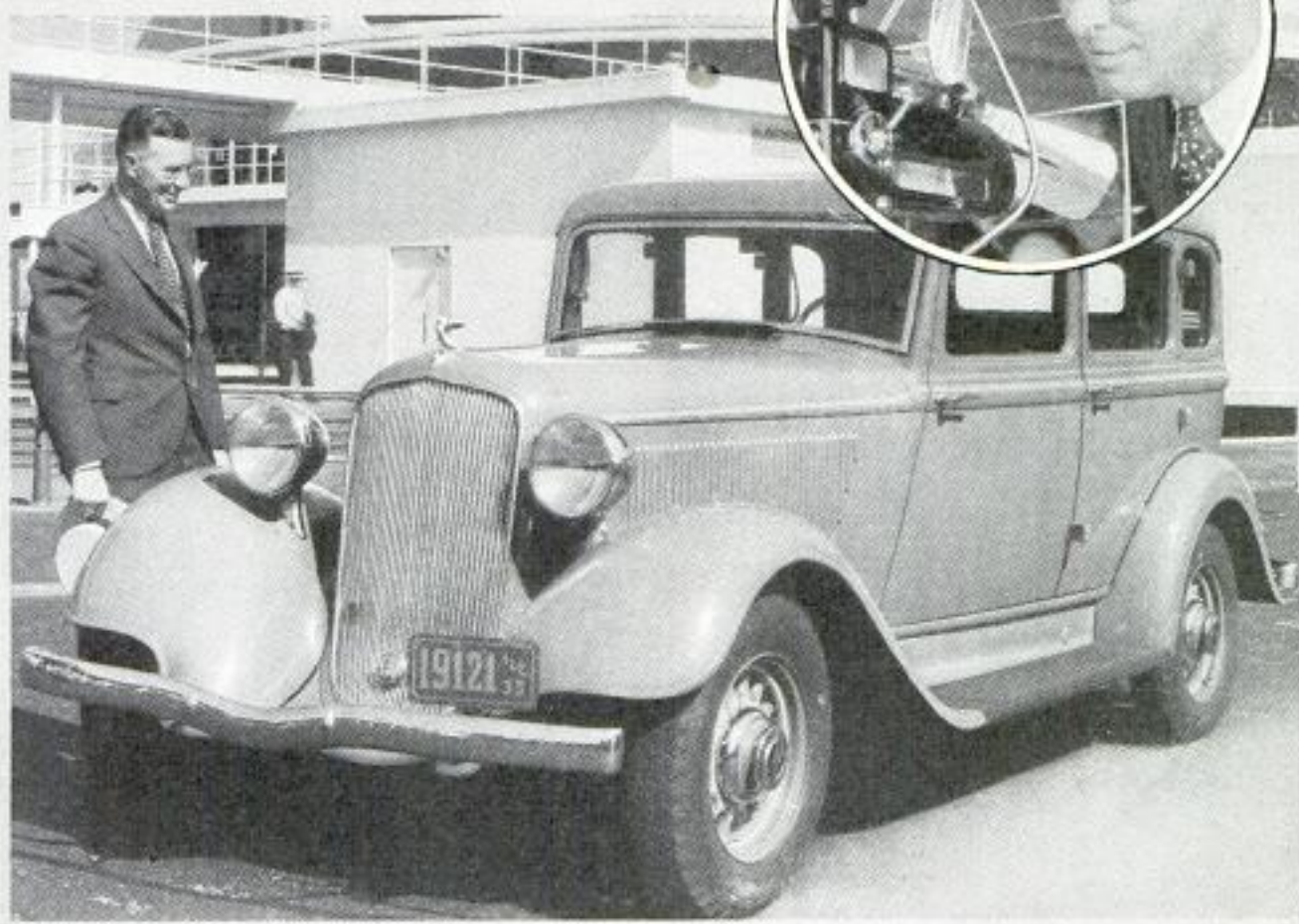
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# WILL YOU TRADE

one year's leisure time  
for  
Success ten years earlier?



**F**ASTER, faster, the years speed by—yet your work drags and your goal seems still so distant that despair grips your heart.

You ask yourself—"Will I ever get there? Or will I get there *too late*?" And you see yourself finally winning success, an old man trying to enjoy the rewards which only the younger man can fully appreciate.

You know what the next ten years are likely to be—barren years—drudgery years, wrongly called *experience years*!

Business demands—and pays—trained men. But business leaves it to you whether you prepare yourself through long routine, or short cut with specialized training.

You can actually "trade" a year's spare-time study for ten years' routine experience—get at home in leisure time the experience-knowledge that most men spend years of labor to get—the trained ability that business pays for handsomely. This is no idle statement, but a fact—established by over 50,000 records in our files. Let us consider a few of these—

**In 1924 a Bookkeeper—  
In 1927, Vice-President**

Mr. A— of Indiana was marking time in a bookkeeper's job back in 1924—after a fine war service and various attempts to find himself in farming, in managing a truck line,

and in other jobs. With his enrollment in LaSalle came the change upward.

First he became office manager of a cannery firm, then entered the automobile field, and in 1927 became vice-president of one of the large automobile sales agencies of the Middle West. He says, "*Spare time invested in study with LaSalle pays compound interest.*"

**In 1918 a Rate Clerk—In 1923,  
Head of Own Traffic Bureau**

After a few years in a little Indiana school, Mr. P— learned telegraphy and went on from that through a number of railroad jobs. In 1918, and already over 40, he had progressed only as far as a rate clerk's job in an automobile plant. Then he learned about LaSalle training in Traffic Management and his real success began. In five years he established his own Traffic Bureau and has made an outstanding success of it. Today he is a registered Practitioner before the Interstate Commerce Commission and a charter member of the Association of I. C. C. Practitioners. And he writes, "*LaSalle training pays.*"

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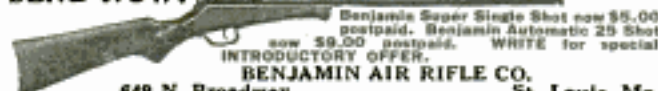
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30x5.50-19	3.35	30x5.50-19	3.75
30x5.50-20	3.40	30x5.50-20	3.75
30x5.50-21	3.45	30x5.50-21	3.75
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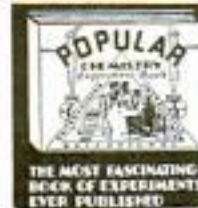
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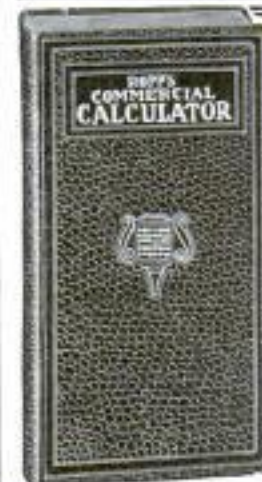
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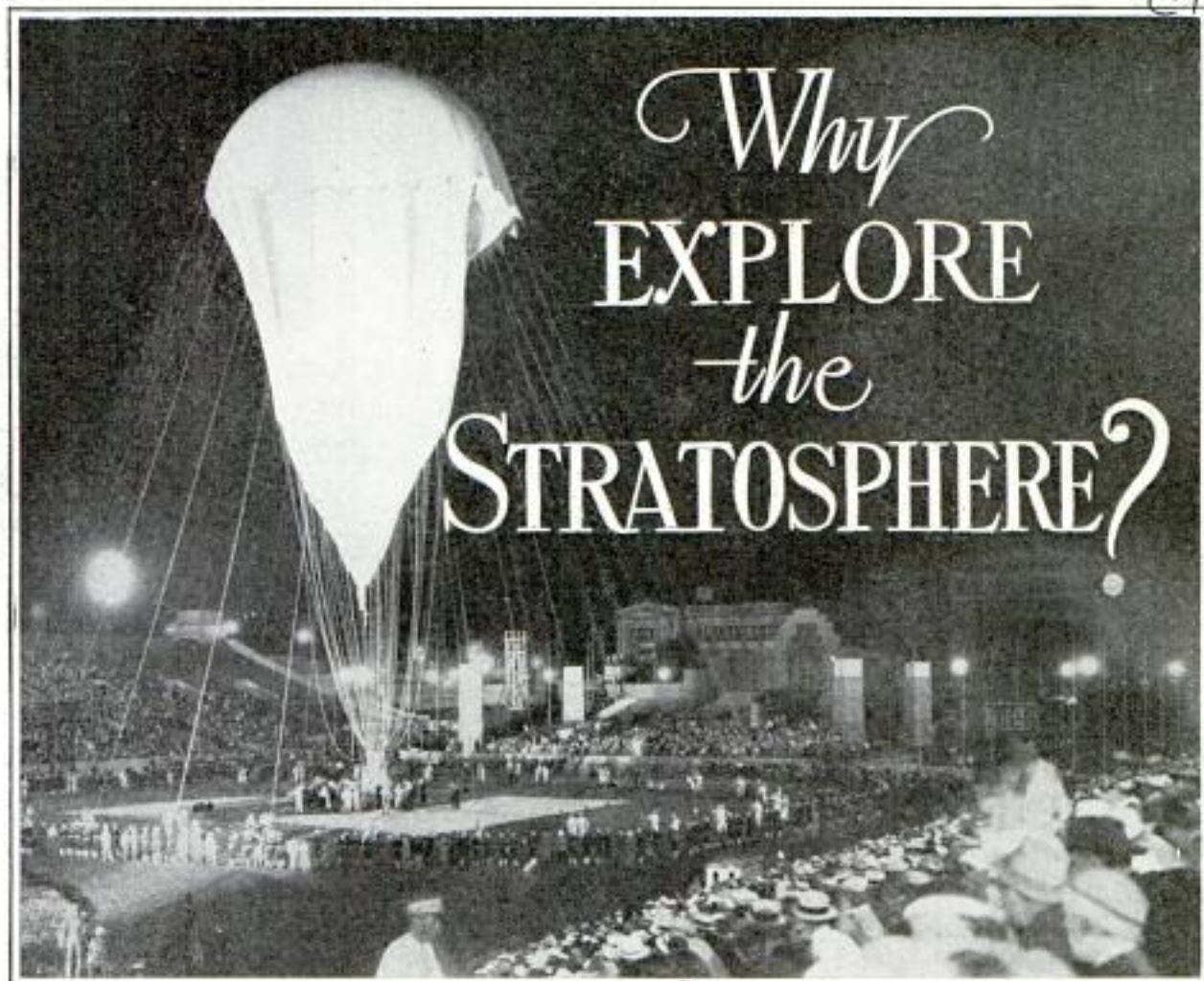
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 60

OCTOBER, 1933

No. 4

C1214.



Start of a Stratosphere Attempt Which Ended in Failure; This Balloon Started from the Chicago World's Fair with Lieut. Commander T. G. W. Settle but Was Forced Down

**T**HIRTY years ago the stratosphere was a vague region of cold emptiness known only to a few men whose imaginations soared above the clouds. Today it is a region whose major divisions are as well-defined as the earth's continents, and its systematic exploration is a work of huge importance.

Five nations are pushing important stratospheric work, mostly in the nature of airplane and balloon expeditions, and numerous pioneers are trying to discover new ways of conquering this cold kingdom of mystery where there is no sound but the majestic music of the spheres,

where the skies are deep blue, purple, and blue-black, where the sun shines forever, and the stars gleam with the cold ferocity of dagger points.

Many things fill the void of space, men have just discovered. There is, for one thing, an invisible maze of radiations astonishing in their power and range. Unexpected news drops from the skies, news that will divert the energies of man and change the course of civilization. Now, you may say, these may be wonderful phenomena to scientists interested in the laws of physics and mathematics, but how do these wonders of the stratosphere af-

Don Blaszman, 55 W. 86th<sup>481</sup>  
New York

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Lieut. Commander Settle Inside the Metal Gondola of His Stratosphere Balloon with the Radio with Which Two-Way Communication Can Be Maintained from the Earth

fect me? One hint in this direction comes from Wiley Post, who flew the "Winnie Mae" around the world. He came back to New York cheering the high altitudes. If you want to swing around the globe swiftly, safely, and comfortably, he said in effect, go "upstairs." He is anxious to demonstrate that the higher you rise the faster you fly, that speeds of 500 miles per hour are not only practical but highly desirable, that circumnavigation of the globe need require but two days of any man's time, and that all these things are now realizable if we apply our present-day knowledge.

Now one understands why nations with far-flung colonies and wide interests have taken the stratosphere to heart. India, now one week from the motherland, may become an eight-hour neighbor to London, and France, with vast colonies needing reclamation, sees the possibility of knitting her colonial empire into an invincible union. The Farman stratoplane "F-1000-1," sponsored by the French government, is now undergoing tests prepara-

tory to making expeditions into the stratosphere.

The "Winnie Mae" was able to fly 200 miles an hour at an altitude of 15,000 feet. What Post wants to test now is a new supercharger which will permit his engine to deliver its full rated 550 horsepower at a level of 35,000 feet. He also wishes to add a controllable pitch propeller which can grip the air at 35,000 feet and thus take full advantage of the engine's power.

There are also other reasons for invading the stratosphere and there are, besides, other ways of carrying on the exploration. The weather man pioneered in stratospheric exploration. He sent up meteorological balloons carrying self-recording instruments attached to a parachute. He sought to know, and still wants to know, more about the temperatures, wind velocities, barometric pressures, and amount of water vapor in the thin upper strata. All these things have a direct bearing on the daily weather.

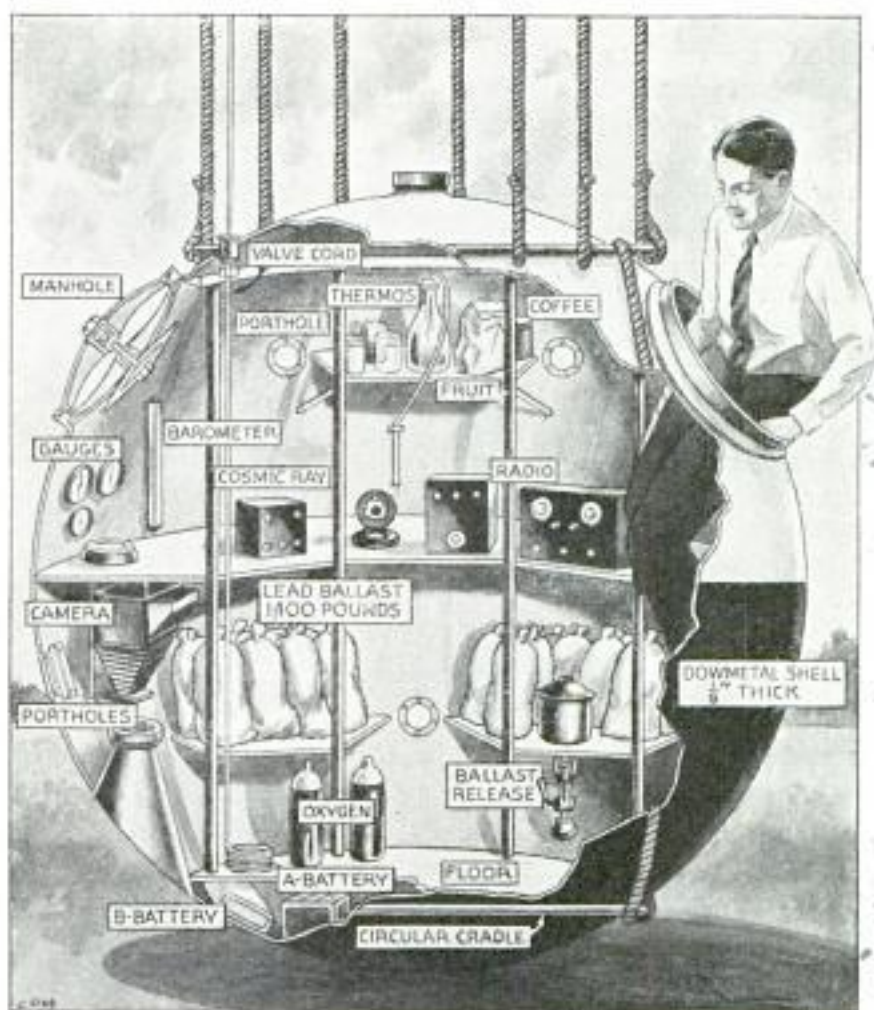
But there is no adequate substitute for

human observation and that is why there was such great interest in Auguste Piccard's successful sallies into the blue. He went to study "cosmic" rays; and the important result of his observations is that these mysterious radiations may not be cosmic after all. He is prone to believe that they originate in the stratosphere itself.

But what are cosmic rays? That question is still practically unanswered, even though we are positive that such rays exist, and that they have a power and penetrability that upsets all our old notions. Not even mountains of rock can stop cosmic rays. They pierce an atmosphere 300 miles thick plus twelve feet of solid lead! And of what earthly use is the cosmic ray to us? "Cosmic rays may be our energy of the future," answers Piccard. "The energy in each cosmic ray is one million times greater than that produced by the most violent reaction between molecules or atoms. Think what this means for the engineer? The raw materials cost nothing—water, for example. The transformation of the atoms of three drops of water would produce enough cosmic energy to light a city for a night."

The cosmic rays found on the surface are different from those in the upper spaces, because the radiations are weakened and changed by absorption in the atmosphere. Therefore, it is necessary for men to soar into the atmosphere if they are to discover the real nature of the cosmic radiations.

Another possible means of human flight into the stratosphere is by the rocket. It has great potentialities, but it is still undeveloped, awaiting the finding of a proper fuel. The man-carrying rocket will take up the work where the airplane and



Drawing of Interior of Stratosphere Gondola Showing Arrangement of Food, Oxygen, Ballast, Photographic and Scientific Equipment

balloon are forced to give up. According to Piccard, we cannot expect the present type of balloon to go beyond twenty miles. The airplane, whose efficiency requires considerable air density, may reach its limit even lower than the balloon. But rockets will find their element in the thinnest atmosphere. Authorities predict altitudes of 1,000 miles and more, and the rocket's range will depend only upon its ability to carry a fuel supply.

Aside from cosmic rays and meteorological studies, Lieut. Commander T. G. W. Settle, navigator of the stratospheric balloon sponsored by A Century of Progress, wants information on the blanket of ozone which is believed to absorb a great deal of the sun's ultra-violet energy before it reaches the earth. Not least among the aims of stratospheric flight is the acquisition of more knowledge about the ability of the human system to withstand the rigors of traveling in thin air. Can our body engines adapt themselves to the high

altitudes as well as to the high speeds which we contemplate there?

Engineers are also interested in the effect of stratospheric conditions on various substances like cloth, wood, alloys, and native metals. It is already known that certain metals become brittle when subject to low temperatures. In some instances it has been found that wood is superior to metal as regards strength. The attempts of scientists to study variations in the sun's radiation has not met with complete success because of the problems created by the thick atmospheric blanket. Far above the clouds, the sun's intensity must be very steady and stratospheric explorers will be able to study solar radiation to great advantage.

The photographs made by Piccard from an altitude of 50,000 feet made the giant Alps appear like miniature hills intersected by trickles of water. If there were no mist, Piccard might have looked down on a circular area of about 250,000 square miles of the globe's surface. The immediate possibilities of high-altitude photography for community planning, for transcontinental mapping and surveying, for

economic planning, for flood control and military operations are at once apparent.

The stratosphere pilots must navigate in the midst of an eternal bombardment of meteorites. Whether it is only 5,000,000 or 50,000,000, as some state, the fact remains that the earth is a target for many of the so-called shooting stars. These meteorites expend tremendous energy when they come into contact with the frictional force of the atmosphere. Fortunately for us, most meteorites consume themselves in passing through the dense air blanket. Some fair-sized meteorites which are observable from the earth travel at an average altitude of seventy-three miles. But their speed is phenomenal. Thirty miles per second is quite common; and they have been seen to go as fast as sixty miles per second. Also, the atmosphere probably is freighted with electrical fury, and such disturbances may involve hundreds of millions of volts at one stroke.

These are some of the problems awaiting stratospheric explorers. There is reason to believe that other sources of energy and other reactions abound in the great universe once called empty.

Research discovery Mrs. U. Koehring  
and H. J. Puytherch, U. S. Fisheries Dept.  
Biological Laboratory

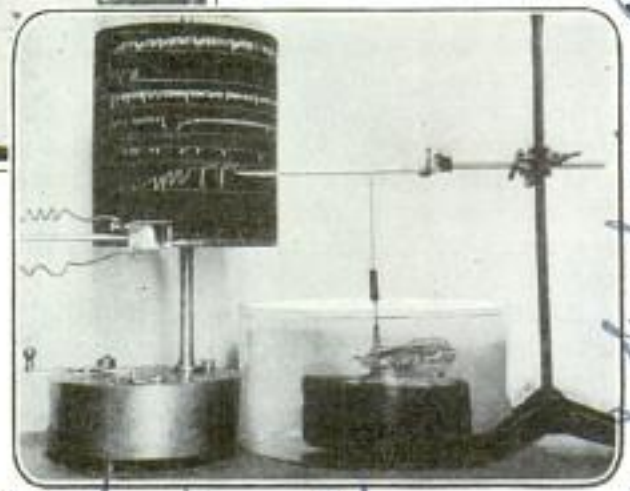


Top, Treating Oysters in Chemical Baths; Right, Instrument Records Muscle Action

**OYSTER SHELL EASILY OPENED BY CHEMICAL TREATMENT**

Oysters can be opened easily by a chemical treatment that has the effect of a narcotic, causing the oyster's adjuster muscle to relax so that the knife can be inserted

in the shell. By recording muscle actions it was found that in baths of diluted hydrochloric acid, the oyster relaxed without injury to the meat. Only five cents' worth of acid is required for treating 1,000 oysters, saving between thirty and fifty per cent in labor.



Research discovery of Mrs. U. Koehring and H. J. Puytherch

U. S. Fisheries, Bean-fort. N.C.

*Escondido, Calif.*

# Moving Shelves Bring Groceries to Customers



*operated by A.C. Jones*

"Merry-Go-Round" Grocery Store with Revolving Shelves Which Move the Entire Stock Past the Customers Every Few Minutes; the Shelves Are Moved by a Small Motor

One Los Angeles grocery store parades its stock past the eyes of its customers instead of asking patrons to wander about hunting a bottle of olives or a sack of flour. The customers are seated on stools at a counter and the shelves move slowly past, giving plenty of time to make a selection. Eight minutes are required for all the shelves to pass by any one customer. The revolving shelves are 157 feet long and are operated by a one-horsepower electric motor. There are sixty-three sections in three ledges for groceries, and baskets for the chosen articles rest on the counter in front of the patrons. Each section is numbered and has a button so a clerk may be summoned, and prices are listed beneath each article shown. The replenishing of the shelves is done from the rear. The butter, milk and cold-drink section is separate and is operated by pressing a foot lever, causing a glass slide to drop. When the customer is ready, he releases the lever and the slide goes up. Except for boys to keep the shelves filled and a cashier to check purchases, the "merry-go-round" store can be operated virtually without man-power, since the

stock is brought to the customer, and the patron requires no aid in locating the various items.

## FUEL PUMP TESTER FOR AUTO CHECKS CAR PERFORMANCE



Automobile fuel pumps can be checked quickly and accurately on the cars under actual working conditions with a testing apparatus now on the market. It checks the suction pull of the pump and pressure against the carburetor float valve, and in addition detects leaking valves, defective diaphragms or leaking fuel lines while the motor is running.

*Rotisserie Market*

*Cropley Testscope Co. 38 S. River St. Aurora, Ill.*

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*Cropley Testscope Co. 38 S. River St. Aurora, Ill.*

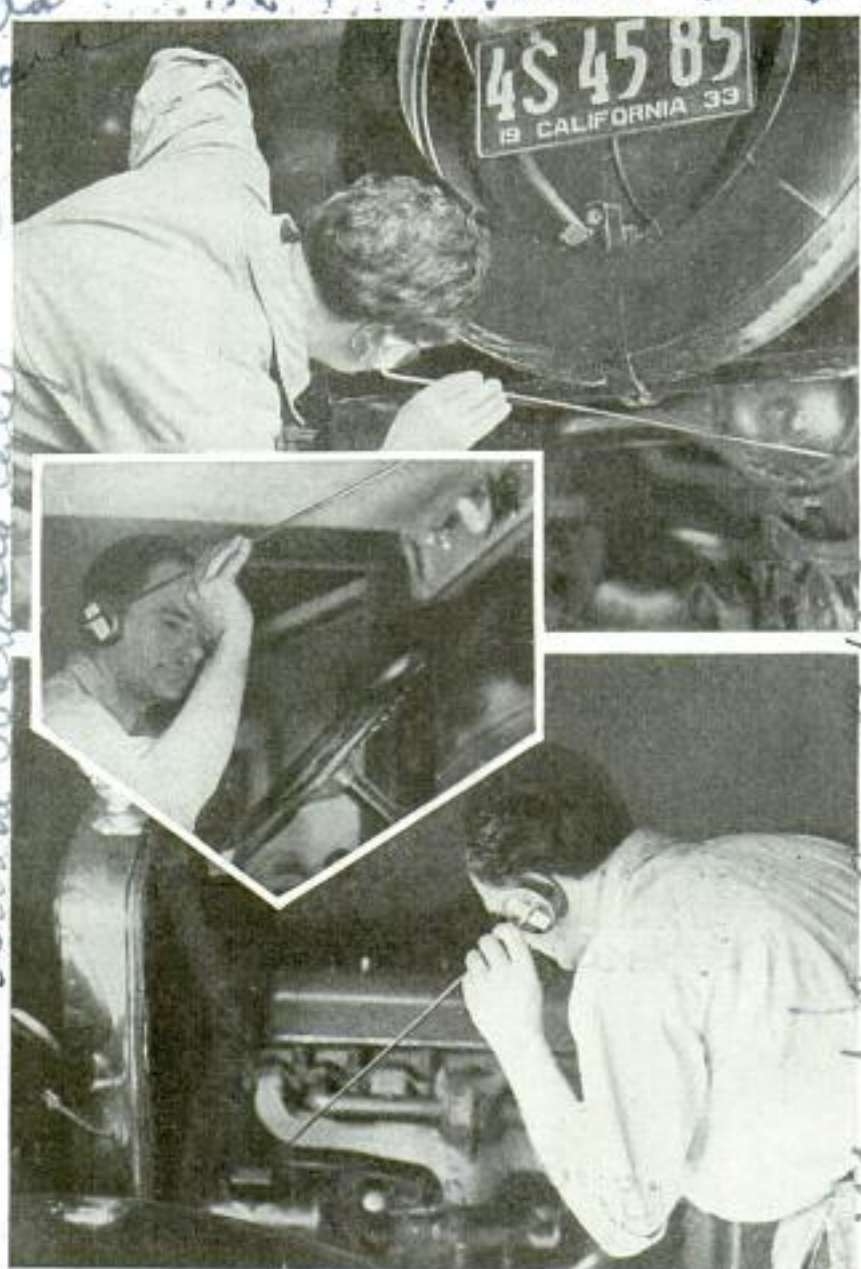
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other engine noises. It is claimed the device is useful in locating bearing defects, knocks, loose or worn timing chains, broken valve springs, noises in the transmission, clutch, universal joint and wheel bearings, and body squeaks and rattles. With the rod placed on the cylinder head, it is even possible to distinguish the different sounds of the valve, valve spring and valve guide.

**POWER INCREASED IN GAR WOOD'S SPEED BOAT**

For the 1933 Harmsworth trophy race, in which the British entered a stunt speed boat only twenty-four and one-half feet long, Gar Wood speeded up and strengthened his world's record boat, "Miss America X." The American craft was given a new hull of double diagonal laminated layers put together with a special glue, to eliminate vibration at high speed. In addition, Wood increased the output of his four Packard engines by 100 horsepower each,

Using a Motor "Stethoscope" to Locate Trouble in Motor; It Amplifies the Sound, Making It Easier to Trace Any Unusual Noise

**"STETHOSCOPE" FOR THE AUTO LOCATES TROUBLE**

Using the same principle employed in the doctor's stethoscope, an instrument for locating trouble in the automobile operates by amplifying sounds so they can be traced. It consists of a slender rod to which is attached a cup-shaped metal piece containing sound-recording material. A pad over the end of the cup enables it to be fitted comfortably to the ear. The mechanic moves the rod from place to place, searching for any unusual sound or noise in the motor, the instrument causing it to be magnified or separating it from

bringing the total to 6,800 horsepower. With the old engines, Wood established a world's record of 124.86 miles per hour for a one-mile straightaway. An arch also was placed in Wood's boat in the manner of an arch on a bridge, running through the center to hold the craft rigid and the planes in position. The British entry, designed and driven by Hubert Scott-Paine, steers from the front and barely touches the water when hitting top speed. It is powered by a Napier-Lion motor of 1,400 horsepower. Its principal characteristic is its remarkable acceleration. Scientists timing its pick-up say it has an acceleration faster than anything else in transport,

Detroit Free Press 730/33

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*Charlie Lange and  
Marion Taylor Dallas  
Texas*

except an airplane launched by a catapult. The hull is an orthodox single-step, but has a bizarre top construction whose most outstanding feature is a cockpit with two seats of rubber slings covered with streamlined cowling like a submarine.

*2/16/*  
**ROLLING GUARD FOR HIGHWAY**

Automobiles running into a highway guard equipped with a revolving bumper are shunted back on the road automatically by the action of the guard itself. The revolving section consists of pipe mounted to turn freely and placed low enough so only the tire or lower part of the wheel comes in contact with it. The downward motion of the rotating wheel causes the pipe to revolve downward when struck. This prevents the car from climbing the guard and also has a tendency to divert it back on the road without much damage.



Highway Guard Consisting of a Revolving Pipe Which Tends to Shunt Car Back into Road



Texas Flyer Sliding Down a Rope to Safety after His Ship Landed Upside Down in the Wires of a Power Line

**PLANE TANGLED IN POWER LINE BUT PILOTS "LAND" SAFELY**

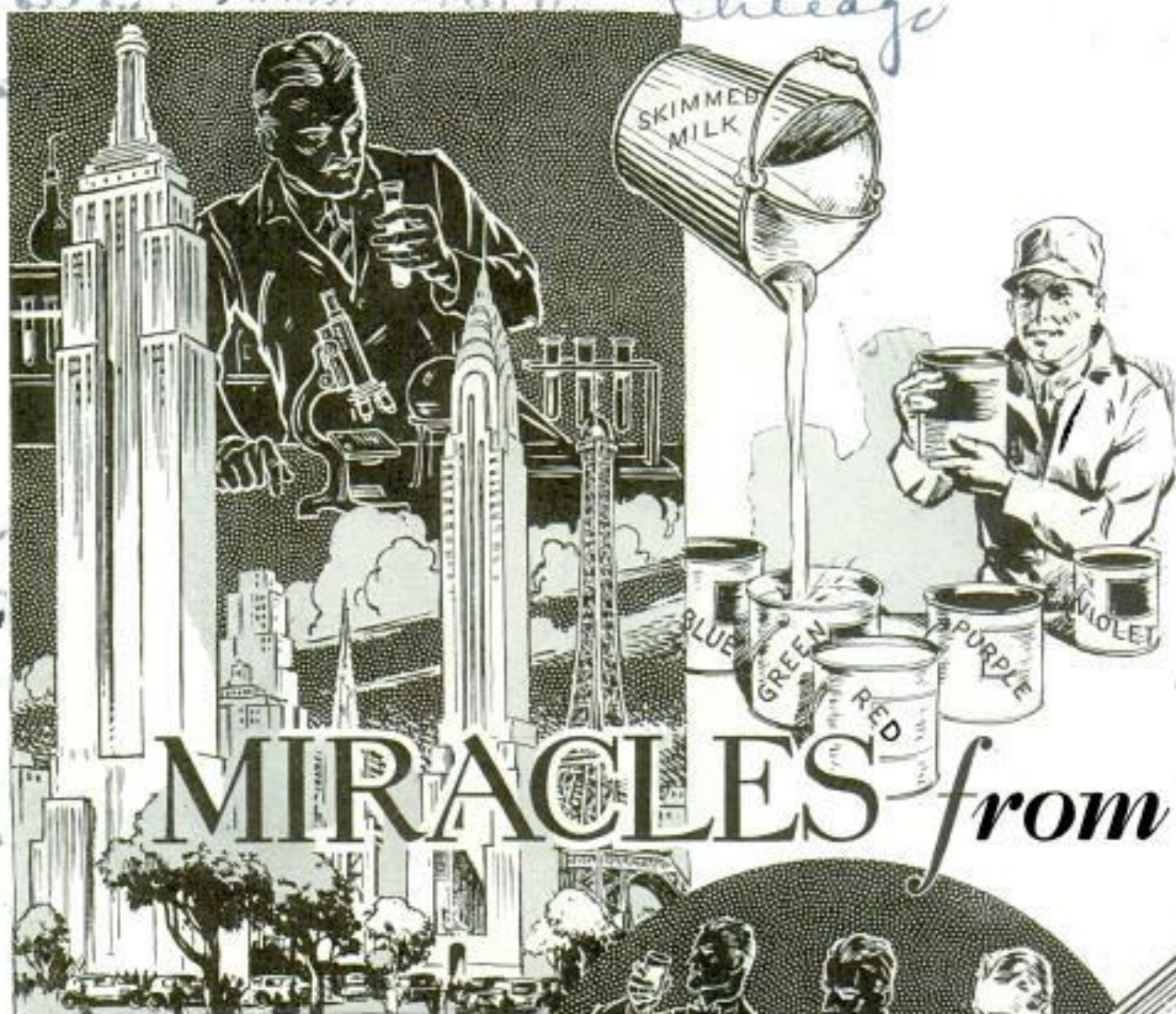
Two youthful airmen of Dallas, Tex., recently had the unique experience of terminating an airplane flight by sliding down a rope from the ship to the ground. They were coming in to a landing when their craft swooped too low and a wheel struck the wires of a power line. The plane turned upside down and came to rest tangled in the wires. The pilots clambered out on a wing while their ship seasawed back and forth thirty feet in the air. Firemen threw them a rope and they tied one end to a wing strut, then slid safely to the ground after being suspended for nearly five minutes. Their plane was lowered with more difficulty, however, for it was necessary to employ derricks to remove it from the wires.

At the top speed of Sir Malcolm's record automobile dash, the tires each increased approximately one inch in diameter because of centrifugal force.

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Chicago



# MIRACLES from

WHOLE houses made from corncocks, a city lighted with power from waste gases, door-knobs, doors and tiling made from rosin, paints made from skimmed milk, even waste molasses transformed into automobile fuel, at an annual saving of millions of dollars to motorists—these are only a few of the miracles of modern chemistry.

At eighty-four, Thomas A. Edison was asked, "If you were a young man again, what career would you choose?" The inventor answered, "chemistry! It touches all sciences—and future chemical discoveries will benefit mankind to an extent that cannot be calculated today."

Chemical progress has so changed our industrial and commercial methods that



Top, Left, Illustrating Chemist's Importance to Civilization; Right, Skimmed Milk as Source of Paint; Bottom, Simple Chemical Experiment

no individual can exist independently of the conveniences chemistry makes possible. A few years ago, two European governments were considering an exchange

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# TEST TUBES



Top, Left, Tubes Containing Chemical Solutions; Right, Conquering Tropical Disease; Bottom, Fuel from Molasses

of certain tropical colonies. To equalize a difference in valuation, the nation holding the more valuable area planned to accept a single chemical secret in payment of the second nation's remaining debt. This secret preparation was known to overcome tropical diseases that had prevented development of the territory controlled by

the first nation. We dress in garments that depend for texture, color and comfort upon chemistry, we enjoy foods preserved and made palatable by chemical means and every piece of material in a modern automobile is chemically developed. We marvel at the height of the Empire State building, yet before the architect could draw a line of his plans, the chemist was required to devise new combinations of atoms in all the materials used to assure that the steel, the concrete, the cements and face bricks would have strength to withstand the strains upon the completed building.

Important research is often complex, and available only to the skilled industrial chemist. However, the fundamental principles can be studied by anybody in his own home through the following experiment often used as a "parlor trick." Two water tumblers are placed upon a table. From a glass water bottle, water is poured into one tumbler. The magician sips the water and encourages the spectators to do likewise. "You see," he asserts, "this bot-



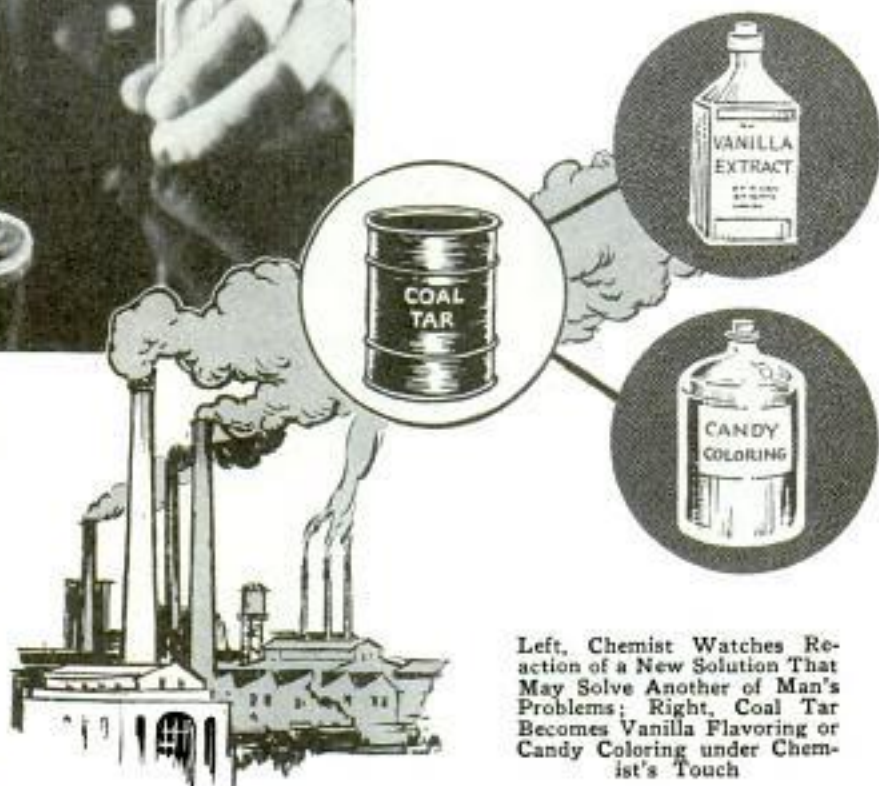
tle is filled with common tap water, the same as you have tasted in the tumbler." He then fills the second tumbler with water from the bottle. As the water reaches the tumbler it changes to a red color.

The experiment is prepared as follows: first, the bottle is filled with tap water, to which has been added a pinch of common washing soda. Care must be taken that no taste is noticeable. Cooking soda should not be used. An alcoholic solution (0.1 per cent) of phenolphthalein, pronounced "fe-notha-leen," is procured from the drug store. The two tumblers are then rinsed and, into one which can be identified, a drop or two of the phenolphthalein solution is placed. The experiment is then ready to be presented.

Had perfectly dry washing soda and dry phenolphthalein powder been mixed, no

change would have occurred because the union of chemical elements in the washing soda is strong enough to resist the attraction of the elements contained in the other. But when the soda is mixed with water, the union between its chemical element, sodium, and its other elements (carbonic acid radicle) becomes loosened up, and from the weakened union the sodium readily departs to unite with the phenolphthalein drops in the second tumbler, forming the red salt that tints the tap water.

The depletion of natural re-



Left, Chemist Watches Reaction of a New Solution That May Solve Another of Man's Problems; Right, Coal Tar Becomes Vanilla Flavoring or Candy Coloring under Chemist's Touch

sources has become a serious problem. In paper alone, we are using up timber four times as it can be grown. Our oil wells may dry in fifteen years.

Chemists have solutions for some of these problems. Packing-house refuse has been converted to combustible gas for power, gasoline has been made from soft coal, table sugar is refined from a weed, the Jerusalem artichoke.

As Edison said, we cannot calculate today the benefits chemistry will bestow upon us in the future.

## Highway Lamp Makes Night Driving Safe



High-efficiency sodium-vapor lamps, which for a year have lighted experimental stretches of road in continental Europe, now have an American equal. Rumors of these super-highway lamps have drifted across the Atlantic for many months. It was said that they gave three times as much light intensity, for the same amount of electrical energy, as common tungsten filament lights; and that because of their yellowish light, the eye was able to distinguish sharply the edges of objects some fifteen times better. The pioneer installation in this country is on a half-mile stretch of road between Schenectady and Albany, N. Y., near the laboratories of the General Electric company whose engineers developed these super-lamps. Night motorists on this road have had the unique experience of driving fast—as high as sixty miles an hour—with all car lights turned out in perfect safety. Perfect visibility is achieved from the sodium lamps overhead which cast their yellow glow over the road without glare. The Dutch and American lamps look, when unlighted, like an ordinary electric bulb inside a clear-glass thermos bottle. The inner bulb contains a thorium-coated filament and two nickel anodes. The electrons emitted



from the filament serve to start the tube in operation by ionizing a small quantity of contained neon gas. When the neon discharge sets in, the temperature of the lamp rises and the metallic sodium inside starts to vaporize. From that point on the sodium ions carry the tube current, and the illumination from the tube changes from the red of neon gas to the yellow of sodium. The thermos-bottle container—of two walls with an evacuated space between—serves to keep the heat of the lamp within and maintain the operating temperature.



Top, Road Illuminated with Sodium Lamps; Center and at Right, Examples of Sodium-Vapor Lamps for Street Lighting

Allis-Chalmers Mfg Co

492

POPULAR MECHANICS

Milwaukee, Wis

# Baby Combine Covers Field at Five-Mile Gait

#495.00 cash for La Porte  
495.00  
Chnd



Two-Wheeled Baby Combine Being Operated by Tractor with Pneumatic Tires; It Cuts a Five-Foot Swath

Designed particularly for the small, diversified farms of the corn belt, a baby combine, pulled and powered by an ordinary farm tractor, cuts and threshes grain at a speed of five miles per hour. One man can operate both the tractor and harvester-thresher which weighs only 2,400 pounds. The ordinary cumbersome combine, weighing three tons or more, travels from one and one-half to two and one-half miles per hour, requires an auxiliary motor to operate it, and cuts swaths from

ten to sixteen feet wide. The little machine cuts a five-foot swath but travels twice as fast as its ten-foot big brother, so does the same amount of work. It has only two wheels and they use airplane-type pneumatic rubber tires. Due to the low air pressure in these tires, they absorb much of the shock in negotiating uneven ground and at an increased speed. The combine can be handled by any two-plow, power take-off equipped tractor. The width of the threshing cylinder in the combine is equal to the width of the cutter-bar, the stalks of grain passing directly into the cylinder head first, and the width of the straw stream is always the same as the width of the swath cut by the sickle. The straw going into the cylinder in a thin stream does not

C595

*Reiss instruments*

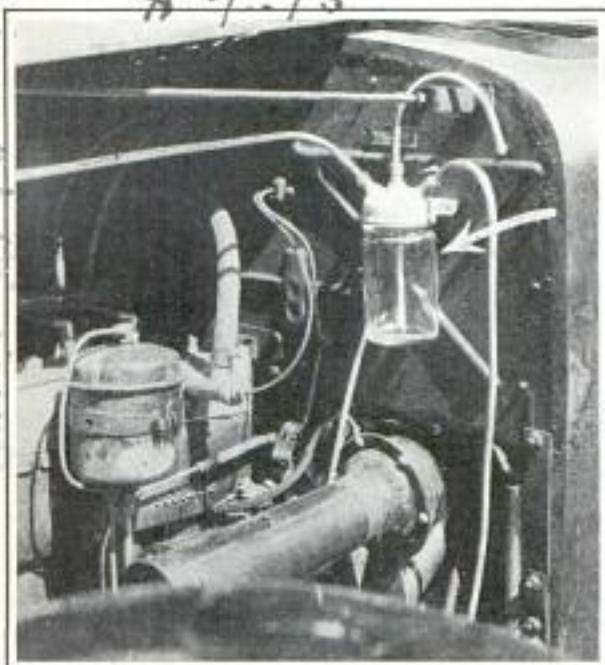
bunch and each head is processed between the cylinder and concaves, leaving the straw the same length as when cut. Speed variations do not affect the separator because it has the capacity of a twelve-foot combine.

**OVERFLOW TRAP KEEPS ENGINE COOL**

*cll 2*

To reduce the temperature at which an automobile motor performs and prevent overheating, an overflow trap for the radiator is now being produced. Due to water expansion, a running car often does not retain a full supply of water in the radiator. Instead of allowing the water to spill out through the overflow pipe, the trap forces it into a condenser where, after being cooled, it is returned to the motor, this process being repeated over and over. In winter the system prevents evaporation or spilling of the anti-freeze solution.

*# 4-75*



Overflow Trap for Auto Radiator Which Forces Extra Water into Condenser Where It Is Cooled



Enlarged Picture of the Various Forms of Life as They Appear When a Drop of Water Is Placed under the Microscope

**LIFE IN A WATER DROP SHOWN BY MICRO-PROJECTION**

*2nd floor South Hall of Science*

Enlarged pictures of the forms of life to be found in an ordinary drop of water are shown to visitors at Chicago's Century of Progress. The views, which greatly magnify the microscopic life in a water drop, are made possible by a recent method of micro-projection. The enlarged views make it easy for large numbers to see the minute life forms.

*microwarmer*

**SMALLPOX VACCINE FROM EGGS IS FREE FROM BACTERIA**

*cl 208*

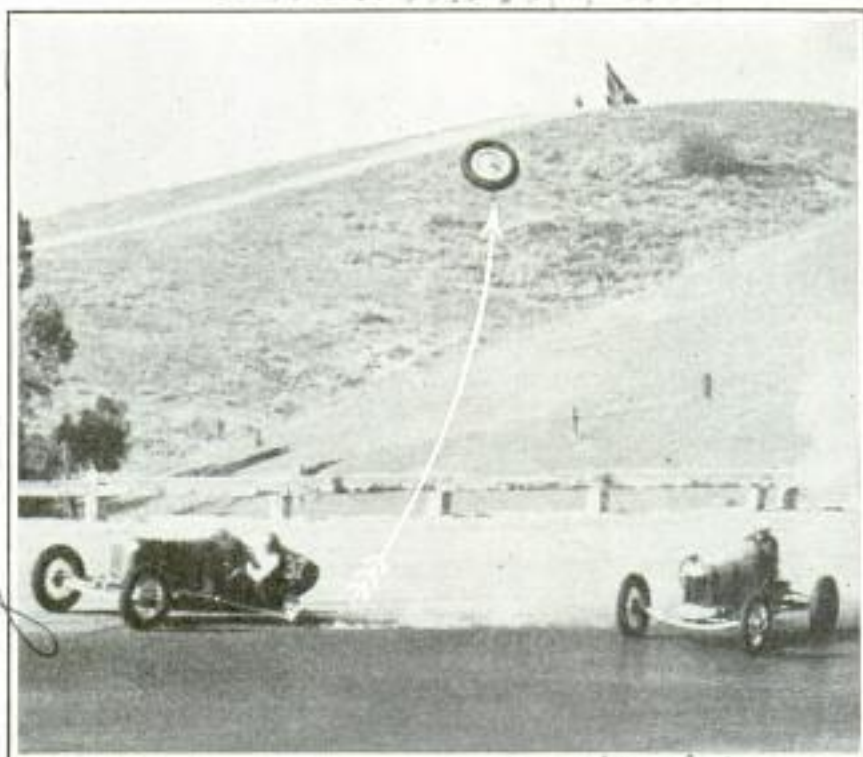
Large-scale production of a bacteria-free virus for vaccination against smallpox is made possible by the discovery that chicken eggs may be substituted for calf lymph as a source of the material. From twenty-eight eggs, Col. W. D. H. Stevenson and Dr. G. G. Butler, of the British government lymph establishment, produced enough virus to vaccinate 7,000.

*Dr. Henry Colmery of Munich Germany*

*street Bismarck*

*Midwest Motor Car Cooler Co. 360 N. Michigan Chicago*

*Science News Letter Copyrighted material 8/6/03*



Racing Car Pictured Just after It Threw a Wheel on a Los Angeles Track; Note the Still Spinning Part High in the Air

### RACER THROWS A WHEEL BUT STAYS RIGHT SIDE UP

One of the most unusual accidents of the 1933 auto-racing season occurred on a Los Angeles speedway and the cameraman was there to record the spectacular incident. H. D. Provan, a driver, threw a wheel while traveling at high speed, and "threw" is the right word, for it sailed forty feet into the air after leaving the axle, but the driver managed to keep his three-wheeled vehicle upright until he could bring it to a stop and escaped without a scratch.

### NUT BUTTER UNSPOILED AFTER CENTURIES

Hazelnut butter 2,700 years old and still in good condition has been found buried with the remains of a man of the Iron age in a grave in Germany. The material consisted of two lumps about the size of plums. The corpse had been cremated, and the urn containing the butter was in the fire. This thoroughly sterilized the earthen vessel and its sealed-in contents, coating the fat with a

carbonized layer that constituted a second protective covering, making it impossible for bacteria and fungi to penetrate to the fat and spoil it. The butter was identified by particles of carbonized nutshell embedded in it.

C1124

### SHEEP TRAINED TO PULL CART

Four trained sheep on a New Zealand farm have been taught by a fourteen-year-old girl to pull a cart loaded with wood, drag a harrow and do other work usually performed by other animals. The little girl began her training with a lamb and with patience and perseverance taught it to pull

a cart. She then trained another sheep to work in harness with her pet and finally succeeded in coaxing two others to team up. To the shepherd who has tried to persuade a milling flock to cross a stream, the little girl likes to show what her team will do in water. She drives the team through the water without trouble. She claims it requires only a few weeks to train such an animal and uses exactly the same commands as for horses. The sheep in the team are two-year-olds.



New Zealand Girl and Her Trained Sheep Which Wear Harness and Pull a Cart, Even through Water

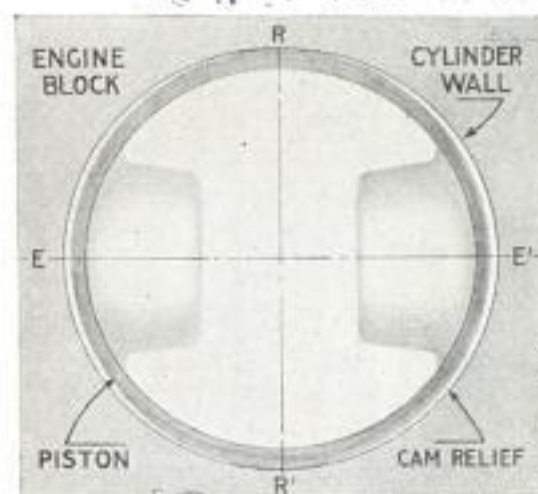
Ascend speedway

near Bittlingen

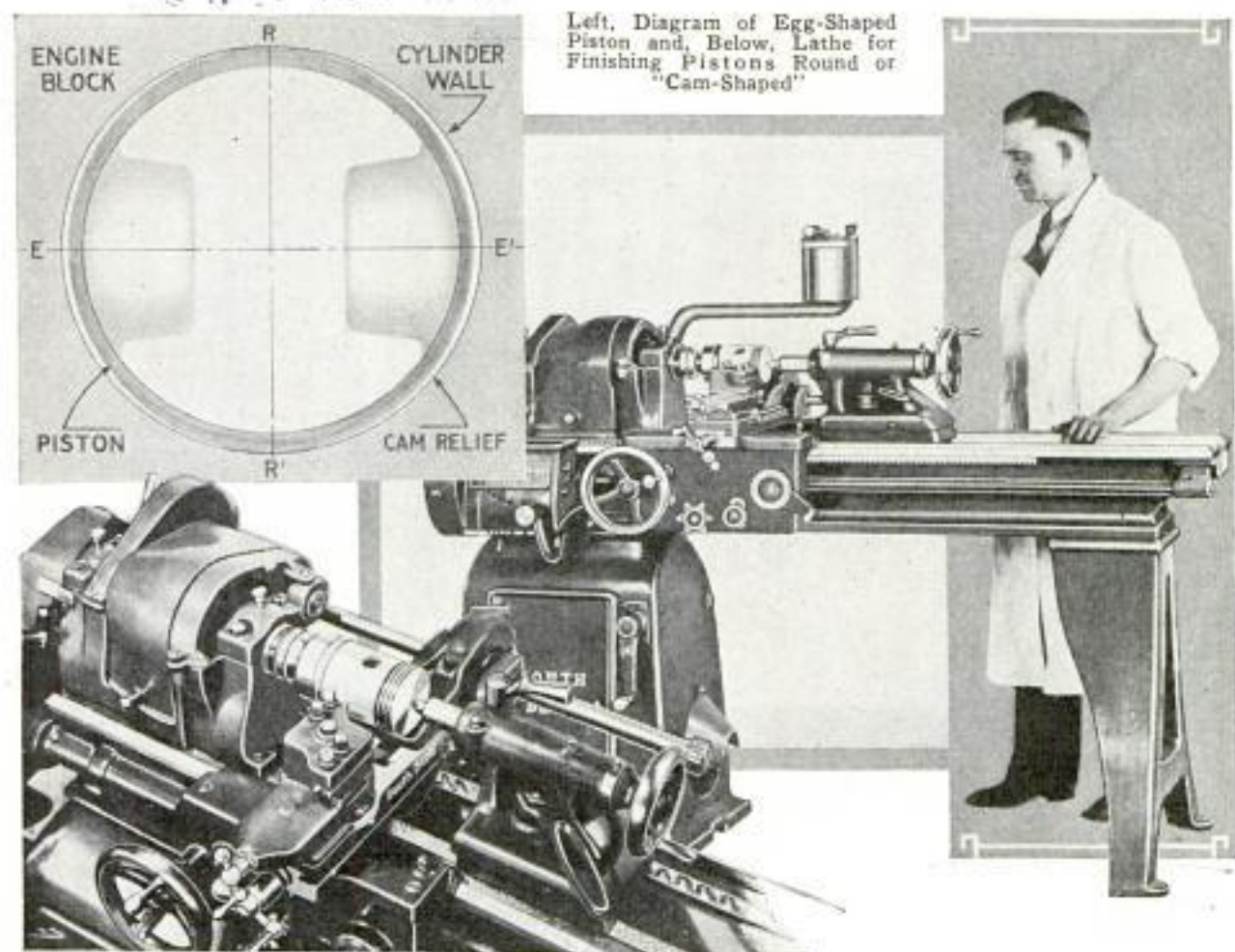
Worms near Matamoras N.J.  
Mrs. Frances Lee

Found by Prof. Her. Johannes Leuss  
near Bittlingen





Left, Diagram of Egg-Shaped Piston and, Below, Lathe for Finishing Pistons Round or "Cam-Shaped"



Round pegs may fit round holes, but many automotive engineers today are no longer designing round pistons for the round-engine cylinder bores. Instead the pistons for many cars are variously called cam-shape, oval-shape, eccentric, egg-shape, elliptical and out-of-round. To the naked eye, however, the new type of piston still looks round because the out-of-roundness is only from five-thousandth to two-hundredth of an inch, depending on the make of car. This change in pistons has been caused by the coming of the high-compression high-speed motor. With increased compression and speed, it became necessary to fit pistons closer to eliminate piston slap and reduce noise. Because of the oval shape, the new piston can be fitted very closely to the cylinder bore while cold without danger of sticking or "freezing" when it becomes hot. This is because, when heated during operation of the engine, the piston really expands from an oval shape to one nearly round.

After much experimentation engineers have found the proper place to make a piston short in diameter to allow for expansion. The spot is where the piston pin-holes are, or where the pin bosses are located. Expansion is greatest there because most metal is massed there. Therefore a few thousandths of an inch is sheared off the piston skirt there, making the sides elliptical. In some instances both lands and skirt are made elliptical. To meet the need for finishing pistons "cam" shape in service shops, a lathe is being offered equipped with a cam-turning device permitting the finishing of pistons, both round and cam-shaped, on the same machine. This lathe is equipped with automatic feeds and has a double tool holder, one tool bit being used for rough turning and the other for finish work. Many of the cars finishing at the Indianapolis race this year had lathe-turned pistons which had extra grooves cut in the piston skirt to further aid in cylinder-wall lubrication.

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# Tests Show How High Altitude Affects Pilots

*Baltimore, Md.*

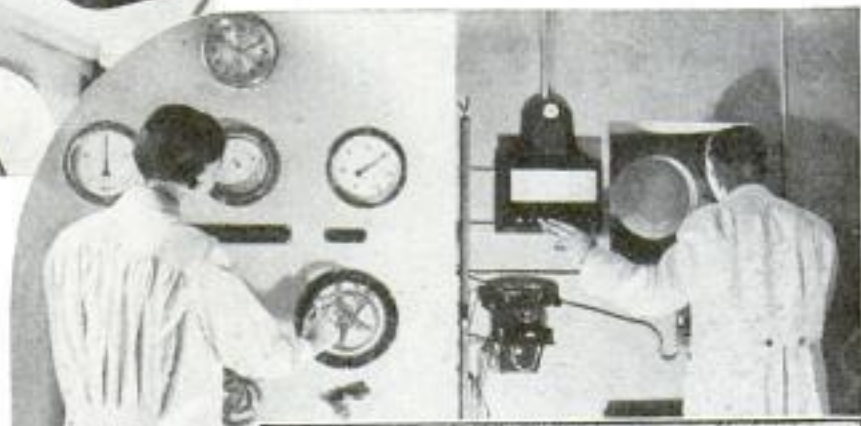
Hopkins University department of chemistry, report this discovery. X-ray examination of "solid-solution" organic compounds show that they behave as if their building blocks had average lengths corresponding to the average of the lengths of the chemical molecule chains, not various lengths as have the individual compounds when they are not mixed with others. Thus, the accepted idea that such mixtures are only random amorphous mixtures is proved to be incorrect and crystal lattice structure is shown typical for average chain lengths.

*Ependorf Hospital  
Germany*



© World Wide Photos

Illness caused by extremely high altitudes is being studied extensively at the Institute for Aeronautic Medicine in Hamburg, where equipment has been installed to simulate in a laboratory the conditions encountered by aviators at great heights. A central oxygen system makes it possible to provide ten persons in the test chamber with oxygen, measuring the amount being received by each individual through breathing instruments. The flyers write their names and addresses repeatedly as the air conditions at various heights are reproduced, and their reactions are studied by comparing the handwriting at one period with that of another. To pass such tests, flyers must be able to think and act as well at reasonably high altitudes as at lower ones.



3500	11:30	James J. ...
4000		Walter ...
5000	12:1	Walter ...
6000	12:15	Walter ...
6500		Walter ...
6500	14:05	Walter ...
6500	14:15	Walter ...

## CHEMICALS JOIN LIKE BRICKS IN WALL OF BUILDING

When complex organic chemical compounds, like alcohols, paraffins and fatty acids, get together, they are not content to merely mix, but they join together in the manner of bricks in a wall. Prof. Emil Ott and Dr. D. A. Wilson, of the Johns

Above, Testing Effect of Altitude on Flyers; Below, Handwriting Specimen of One Pilot

*Science  
New 2/6/33*

**ONE UNIT IN CELL DETERMINES CANCER SUSCEPTIBILITY**

Whether or not a person is susceptible to cancer depends on just one gene in the germ cells from which he grew—an almost infinitesimal thing about the size of a molecule. It is that tiny, single unit among the many complex factors of heredity that makes the difference between susceptibility and insusceptibility in the opinion of Miss Maud Slye of the Sprague Memorial Institute and the University of Chicago. Her studies on cancer have been carried on for twenty-three years and involve more than 100,000 autopsies. She has made her studies on generations of mice which develop cancer like humans. Heredity alone is not the cause of cancer, she says. Prolonged irritation may be an external factor responsible for it, but internal factors may have to do with functioning of the endocrine glands or with other physiological conditions. An external factor acting with internal factors upon a susceptible soil is probably the cause of cancer, she believes.

Althach Sons, 123 W. Madison, Chicago  
 Science News 7/22/33



Coin-in-Slot Microscope Which Exposes One of Ten Subjects When Money Is Deposited

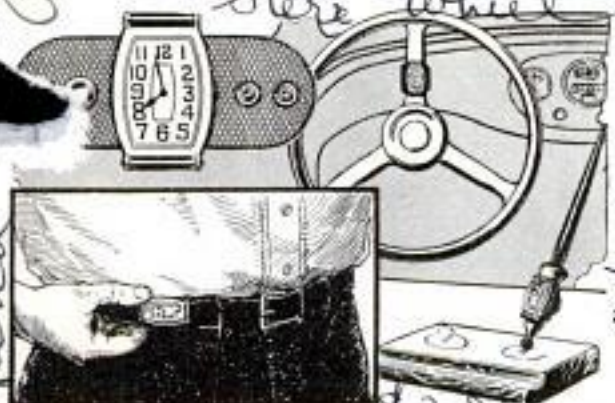
**COIN-IN-SLOT MICROSCOPE REVEALS NEW WONDERS**

Operated by placing a coin in the slot, an automatic microscope has been produced for the general public to see the wonders of a world invisible to the human eye. A chart under the glass top lists ten subjects of interest. By turning a dial to the corresponding number on the chart, one of these subjects may be seen in the microscope by depositing the coin. The subject is illuminated by turning the handle of a timer switch.

Hawkeye Delweir  
 C1141  
 C1139  
 Rathbun Brothers  
 Delweir, Iowa

**WATCH SNAPS ON ANYWHERE AT USER'S CONVENIENCE**

Fitted with a snap-on strap, a small watch may be attached almost anywhere,



Watch with Snap-On Strap Which Can Be Attached to Steering Wheel, Belt or Desk Set

on the wrist, the steering wheel of the automobile or boat, the belt of hunter, trapper or camper, and even on the base of the table lamp. Quick attachment or removal increases its uses.

A 1,200-mile pipe line is being constructed across the Syrian desert to carry oil from Iraq to Mediterranean ports.

**FISH WITHOUT AN AIR BLADDER LIVES IN SWIFT STREAMS**

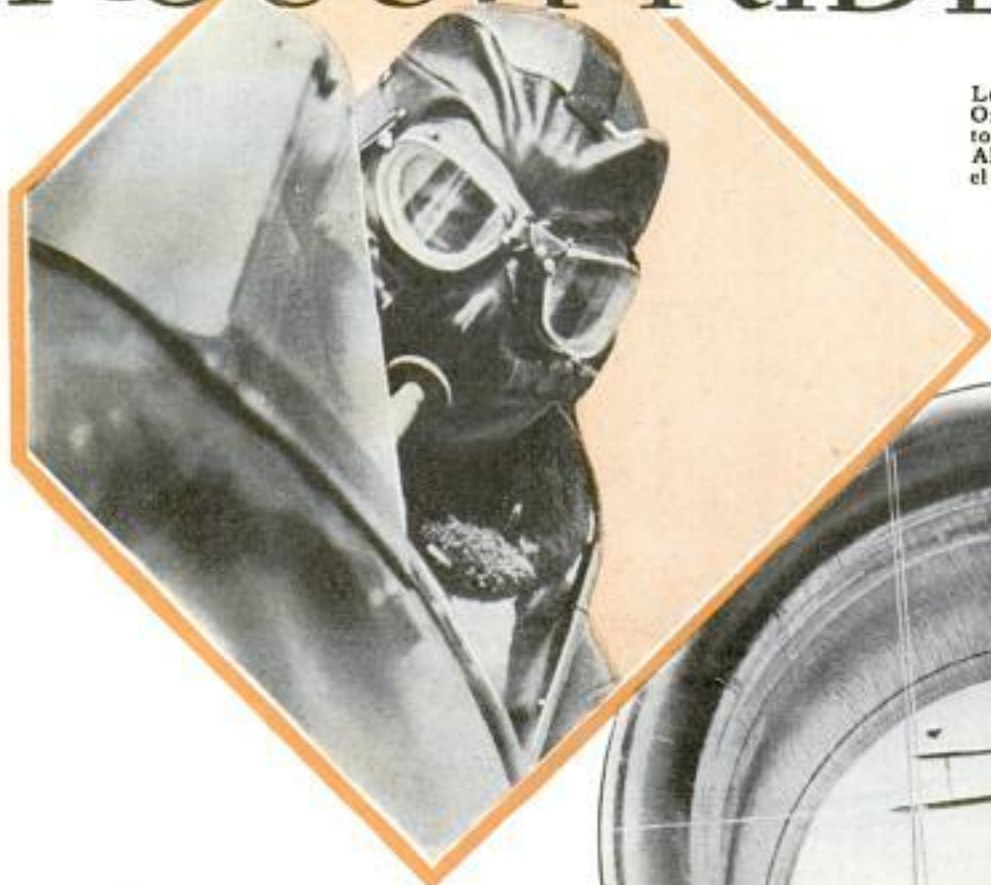
A fish that can't float and doesn't want to float, lives in the headwaters of the James river in Virginia. Specimens of this fish, believed to exist only in this one corner of the earth, have been obtained by the Smithsonian Institution, and reveal that it belongs to the sucker family and has no air bladder. As a result it cannot float like other fishes, but can only sink to the bottom or keep swimming. This is no handicap for the sucker for it had to rid itself of the air bladder in the course of evolution or become extinct. The reason is that the mountain streams where it is found are so swift that the little suckers had to remain on the bottom or be washed away. So they rid themselves of their "water wings" and survived.

Althach Sons  
 123 W. Madison  
 Chicago

E. L. Reid, Biologist  
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C1000 : Capt. Thos. E. Stinson, Jr.  
145 S. Spring St.  
Los Angeles, Calif.

# ROUGH RIDERS



Left, Army Pilot with Oxygen Mask Ready to Test Plane at High Altitude; Below, Model Flying Boat Ready for Test in Tunnel



THEIR eyes fixed anxiously on a tiny dot high in the sky, a group of army officers stood one recent morning at a California airport. For half an hour the plane above had been looped and spun by a skillful pilot. Now it was poised at the top of a 15,000-foot climb, ready for a hair-raising, screaming vertical dive. Would it stand the gaff? Would a wing or a cowling or a strut fail in this final test?

The hum of the engine, coming faintly from the three-mile height, rose in pitch. For five seconds, ten seconds, twenty seconds, the plane hurtled down. Then, slowly, the plane tilted. With a mile of altitude left the pilot exhausted his terrific speed in a sweeping climb. Down on the ground once more he cut the switch. "Will she do, Eddie?" the chief designer called. "She will," was the response. "Any plane that holds together in a vertical dive like that is safe."

The vertical dive is the crucial test of a military plane. Aircraft makers build solid strength into commercial transports but they shave the margins of safety when

they design fighting planes. If the design is too light, like the one that killed three test pilots in a row, it is a failure. If it stays together during the testing period it is a success.

Even the heavy passenger transport you ride so confidently was subjected to a topsy-turvy rough and tumble in the sky to guarantee your safety. With you on board, the pilot eases the plane along with gentle hands. But the day the plane was wheeled through the factory doors it was ridden by a pilot who seemed to do his

# of the SKY



best to break it apart. The test pilot of 1933 needs more than a mere oversupply of courage. Behind a coldly calculating brain there must be a store of technical knowledge. He can leave nothing to luck, for the initial flight of a fifty-thousand-dollar creation is a serious undertaking. If the plane is unbalanced, or the controls seem scrambled, the pilot tries to find the cause and correct it before he leaves the ground. Sometimes, however, an unsuspected fault reveals itself only in the air.

A few years ago most airplanes were built to conventional designs and test pi-

Above, Play in Elevator Fittings May Cause a Disastrous Flutter in Tests; Below, Eddie Allen, Test Pilot, Examining Offset Ailerons He Tested

*Douglas Aircraft Co  
Santa Monica  
Calif*



time. The first plane with a covered cockpit crashed from 150 feet. The pilot reported that the controls were mushy. What had happened was the cage interrupted the flow of wind along the fuselage and the elevators and rudder were acting in dead air. The trouble in this case was corrected by increasing the dimensions of the tail, extending the



Top, Inspecting Rigging after Test Flight; Above, Using Fluoroscope to Find Structural Defects

lots rarely ran into difficulties in the air. Lately, however, the demand for more speed and the trend to low-wing mono-planes have resulted in experimental types that must be tested again and again. A plane that maneuvers perfectly at 100 miles an hour may be hard to control at twice that speed. Another plane may refuse to pull out of a dive. Sometimes two years elapse from the time a new type of military plane is conceived until the finished product is put in service use.

Even after a new design is approved a slight change may completely alter the way it handles in the air. A new wing flap or a different engine cowling is apt to cause trouble. Recently the military authorities decided to cover the cockpits of new fighting planes with transparent cages. It was found that pilots could fight more efficiently in warm still air than when exposed to the cold gale of the slip-stream. But the cage was a hoodoo for a

control surfaces out into the wind again.

"Another time some changes were made to the engines of a bomber at the experimental field at Dayton, Ohio," says Eddie Allen, test pilot. "Then the plane was loaded with live bombs for a weight-carrying test. Right after the take-off the engine supercharger gears stripped. The motors were still turning but the pilot couldn't get enough altitude to turn back or to clear the adjoining buildings. He took a chance and flew down the river, zooming up to clear the first bridge. The plane settled down again and he had to zoom all of the



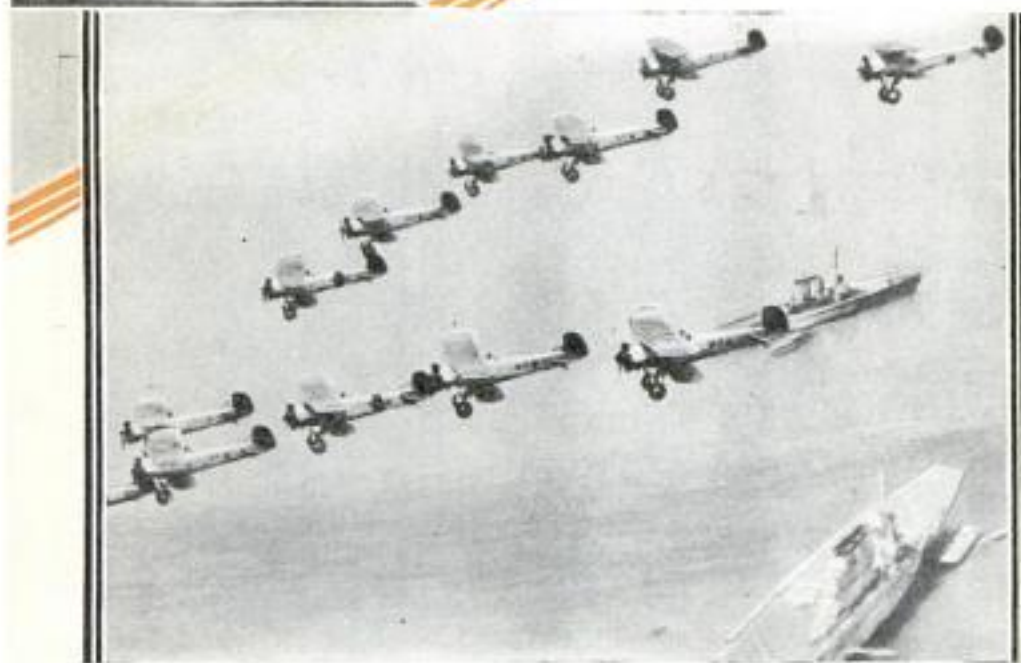
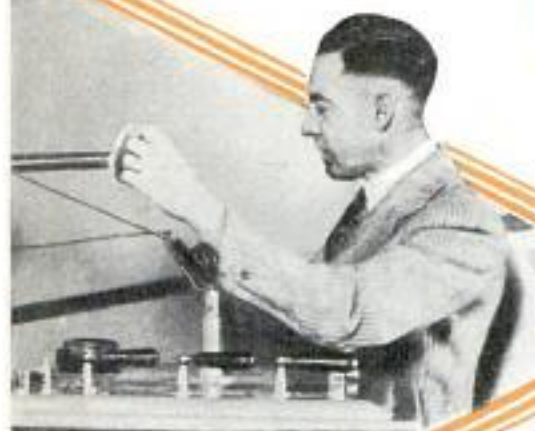
The Parachute Is the Last Resort When the Test Pilot Loses Control

bridges in succession before he could gain enough altitude to return."

How would you like to be testing a plane and find yourself unable to land? That

C/1000

was the predicament in which one pilot found himself. The new plane was tail heavy and the pilot held the controls in full diving position in order to fly level. Coming in to land, the heavy tail dropped down too sharply for safety and the pilot, after flying around for a while to think things over, solved his problem by flying



Above, Pilot with Test Instruments and Report Sheets; Left, Tested Planes in Formation

and holding his head out so that he could see ahead. Then he closed the window and flew by instruments. A motor-driven pump forced fresh air into the cabin

one wing into a tree. That brought the plane down in a heap, but he was able to walk away from the wreck.

"Things like that are all in the day's work," says Allen. "Another pilot had landing trouble in a plane that was fitted with an air-tight chamber for high-altitude flying. Entrance into the cabin was through a side window that swung inward. The pilot took off by opening the window

and an escape valve kept the interior at normal-atmospheric pressure. The scheme worked fine until the pilot decided to land. Then he found that the escape valve hadn't been working and that the air pressure inside the cabin had built up. He couldn't force the window open against the pressure and he was afraid to break the glass for fear the explosive outward rush of air might pull him out of the plane.

"He flipped the plane over on its side and peered down at the ground until he located the field. Landing was a problem because he couldn't see ahead. He finally sat down in the middle of the airport by looking out the window and watching the scenery as he flew past it."

A test pilot can pull the wings off nearly any airplane by pulling out of a dive too sharply. The trick is to flatten out in a moderate arc. The wings may bend up considerably without danger but the plane is doomed if they begin to flutter. Not many have lived to tell about such death dives because the pilot usually loses consciousness for a second at the time he most needs all his energy.

Few pilots race their motors during a dive, Allen says. Instead, they throttle them down. Gravity alone causes the plane to dive faster than the engine can pull it and the usual consequence of a true power dive is a wrecked motor. Clean streamlining rather than horsepower decides the terminal velocity of a falling plane. After the propeller tips begin to move at the speed of sound, additional power merely

manufactures more sound instead of more speed. A diving plane, traveling many times faster than an express train, heats up just like a meteor. It is estimated that at 400 miles an hour the compressed air in front of the leading edges attains a heat fifty degrees above the temperature of the surrounding atmosphere. Another thing pilots have learned about diving is that the highest speed is reached near the top of the dive.

The diving test is only part of the thorough examination of a new airplane. On the first flight the pilot does little more than test the plane for maximum speed, spinning characteristics, and its ability to withstand the dive. Then comes a check flight with full load. After that are many hours of routine flying in which the pilot must fly the plane, keep his course, and read and record as many as forty instruments an hour. Then several different pilots try it out. Their opinions are final. If a wing seems to drag on a turn, if the tail vibrates in a climb, or if the controls respond slowly in some maneuvers, the factory must try again.

C1075



### TELESCOPE AND FLASHLIGHT COMBINED

Serving a double purpose, a combined telescope and flashlight has been introduced. The telescope is five-power and is easily focused by sliding the head. At night, the flashlight equipment is installed in the instrument in a few seconds. The light has no switch, being turned on and off by rotating the head. A 1,000-foot beam may be obtained by using a third battery cell. The device may be used as a service lamp by sliding off the head and standing it on end, and also is convenient as a burning glass to focus the sun's rays for kindling a fire.

Little  
old  
713  
The Pitney Specially Developed  
Co., Minneapolis, Minn.  
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see July 19 33 - 62

# Pictures Taken in Darkness with Black Light



Examples of Photographs Which Were Made in Darkness, Illumination Being Furnished by the Invisible Rays from a Black-Glass Bulb Which Passes only Ultraviolet Beams

Some classes of photographs can be taken in darkness without the aid of visible light by using an ultraviolet lamp constructed with a bulb of black glass which filters out nearly all the visible rays and permits only the transmission of long-wave ultraviolet beams. These rays are strong in actinic quality, that property of radiant energy which produces the chemical changes on photographic plates. The Westinghouse Lamp company which developed the black bulbs states that ultra-

violet radiations already have been advanced as a means of taking photographs in the dark in a bank or in a baby's nursery, thus making it possible to obtain pictures of intruders. A more plausible possibility is for portrait work. The high-intensity visible illumination necessary in studios creates such brilliancy that squinting often results and faces are twisted into unnatural expressions. Under the rays of several black bulbs, however, the visible illumination is almost negligible.

*Europe - J. M. Voith, Heidenheim, Germany  
St. Gallen, Austria*

*Bloomfield  
Mr. C. H. ...*

## INTERIOR PROPELLER FOR TUG GIVES GREATER POWER

Fitted with an interior propeller, a new tugboat has been found faster and less costly to operate than similar craft equipped with the conventional screw placed directly before the rudder. The interior blades are located inside and well toward the center of the hull, where they work on two converging streams of water drawn in from each side at a slight angle through inlet ports located well forward. The two streams meet exactly where the propeller gets the strongest "bite" at the

water, sending it out in one stream through the discharge port at the stern. The chief advantage is said to be greater power and efficiency without increasing the size of the hull. The propeller may be coupled directly to the power plant.

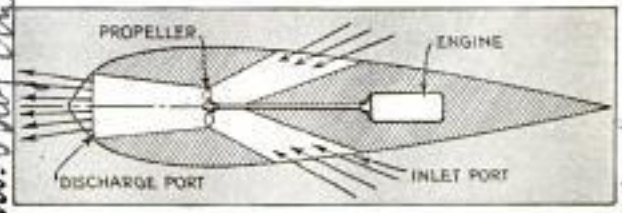


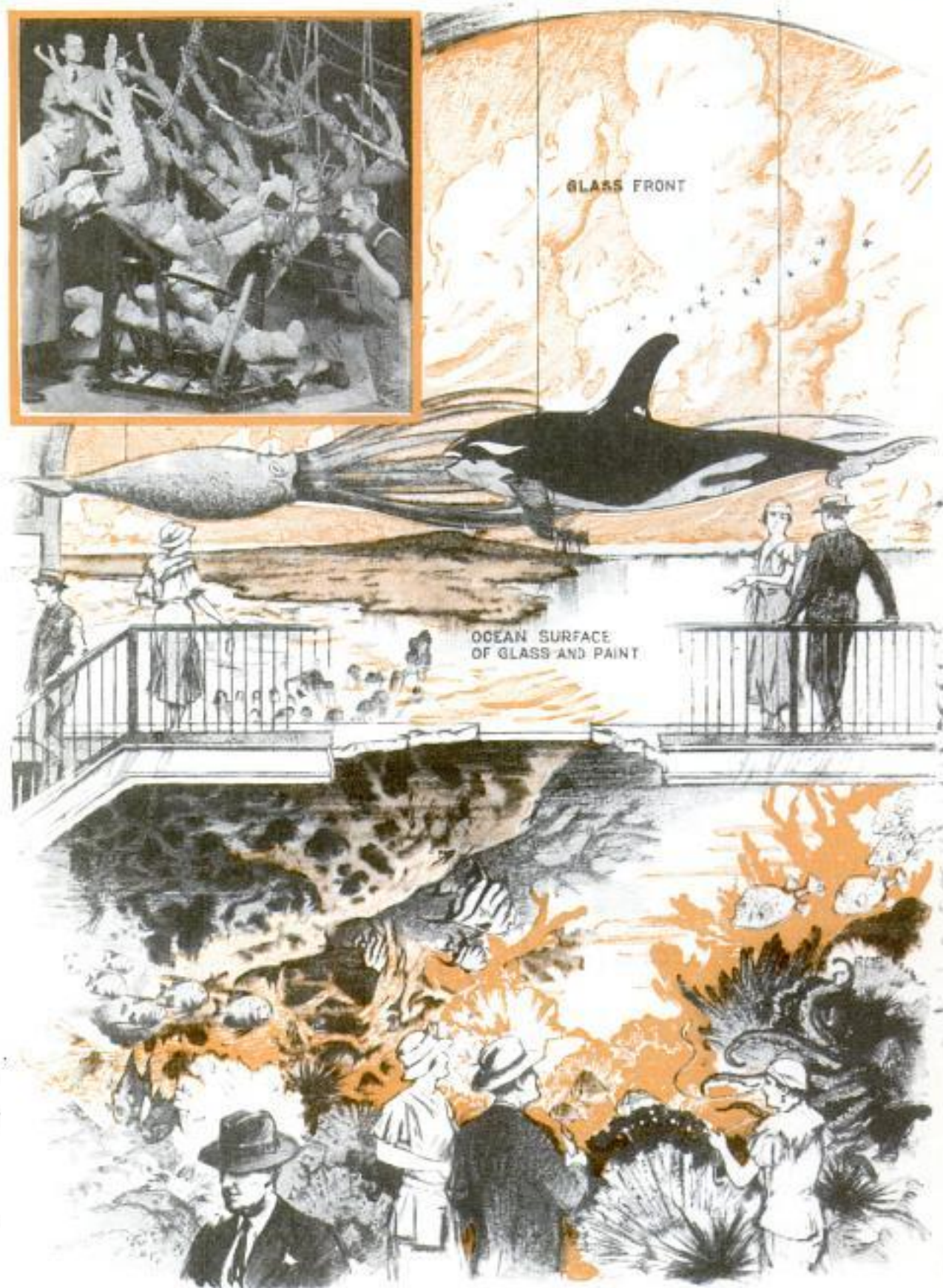
Diagram Showing How Propeller inside Tugboat Handles Water through Inlet and Discharge Ports

U.S. Canada

Voith-Schneider Propeller Co  
723 Chrysler Bldg 40th

*used in Germany  
Article in Motorship*

## Sea Exhibit Gives Idea You Are under Water



Visitors to Hall of Ocean Life View Coral Reefs through Glass from Balcony or Descend into Pit Where They Get Impression They Are Actually under Water; Photo Shows Preparation of Coral

*Miss Jean W. Warner*

*Secretary, Press Relations*

*©/084*

POPULAR MECHANICS 50¢ *\$1.00* 505

*pat pend.*

### FLOOR OF OCEAN REPRODUCED TO DEPICT MARINE LIFE

Everything but the water is included in the exhibit of marine life portrayed in the recently opened Hall of Ocean Life at the American Museum of Natural History in New York. But the exhibits are so close to actual conditions that the visitor gets the impression of being under water as he views them. Life as it appears on the ocean floor is shown in a one-story structure sixty feet high, 160 feet long and 130 feet wide, connected by a balcony to the Hall of Fishes. In the center of the dome-shaped roof is a great panel upon which is painted a sunlit tropical sky. A series of murals illustrate sperm whaling and there is a collection of shell fish and skeletons of whales. An impressively arranged group of corals represents the work of natural scientists over a period of ten years, and habitat groups show sea elephants, fur seals and others. In addition there is a fully equipped whaling boat. The coral exhibit depicts life under the sea in all three dimensions. The visitor views this exhibit from the balcony by peering through transparent glass which simulates the water. By descending from the balcony to the floor level he seems to be going down to the bottom of the sea and wanders among coral reefs and forests as well as hundreds of wax copies of sea fish. So skillfully has the ocean floor been copied that the visitor is hardly aware of the artificial phases as he peers upward to the sky above the glass-ocean surface. It is estimated that in preparing the exhibit, forty tons of coral were brought up from the bottom of the sea, cleaned, prepared for coloring and then treated with beeswax and glass to simulate the living coral. Color sketches and models of numerous fishes of the tropical reefs were made, and to do this it was necessary to catch and view the originals. The framework for the coral group required 12,400 pounds of steel for supports.

*©1079*

### EVERLASTING MATCH IN CASE IS AID TO SMOKER

Practically eliminating the old-style match, an "everlasting" match in a decorative case has been introduced as an aid to the smoker. The device is not a lighter,



Cigaret Lighter Ignited Like a Match by Scratching Tip against Rough Side of Case

since it operates without the use of wheels, wick or springs. The sparking metal is not flint, but a secretly processed metal that cannot pulverize. The match can be lit and re-lit time after time by simply striking the tip against the roughened edge of the case.

### VISIBLE OILERS FOR BEARINGS KEEP CONSTANT LEVELS

*©1102*

Two new types of automatic oilers are being produced to maintain a constant level for bearings. Both have a visible oil supply. One type is known as the constant-level oiler and is intended particularly for electric motor bearings and other reservoir bearings with oil ring, packing or ball or roller bearings where oil in the reservoir should be maintained at a determined level. This is done by means of a tube which permits air to enter and oil



to flow from the reservoir when the level of oil in the bearing reservoir drops below the proper level. When this level is attained, the flow is stopped automatically. The other type, a thermal oiler, is for use on sleeve bearings of the open type and is operated wholly by changes in the bearing temperature. Heat in the bearing causes an expansion of the air in the thermal chamber, forcing small quantities of oil to the bearing.

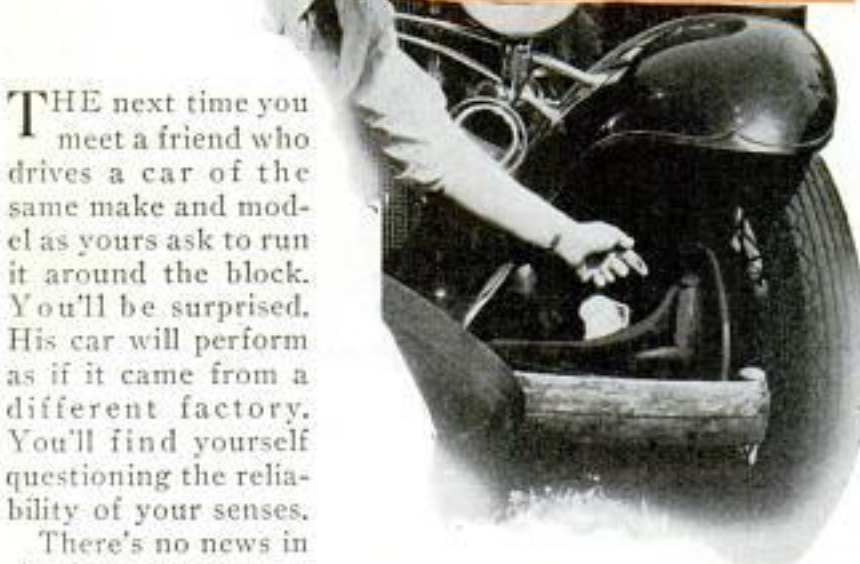
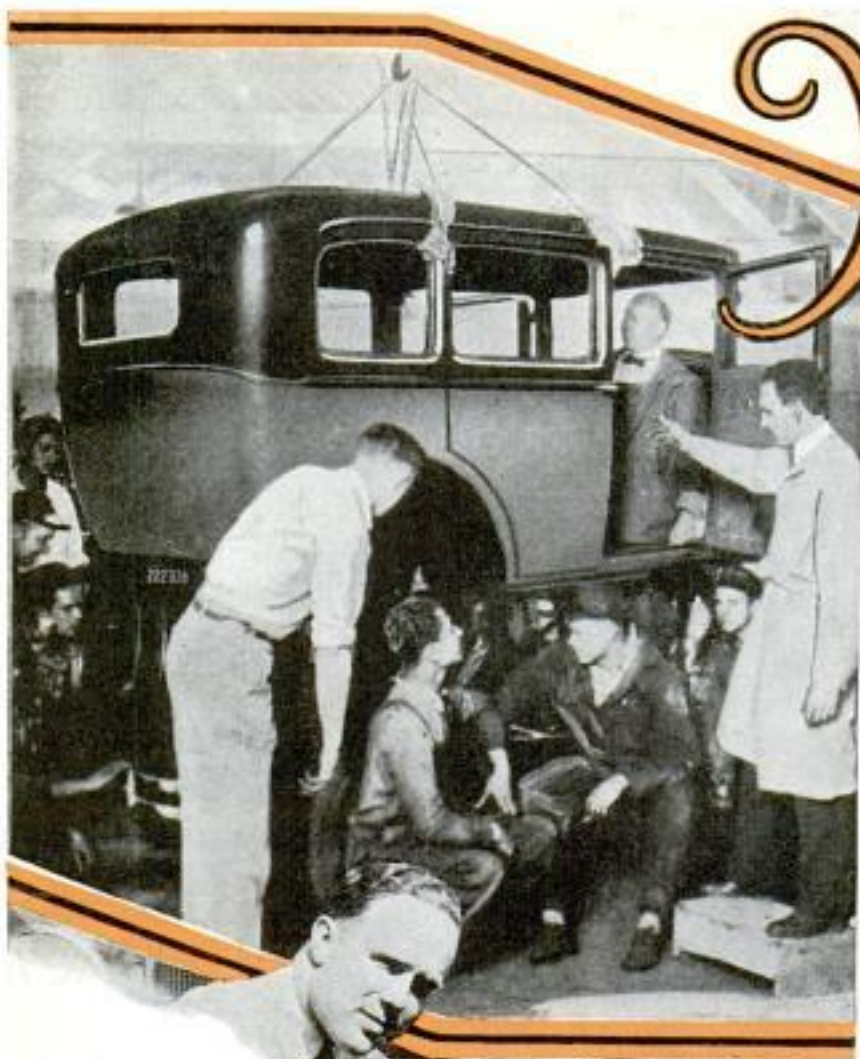
*Match King Inc.*  
*10 N. Clark Chicago*

*Speedway Mfg. Co.*  
*1834 S. 52nd Ave.*  
*Chicago, Ill.*

C1061

# YOU

## How Owners and Drivers Govern the Behavior of Their Automobiles



THE next time you meet a friend who drives a car of the same make and model as yours ask to run it around the block. You'll be surprised. His car will perform as if it came from a different factory. You'll find yourself questioning the reliability of your senses.

There's no news in the fact that no two cars are alike, regardless of the similarity of nameplate, year and model. But how many motorists realize that they have themselves to thank, or blame, for this? What a car becomes during its life of service depends largely on what attention it receives and how it is handled. With a

Above, Putting Body on New Car; Below, the Way a Car Steers Is Largely Dependent on How the King Pins Are Lubricated

certain kind of lubricant, for instance, it is possible to zinc-plate the gears and make them better than they were when the car rolled off the assembly line. Bearings, cylinder walls, pistons and other vital parts of the motor have to "season," "age" or "set." Some cars do not run their best until they have been driven upward of 10,000 miles. It is not unusual for cars to run better at 50,000 miles than when new. It depends on whether or not the owner realizes his role in the process.

When a customer complained that his car would not climb a test hill in high gear the service manager went along for a demonstration. He noticed that the owner kept the throttle wide open all during the ascent. Along toward the top the car labored so badly the owner was forced to shift.

Then the service manager took the wheel. He, too, started out with a spurt,

© 1961

# MAKE your CAR



but the speed remained uniform. There were a couple of momentary hesitations on the way up, but the owner did not notice them. When the car hit the crest of the hill it was doing thirty-five miles per hour as against twenty on the previous trial.

"You must have a heavy-foot," the owner laughed. "I was pressing with all my might."

"On the contrary," explained the service manager, "several times on the way up I lifted my foot from the accelerator. That closed the throttle. When you do that the pistons suck oil from the crankcase. This lubricates the cylinder walls, reduces friction, cools the hard-working parts and increases compression. You're too eager. A nervous driver would get over this hill with your car just because of the way he would handle the accelerator."

One of the most interesting things about motor cars is the way the same set of



Above, Testing Car in Factory "Punishment Pit"; Vibrecorder Used to Test Vibration of New Model

brakes will perform with different drivers at the wheel. One motorist tried to stop promptly and the two rear wheels locked and slid. Another driver ran up to the speed the owner had been traveling and stopped the car in less space without sliding the tires. The owner insisted that because the brakes had warmed up they had become more efficient, so he tried again. His second performance was as bad as the first. He applied too much initial pressure

*J. H. Pircey Research Engineer, Chrysler Motors  
Sells 7,900 Jeepel Compases and  
Electron mail  
says this would cost about \$50.00 to build*

*description Vol. 16. 507  
Feb. 1925 same Copy of Journal*

C1061

to the brake pedal. The weight of the car tipped forward, causing the rear end to lift up. This lightened the rear and reduced traction. Under such conditions brakes easily lock.

His friend applied the brakes more gradually, "dabbing" the pedal until

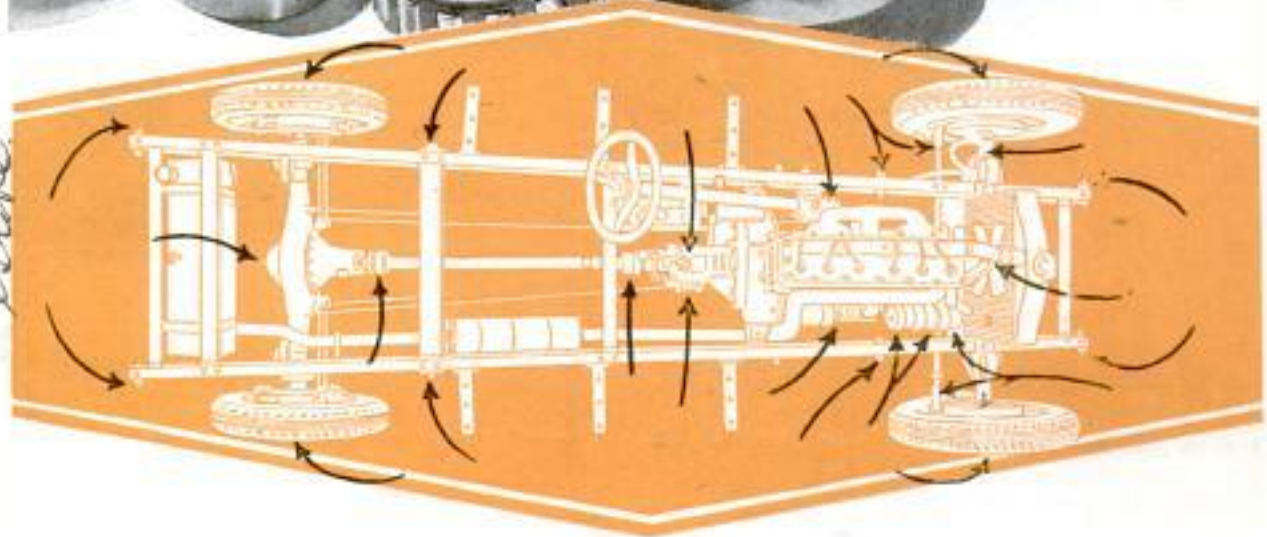
speed gradually. Dabbing of the brake pedal—intermittent application of foot pressure—not only helps compensate for any lack of equalization between the individual wheels but allows the body to regain its normal position with respect to the chassis. This maintains the normal weight distribution and thus

Right: Testing Properties of an Automotive Lubricant Which Deposits a Thin Film of Metal on Bearings and Other Surfaces, Protecting against Wear and Corrosion; Below: Point Chart for the Metal-Plating Lubricant



Chicago - Bullock Motor  
Trackage 6984 Collage  
Lubricant

Lubriplate Corp  
20th change Plate, Refs



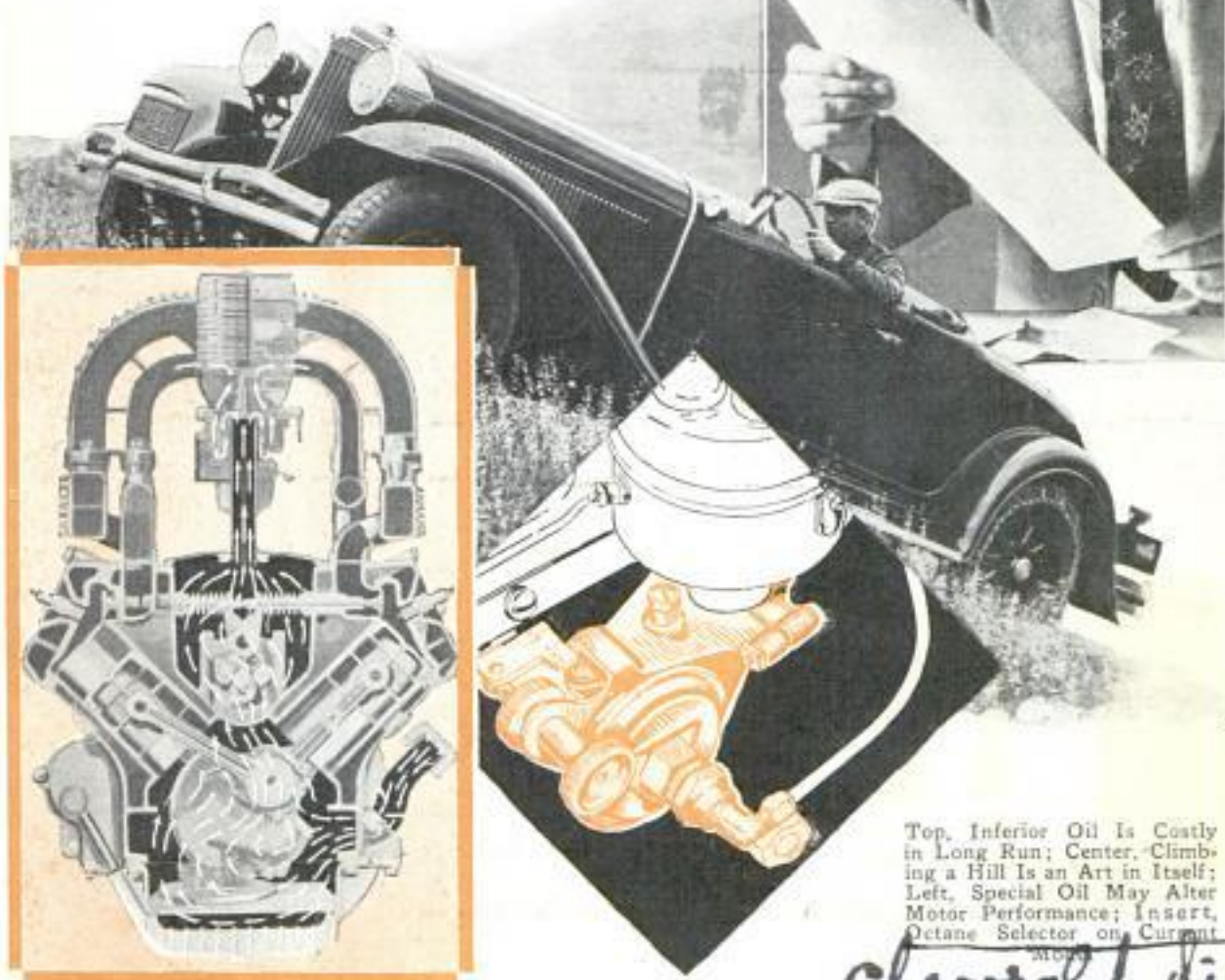
the speed was reduced from thirty to fifteen miles an hour. Then he went down a little more firmly on the pedal. Momentum had been considerably reduced. By that time had he tipped the car's body well forward through abrupt pedal pressure the rear wheels would have had but a very short space in which to slide. Most drivers forget that as they near the object to be avoided the car is easier to slow down, provided the braking has tapered off the

helps prevent sliding and skidding. The erratic driver sometimes stumbles over these facts. Not only does the owner who applies the correct rules of operation obtain better immediate performance from his car but he guarantees himself future satisfaction by lessening wear on the tires, warpage of brake drums and strain on the entire braking system.

Much warpage of brake drums is the direct result of setting the hand brake

C1061

when garaging the car. Formerly cars did not travel so far and brakes did not have so much work to do. Today when a motorist stops the brakes are apt to be quite hot. He sets the shoes of the hand-braking system against these heated drums. As they cool they meet the resistance of the hand-brake shoes and warpage follows. After that the brakes cannot be the same as they were when the car rolled out of the factory. New drums will be needed, but the resulting braking action may be



Top, Inferior Oil Is Costly in Long Run; Center, Climbing a Hill Is an Art in Itself; Left, Special Oil May Alter Motor Performance; Insert, Octane Selector on Current

*Chevrolet Six.*

better or worse than the original. The car is now on its way to being itself—different from any other car that bears the same nameplate.

Of course, anyone can change the characteristics of a motor by retarding or advancing the ignition timing. With a reduction in valve-tappet clearances a motor will become smooth and quiet in traffic and for low-speed driving, but it will lack pep and may become quite noisy on hills when the valves start holding open. In-

crease the tappet clearance and the motor becomes lively, but noisy. It may sound like some other make of car. It may even perform more like that other make.

A variety of effects can be obtained by changing the carburetor adjustment. Somewhat the same results are obtained, however experimental they may be, by switching to a gas with a different group of characteristics and a higher or lower octane rating. Even a pedal adjustment

(Continued to page 128A)

*probably made in Chevrolet factory*

Encl. James Montagnes, 608 Harbour  
Commission Bldg  
POPULAR MECHANICS  
Toronto 2, Ont. Canada

# Radium Ore Brought Out of Arctic by Planes



Above, Planes Landing in Arctic with Mining Supplies;  
Left, Cargo Carried by One Ship

Radium-bearing ore is now being brought out of the Arctic regions by airplanes, the same ships which carried in the mining equipment to obtain the ore. The Arctic radium field is on the shores of Great Bear lake and the rock is being transported from there by the ton nearly 3,000 miles by air, water and rail to a factory at Port Hope, Ont., where chemists extract this most precious mineral which sells for \$70,000 a gram or about \$2,000,000 an ounce. Opening of the Arctic radium field has provided a new and less costly source of supply for this mineral, formerly mined mostly in the Belgian Congo. Radium rock was found on the shores of Great Bear lake three years ago and now

the region has mine railways, ore compressors, workshops, log cabins, stores, airports and radio stations. Machinery is being brought in by air month after month for, besides the radium rock, the region is rich in silver, gold and copper. At Port Hope a method of extracting radium has been developed which cuts the time from six to three months. This fact and the higher radium content of the Arctic ore are the main factors which are expected to make radium available to cancer sufferers in hospitals at lower cost. Great care must be taken in handling the mineral, for even the ore taken from the mines is likely to damage the skin. Heat and light emanations from the ore are blown away by electric fans in the extracting plant. Three tons of chemicals are required to procure radium from a ton of ore, and every solution and residue is treated over and over to derive every particle of radium concentrate. The total output of the plant at present is only about half a gram a month. Once the pure radium is obtained, it is packed in platinum needles containing one-thousandth of a gram, the needles are sealed with gold and officially certified, ready to be shipped to

El Dorado Soda Mines Ltd.  
Port Hope, Ont. a 80/ King St. E.  
Toronto, Ont. Can.

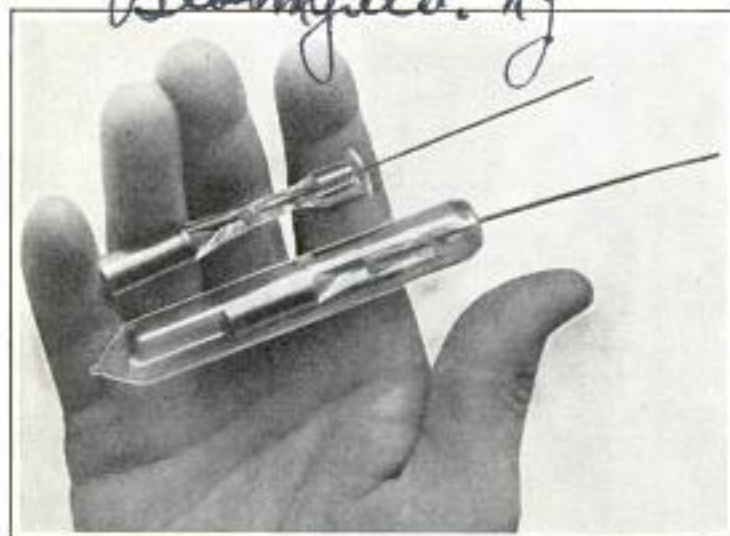


hospitals. In obtaining the radium a number of less valuable by-products in the form of salts and minerals are also reclaimed. Other regions in the Dominion are believed to be rich in the pitchblende containing radium.

c1103  
**NEON TUBES LAST LONGER WITH NEW ELECTRODES COATED INSIDE**

Neon and other gaseous vapor signs have been found to last longer by using an electrode coated inside with a special material. In one test a three-millimeter tube equipped with these electrodes, made by the Westinghouse Lamp company, was operated for 13,000 hours at a current of thirty milliamperes and 10,000 volts without a drop in gas pressure, and in other tests tubes were operated at lower voltages, and it was found possible to lower the gas pressure and still produce fair luminosity. Coating the electrodes was done after research disclosed that the gas in a neon sign disappears because it is driven into the electrode. Where in the past the use of an electrode of large area was the only means of obtaining a low potential drop, the same result is accomplished by the coating inside the new electrode. Easily freed of gases, this electrode makes possible a much wider range of colors in neon signs.

*Bloomfield, N.J.*



Coated Electrode for Use with Neon Tubes; It Minimizes Amount of Gas Absorbed by Material of Electrode



Two Seats of Modern Transport Plane Are Folded Together to Make This Comfortable Berth for Night Flyers

**BERTHS MADE UP IN AIRPLANE BY FOLDING CHAIRS**

By folding two soft-cushioned chairs together, employes of one air-transport company now offer the night passenger a flying berth. The two chairs form a horizontal cot, which is made into a bed with linen and blankets. Each of the planes in which the chairs may be converted into berths can accommodate six sleeping passengers. The flying berth was first used on the night planes of American Airways between Cleveland and Los Angeles and its reception by passengers was so enthusiastic that the company is planning to put sleeping planes with built-in berths in operation.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

*American Airways 310 S Michigan Chicago*

C 1101  
512

40 W. 40th St  
New York

# Water Chilled in Vacuum Cools Air in Home

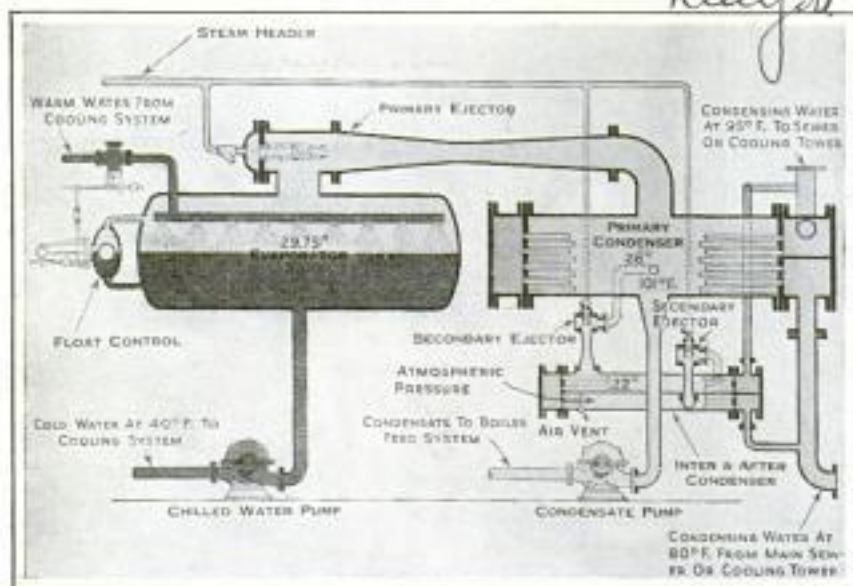


Diagram Showing How Water Is Used to Cool Home in a Steam-Vacuum System by Converting a Very Small Part of the Water into Vapor

form of a fine spray and thus sufficient water surface is present to cause an almost instantaneous evaporation of a small quantity of water. Where water at forty degrees is required only one per cent of the water is converted into vapor, absorbing its heat of vaporization from the remaining ninety-nine per cent, thereby chilling the main body of water. The chilled water is pumped from the evaporator to the cooling apparatus. Steam introduced through a jet and traveling at high velocity

Only water is used as a refrigerant in a steam vacuum-cooling system for homes or large buildings which produces cold water for air conditioning. The unit is known as a decalorator and has no moving parts although it will chill water to thirty-five degrees. The chilling is produced by applying the physical law that water under high vacuum will vaporize at low temperatures. To produce evaporation, the sensible heat of the liquid is given off in the form of latent heat in the vapor. Chilling of the liquid is consequent to this conversion of heat. The water is introduced in the evaporator chamber in the

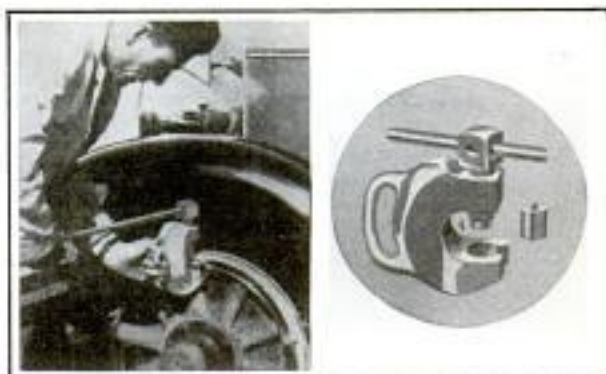
through a Venturi tube produces the vacuum in the evaporator. Standard methods of steam condensation are employed to reconvert this steam and the vapor into liquid. The method is also suited to cooling drinking water. Operation is entirely automatic. A float control maintains a constant level of chilled water in the evaporator, a thermostatic control valve shuts off the steam to the ejectors when the chilled-water temperature goes below any desired temperature and, in the case of a varying load, the thermostatic control turns the unit on and off. Steam at any pressure may be used.

## TOOL TO TIGHTEN AUTO SPOKES IS EASY TO OPERATE

C 1053

Anyone can tighten loose spokes in wood auto wheels without previous experience by using an inexpensive tool which resembles a hand clamp in appearance. Its lower jaw has a hole through it and contains a slot which fits around the spoke just below the rim. A screw passes through the upper jaw and has a die attached which resets the felloe against the spoke and at the same time presses the spoke into the hub, thus tightening it at each end. A long rod extending through the exposed end of the screw gives the operator sufficient leverage to exert fifty

tons of pressure on the spoke. No wedges are required and an entire wheel can be tightened in about ten minutes.



Tool Resembling Hand Clamp Which Applies Tremendous Pressure in Tightening Auto Spokes

Coffer Tool Co.  
Sandpoint Idaho

*Ventura Calif*  
*Ventura*



Playing Water Polo on Boats Instead of Ponies;  
Note the Saddle and Handlebar for Steering

### OUTBOARD BICYCLE-BOAT USED FOR WATER POLO

Outboard boats with some of the features of bicycles provide the "mounts" for water-polo players in a sport filled with thrills and spills. The little boats are shaped something like sea sleds. A saddle and handlebars enable the player to sit upright and steer the craft with one hand, while swinging his mallet with the other.

tor de Terra holds. This process has been going on as recently as perhaps one million years ago, only yesterday in geological time. It started more than 100 million years ago, Doctor de Terra estimates.

### FOCUSING FLASHLIGHT FOR GUN HELPS HUNTER AT NIGHT

Hunting game at night is facilitated by using a focusing flashlight which attaches to the weapon with automobile steering-post clamps, the same kind used by motorists for holding a flashlight on the steer-

*C1160*

### SHRINKAGE OF EARTH'S CRUST 1172 FOUND IN HIMALAYAS

New evidence that the earth's crust is shrinking is presented by Dr. Hellmut de Terra, of Yale University, after studying formations among remote peaks of the Himalaya mountains of northern India, the tallest and youngest mountains in the world. The shrinkage presumably is the result of gradual cooling of the earth's interior. That has been progressing slowly since this planet was pulled off from the sun. What is actually shrinking is the earth's inner shell of semi-fluid "magmatic" rock, which underlies both oceans and continents. When the deep rock layer shrinks, it is believed, the outer crust of hard, rigid rocks is crumpled and wrinkled like the skin of an apple when its inside dries. This is what "wrinkled up" the mighty Himalayas, the Alps of Europe and other mountain ranges of the world, Doc-



Rifle Equipped with a Focusing Flashlight Which Aids the Hunter Who Goes Out at Night

ing column. The light is of the five-cell variety and attaches under the gun so it can be operated by the hand which supports the rifle.

*New York Herald Trib. 7/30/33*

*Com. Hill C. G. and Son*

*petition to Hinduras for American Museum*

*New Haven Conn.*

*According to Capt. R. Stuart Murray and Maj. George Witten*

e 1148  
514

Science News, Bilt  
8/5/33

The DuPont Co. Inc.  
95-16 1st St  
Racine Wis



Electric Beverage Mixer and Dispenser; the Motor is in the Lid of the Pewter Container

**DRINK MIXER RUN BY A MOTOR IS COMBINED WITH SERVER**

Malted-milk drinks and other beverages requiring mixing can be prepared quickly in a combination mixer and server, the former being operated by a small electric motor. It consists of a container with a spout and a motorized mixing rod, the motor serving as the lid for the container. The latter is made of pewter and the rod has a single stem with a rippled-edge disk at the end to do the churning. At the top of the motor is a large knob and switch which makes it easy to handle. When serving, the motorized stem is removed and replaced with a conventional snap-on lid. A screw cap, placed on the spout during mixing, is removed and the beverage is ready to be poured.

**U. S. TO COMBAT SOIL EROSION BY TERRACING FARMS**

In a \$5,000,000 one-year program, the United States government will combat soil erosion by terracing farms. The government will supply the technical direction and terracing equipment and the landowners will provide the power and labor.

Soil erosion now removes 126,000,000 pounds of plant food annually from the fields and pastures of the nation at a financial loss of about \$200,000,000. A maximum amount of unemployment relief is promised for every dollar invested by the government, since estimates indicate that more than twice the \$5,000,000 grant will be spent by landowners in carrying out the work. The department of agriculture estimates that seventy-five per cent of the cultivated land in the United States is seriously affected by soil erosion. Conservation of the fertile top soil, one of the most important agricultural assets, will tend to maintain the value of land held as security for long-term loans, made directly or indirectly with government funds. It will decrease the deposits of silt and sand in bottom lands and stream channels.

**ENVELOPE SEALER IS COMPACT AND SIMPLE TO OPERATE**

Designed particularly for the home or small office, a hand-size envelope moistener and sealer does both jobs as rapidly as it can be brushed across the paper. It consists of a small water container mounted on a metal disk with a felt pad between the two parts. The barrel automatically moistens the pad. An envelope flap is inserted between the pad and barrel, a spring pressing the flap into contact with the pad as the sealer is moved across the flap. A return stroke with the flap removed from the pad and the metal disk pressing on the



Envelope Sealer Which Moistens Flap at One Stroke and Seals Container on Return Stroke

moistened section seals the envelope. It is supplied in different colors. When not in use it can be employed as a paper weight.

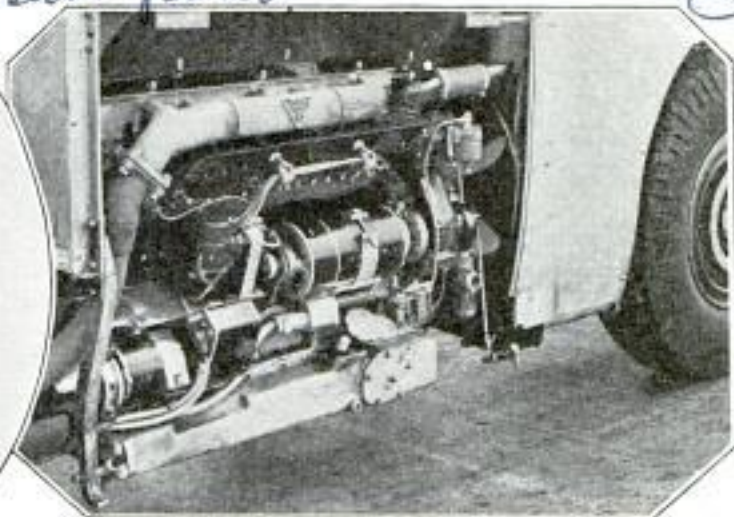
Please send my application for a copy of the book 'The Science of Agriculture' by the U.S. Department of Agriculture. I am interested in the book 'The Science of Agriculture' by the U.S. Department of Agriculture. I am interested in the book 'The Science of Agriculture' by the U.S. Department of Agriculture.

Envelopes  
Sealer  
C. F. Rainey  
Mass

Bruce Envelope Sealer C. F. Rainey Mass



mid classer  
any



pat. pend

© Associated Equipment Co.

Views of Motor Coach with Engine, Gear Box and Transmission Mounted on Side to Increase Passenger Space

**ENGINE PLACED ON SIDE OF BUS TO INCREASE COMFORT**

England is now experimenting with a motor coach in which the engine, gear box and transmission are mounted on one side, just behind the right front wheel. It is claimed this arrangement increases the amount of room for passengers and shields them from the heat of the engine. Another feature of the bus is a special bumper known as a life guard which operates in collisions with persons or obstacles.

**RAZOR BLADES ARE KEPT KEEN WITH ELECTRIC SHARPENER**

Safety-razor blades can be used for weeks or even months by employing an electric sharpener which both grinds and stropps the blade in a few seconds. The sharpener can be plugged into any alter-

nating-current light outlet. It is contained in a small case, on top of which are two pins to hold the blade and two lapping tables which operate at sixty strokes per second. The blade is held against these tables by magnetism so controlled as to give the correct lapping tension. For grinding, the tables are covered with a



thin film of lapping compound applied with a finger. For stropping, the compound is omitted. A blade is given a keen edge in from five to thirty seconds. The sharpener requires no attention except wiping off the tables after using the compound. It is claimed the lapping action results in a straight-edged blade without saw teeth.

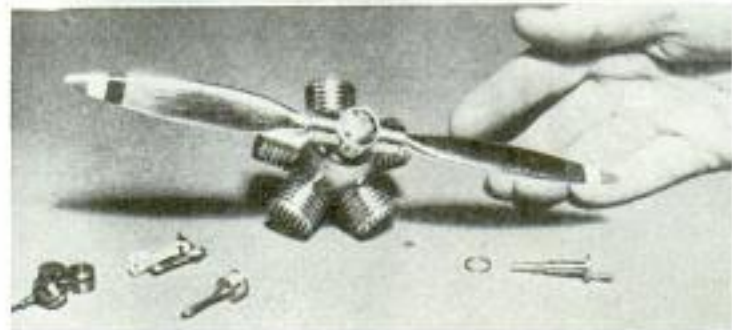
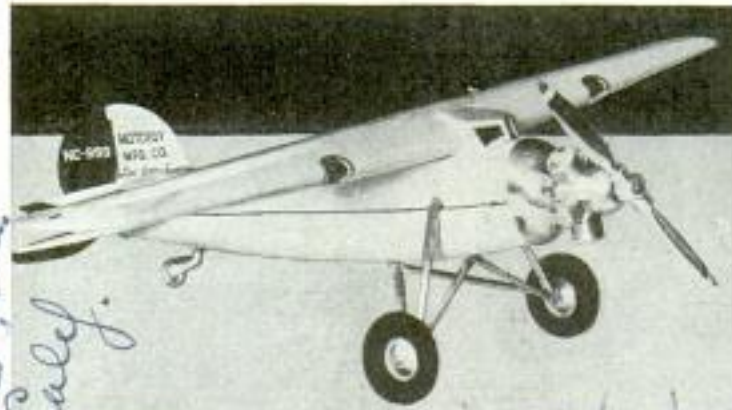
Olympic  
Electric  
\$ 1.50

Park Ave. New York  
No. 1416 230

Hudson's Mfg. Co. Forestville, Conn.  
no U.S. Agent known

The Hudson's Mfg. Co. Forestville, Conn. Factory rep. 916 St. Lees

# Chemical Gas Motor Drives Model Airplane



Model Plane Driven by Motor Which Derives Power from Gas Developed from a Chemical Placed in Tail

Power for a model airplane is derived from a chemical motor which utilizes the expansion of a chemical to supply the motive force. The inventor is now experimenting with a larger motor of the same kind which he hopes to use with a glider. A special stick chemical is placed in a tube in the fuselage of the model plane and ignited, then sealed with a valve lock. Gas is developed which drives the tiny radial motor. Under tests the little motor has turned up 2,500 revolutions per minute and lifted the model plane off the ground in less than ten seconds. For a glider, the

inventor believes the motor, driven by a chemical gas, would solve the problem of long flights, the motor being used only when currents fail.

C1184

## PAPER MADE OF BAMBOO MAY SUPPLY ORIENT

Experiments are being conducted by Chinese experts to discover whether bamboo, the "white pine" of the Orient, may be used as a source of newsprint. If the work is successful, a new industrial field will be invaded by the skyscraper of grasses, which now has more than 400 uses. Some bamboos grow as much as sixteen inches per day, to a height of more than 120 feet, and their stems measure more than one foot in diameter. Bamboo phonograph needles, canes, umbrella handles, curtain rods, flower stands and penholders are not uncommon in America. A bamboo rod often is the fisherman's choice in all parts of the world. Sailing into an Eastern port, the traveler observes huge junks and clusters of sampans with bamboo superstructures, and small sail boats with bamboo masts to which sails are lashed with rope of split bamboo. In the cities, he may hail a bamboo jinrikisha or sedan chair, and on a sightseeing trip may peer into shops displaying fans with bamboo staves, souvenirs carved

from bamboo roots, chopsticks and knives and forks of bamboo, in addition to bamboo baskets, ladders, birdcages, chairs, beds, hats, tobacco and opium pipes, cigaret boxes, shoes, teapots, tools, musical instruments and scores of other articles. The grass also is a popular building material. On many dining tables appear young tender bamboo sprouts that are served like asparagus or as pickles and preserves. Only two species of bamboo are native to the United States, but the oriental variety thrives in private groves from Georgia to southern California.

Reported by National Geographic Society

Fred S. Fairland, Mototory Mfg Co  
 6916 Melrose Ave  
 Hollywood Calif.

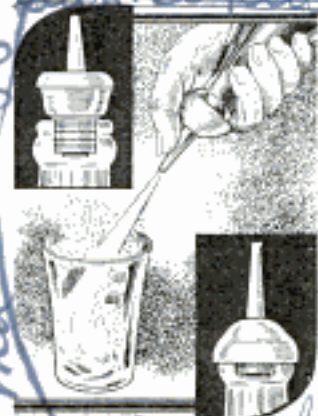
Reported by National Geographic Society

**FISH ABLE TO CHANGE COLORS  
TO MATCH BACKGROUND**

Certain fishes have the ability to change the color of their skins to match their environment. It has long been known that many fishes have a chameleonlike ability to change color rapidly by contracting or expanding their color-bodies, but Dr. Francis B. Sumner, of the Scripps Institute of Oceanography, has discovered that if their contact with a changed background is prolonged enough, they will actually grow new color-bodies or get rid of part of those they have. How deeply this ability is inbred is indicated by the fact that very dark specimens, raised in black jars, will shed part of their complexions when transferred to white jars. Fishes raised in white jars respond equally promptly if moved to black-lined homes.

**BOTTLE SEALER AND DISPENSER  
SERVES CHARGED WATER**

Ginger ale and all kinds of charged waters can be sealed in the original container and served from it by using a rubber bottle stopper which includes a dispenser. A valve stem extends through the rubber



**LONG-HANDED WEED KILLER  
SHOOTS POISON LIKE GUN**

Eliminating weeds without digging, bending or backache is now possible by using a long-handed weed killer which digs out the weed, scores the roots and deposits a dose of killing liquid to destroy any part of the plant which may remain. The weed eradicator is five feet long, holds one quart of fluid and has a spear point four inches long. There are three



Weed Killer Which Can Be Operated without Bending; It Digs Weed and Deposits Poison in Hole

fins for scoring the root, a channel in the fins directing the liquid to the scored parts. A ball-and-socket fluid release directs any desired amount of liquid to the roots, and it is claimed the fluid channel will not clog. A grip link lever controls the flow of fluid and a foot bracket permits the operator to force the tool into hard soil.

**TUBE TO GAUGE SOLDER HEAT  
IS USED FOR STIRRING**

Constructed of metal, a combination stirrer-thermometer is used in soldering. It is generally known that if the solder is not at the correct temperature at the time it is used, the lead and tin of which it is made will separate and result in a weak joint. The thermometer, consisting of a tube about one foot long, enables the worker to keep a close check on the temperature and provides a means of stirring the solder. A pointer shows the temperature at which solder should be kept for best work.



Anderson + Card Mfg. Co. 2916 Arlendale Road, Baltimore, Md.

Mr. Fred M. Sidding, 132 Blufffield Ave, Lake Shore, Ill.

Mr. Sidding, Mfg. Co. Suite 1218, 203 & Lake Chicago

Fred M. Sidding, 132 Blufffield Ave, Lake Shore, Ill.

Sidding Mfg. Co. Suite 1218, 203 & Lake Chicago

# Air "Ghosts" Show Aviators How Wind Acts



Student Flyers Observing the Amusing Antics of Two Air Ghosts—Free Balloons Shaped Like Grotesque Birds Which Show the Aviators How Currents of Wind Move

Huge balloons in the form of grotesque birds are being used by the British army air corps in training flyers. These air "ghosts" demonstrate how wind currents act, and when one of them blunders into the backwash from a plane propeller, the ghost's motions show vividly the action of the air and its direction. Free balloons might serve the same purpose, but the ghosts amuse while instructing.

total weight of the structure about one or more central piers. The new system makes it possible to design buildings with outside walls almost entirely of glass.

## BUILDING PLAN SAVES STEEL AND REDUCES COSTS

Thirty-per-cent reduction in weight and fifty-per-cent lower costs are said to result from steel-structural methods being used in Italy. According to a plan worked out by the architect Guido Fiorini, buildings are practically suspended around a central steel structure with no outside posts. The scheme depends upon a special arrangement of tension members to balance the

## BENCH OF CONCRETE AND WOOD IS EASY TO TAKE APART



Portable park benches made of concrete and wood include comfort and durability along with the movable feature. The ends are of concrete and the seats and backs of wood. Wooden pegs hold the benches together and they can be assembled or knocked down in a few minutes.

Science News Letter  
7/29/33

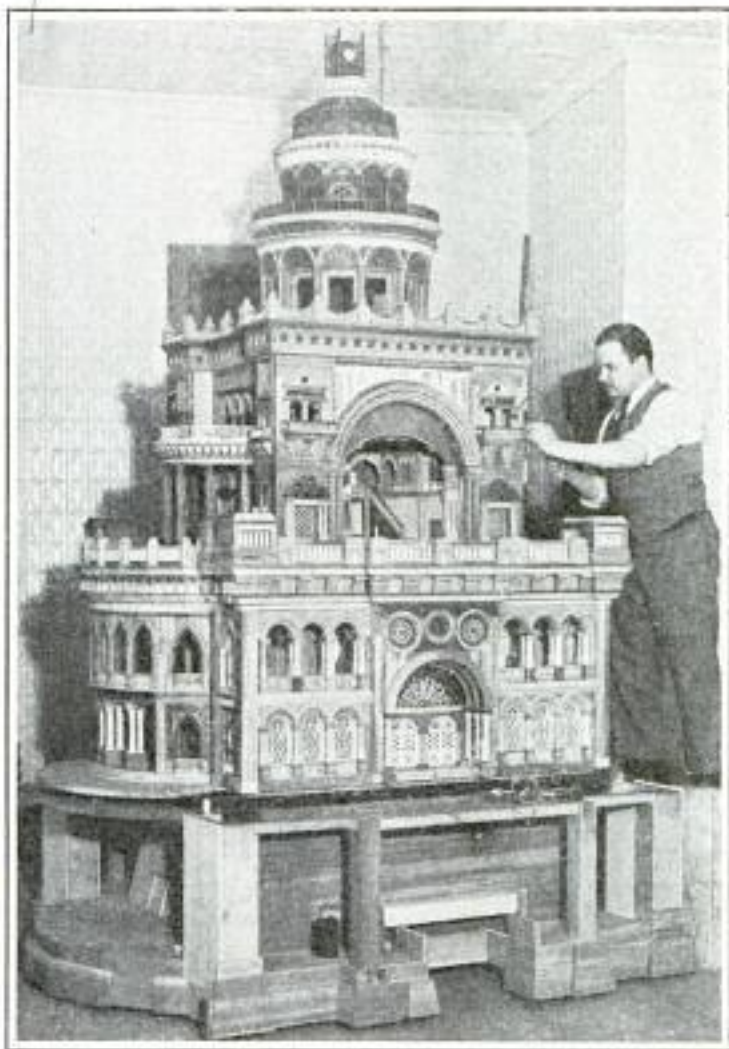


**TOEHOLD SAVES FLYER  
 THROWN FROM PLANE**

When Lieut. Daniel V. Gallery, Jr., was thrown from the cockpit of his navy plane while executing a slow roll at 6,500 feet altitude, he saved himself by hooking the toe of his shoe under the cowling. There he dangled until the ship completed the roll, placing the cockpit in position for him to pull himself back into the seat. Lieutenant Gallery was unhurt and only a slit in the leather of his shoe remained to show what a narrow escape he had from dropping into space. The flyer was equipped with parachute and scoffed at the suggestion that he was in any particular danger. Fellow officers say that his feat would have been impossible but for his strength and quickness, the result of training as a wrestler.

**TWO-WAY PHONE TALK  
 RECORDED ON DISK**

Telephone conversations, both answers and questions, are reproduced on an unbreakable record by the "teleskriptor," a German invention consisting of an intensifier and a reproducer. The teleskriptor is attached to the head and the phone receiver held against it instead of to the ear.



© Michael Sichel  
 Miniature Theater Eleven Feet High Which Contains 30,000 Pieces of Hardwood, Nails and Beads

**MINIATURE THEATER CONTAINS  
 THIRTY THOUSAND PIECES**

After more than three and one-half years of work, a New York man has completed a miniature theater eleven feet high, almost perfect in every detail, which contains 30,000 individual pieces of hardwood, ornamental nails and beads. Nearly all the pieces were fashioned by hand and most of the work was done with a pen-knife and a few other tools. The structure was built in four sections, each containing two floors. Each side of the building embodies an entirely different style of architecture, so the miniature really consists of four structures in one. The entire miniature is lighted by electricity.



Using the "Teleskriptor," Which Records Both Ends of a Telephone Conversation on an Unbreakable Record

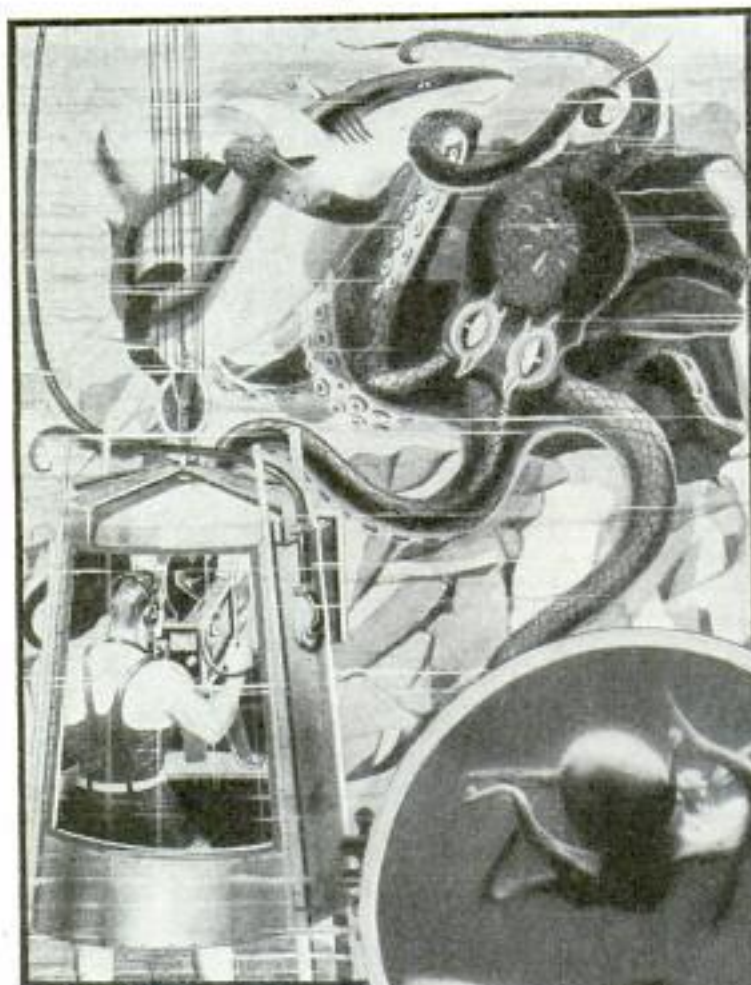
rese Winterfeldstr 47

Wodmer L.T. New York

H. Sillge W. 30  
 Berlin, Germany.

Frank Titus  
 730 W. Broadway

# Shark-Octopus Battle Filmed under Water

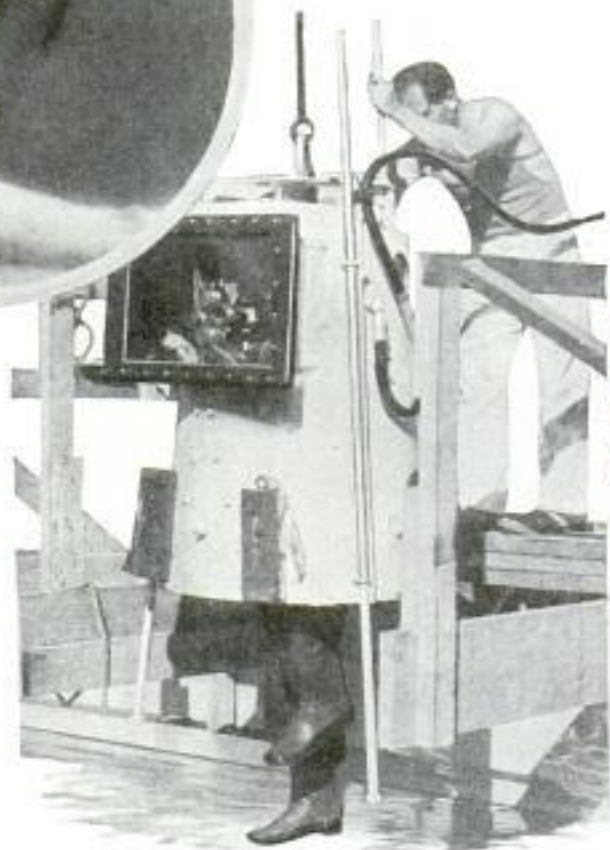


This apparatus was lowered to the bottom of the ocean and a bait was placed to attract the shark as the octopus hovered near by. The picture man did not have long to wait. The shark, enticed by the bait, came speeding along, spied the cuttlefish and the twenty-minute battle was on right in front of the eye of the camera.

## GREEN LIPS SHOW SPEED BLOOD CIRCULATES

German physiologists have devised a method of estimating the velocity of blood circulation which depends on the peculiar light reaction of the dyestuff, fluorescein. The presence of this dye in the blood is indicated by a greenish color of the lips,

If a shark and an octopus engaged in a fight, who would win the decision? This question has been asked many times, but it remained for a movie cameraman to find the answer and bring the proof along. The photographer descended to the bottom of the sea in the Dutch East Indies with his camera and when he rose to the surface, he had a series of pictures showing the cuttlefish's tentacles were no match for the needlelike teeth of the tiger shark. Once in a position to attack, the shark made short work of the octopus, while the octopus made little headway on the shark's tough hide. When the cameraman was assigned the job of filming this battle, he used his knowledge of physics. He knew no water would enter an inverted tumbler immersed in water, so he had a huge glass box, reinforced with steel bands, constructed to accommodate him and his movie outfit.



Diving Ball Used by Cameraman for Filming Fight between Shark and Octopus, and a View of the Combatants Taken under the Water

Science News Letter

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C1120

viewed under pure blue light in a darkened room. In making a test a small amount of the solution is injected into the blood stream, and the number of seconds elapsing until the lips shine is counted. The method is useful in studying circulatory and cardiac disorders. The minimum circulation time thus far observed was seven seconds, while an average circulation time is about twenty-one seconds.



Linotype Model Which Weighs Less Than Two Pounds and Required Eight Years to Finish

**WRITING IN INK IS PRESERVED ON METAL RECORDS**

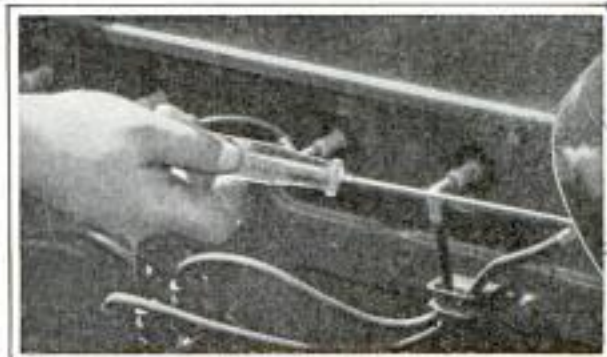
C1165

Records and signatures written in ink can be preserved permanently by placing them on metal sheets instead of paper. The metal is rolled in thin sheets and can be lithographed, printed or penned. Once the ink has been placed on the metal, it is virtually impossible to remove it. Water and rubbing make little impression. Acid may cut into the metal but the ink quickly saturates beneath the surface. After the names or other writings are placed on the metal, it is sealed with a hard wax to keep off fingerprints or other disfigurements. Since the metal does not rust or corrode, the penned writing is as permanent, it is claimed, as a cast-metal plaque.

**NEON LIGHT IN A SCREWDRIVER TESTS SPARK PLUGS**

C1156

Equipped with a neon tube in the handle, a screwdriver for the auto mechanic offers a handy tool for testing spark plugs. In the transparent, shockproof handle is the tube which flashes red when the tip of the screwdriver is placed on a firing spark plug or distributor. The intensity of the spark is gauged by the brilliance of the light in the handle.



Screwdriver with Neon Light in Transparent Handle Which Simplifies Testing Spark Plugs

**MODEL OF LINOTYPE REQUIRED EIGHT YEARS TO BUILD**

Weighing less than two pounds, a baby linotype has been constructed by an Iowa linotype operator who spent his spare time over a period of eight years at the task. Powered with a little electric motor, the model goes through all the motions of a real linotype or intertype. It was made from bits of brass with the aid of a jeweler's lathe. The regular linotype or intertype is about six and one-half feet high. The model is six and one-half inches tall.

**ONE INJECTION FOR DIPHTHERIA DOES WORK OF THREE**

C1169

Protection from diphtheria may be given to infants and children with a single injection of toxoid instead of three. The new toxoid is the result of years of research by the late Dr. Leon C. Havens, of the Alabama Health Office laboratories. It was developed from the old toxoid, already widely used in diphtheria-prevention work. Formerly it required three injections, a week apart, to secure protection. The new product provides immunity for ninety-five to ninety-eight per cent of those susceptible with only one treatment.

The United States lighthouse service uses photronic cells to turn on and extinguish lights automatically each day.

Speed Will Medalists

Howard's... City, Iowa

Science 29/33

Stanley Works, New Britain, Conn

Approved by U.S. National Institute of Health, Washington

# What OCEAN FLIGHTS

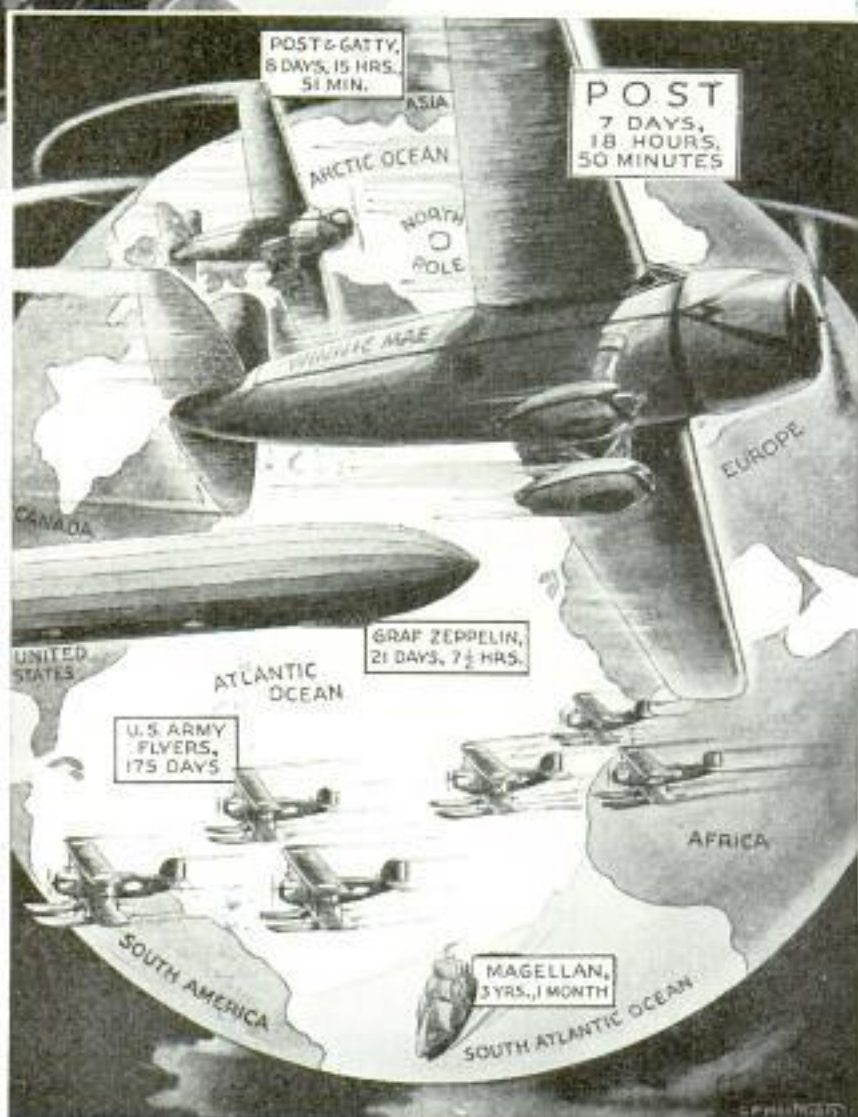


E. M. "Matty" Laird, the bank clerk who turned airplane designer, and the builder of Jimmy Doolittle's trophy-winning "Super-Solution" and many other race winners, gives you the "Why" of transatlantic flights. He visions round-the-world air-mail service and letters mailed in Chicago, Saturday, delivered in Paris, Monday, as a direct result of pioneer ocean flights.

By E. M. LAIRD

WHAT are the lessons learned from transoceanic flights? Do they really advance aviation science or are they foolhardy stunts?

Such questions may best be answered by asking another. What was accomplished by Columbus and other pioneer ocean voyagers who ventured out on the uncharted seas hunting unknown places and proving their theories to the population of the old world? They discovered America and many other places, but, they also opened the way for the great merchant marines which now traverse the waterways of the entire globe. And even in the discovery of America they found the land which gave birth to the famous Wright brothers, Wilbur and Orville, who built and flew the



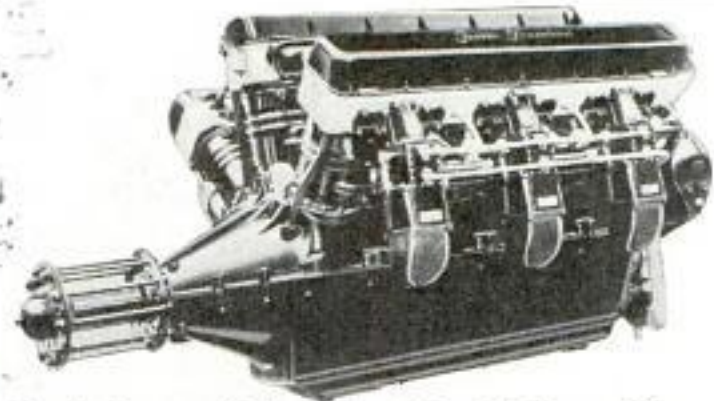
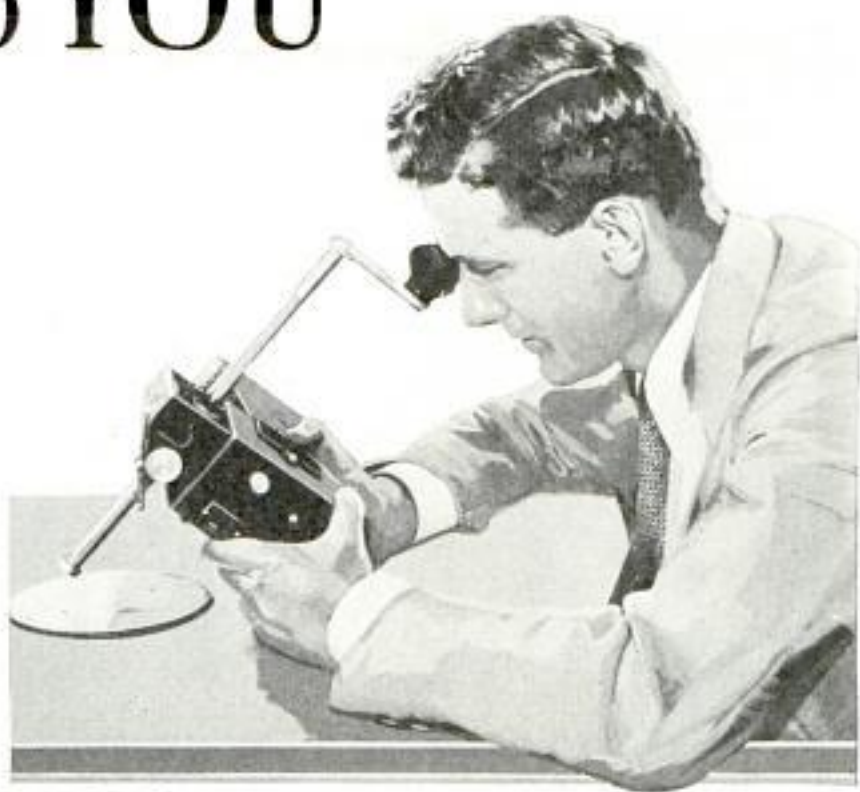
Above, Engine of Italian Seaplane Such as Carried General Balbo and His Armada across Atlantic; Below, Globe-Circling Achievements from Magellan to Wiley Post, Showing How Time Required to Go Round the World Has Been Shortened

C1174

# Mean to YOU

first heavier-than-air power-driven airplane.

Since that memorable flight at Kitty Hawk, S. C., just thirty years ago, there have been remarkable strides in aviation, not only in the development of airplanes and engines, but also in actual flight accomplishments. It has been a hectic grind of development from Sept. 9, 1908, when Orville Wright established an airplane duration record of one hour and two minutes at Fort Meyer, Va., to Wiley Post's pres-



Harold Gatty at Work on Ground-Speed Indicator; Below, Power Plant of One of General Balbo's Ships

ent round-the-world flight in the amazing time of seven days, eighteen hours and fifty minutes, or Gen. Italo Balbo's recent magnificent achievement of leading his fleet of seaplanes from Italy to Chicago and return.

My own case illustrates the youth of aviation. While considered a pioneer in the aviation industry, I did not become interested in flying until 1910 when I took a day off from my job as clerk in a Chicago bank to visit Grant park to witness the exhibition flights of Walter Brookins with his early Wright biplane. I saw the start of his record-breaking flight from Chicago to Springfield, Ill., a distance of 188 miles which he made in five hours and

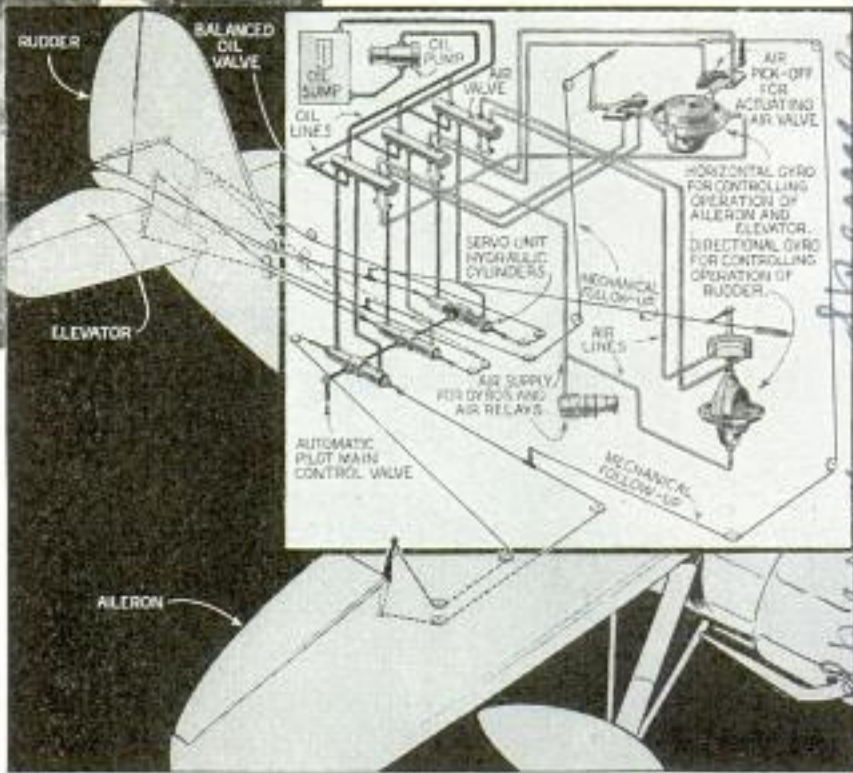
fifteen minutes. That flight is one that is written in the pages of aviation history as a real accomplishment. Today the airlines fly over this same route, several schedules daily, from Chicago to St. Louis, and the time required is less than half that of Brookins' flight from Chicago to Springfield.

On September 17, 1911, C. P. Rodgers started on the first transcontinental flight. It required forty-nine days to complete the trip of 4,900 miles from New York to Los Angeles with his Wright biplane, powered with a four-cylinder engine developing but thirty-five horsepower. There were no instruments of any kind on the airplane, and improved airports were unheard of. Today the twin-engined Boeing transport planes powered by two Pratt and Whitney engines of 550 horsepower each and fitted with all the latest flying and navigating instruments, fly the route from New York to San Francisco in twenty-one and one-half hours with more than a dozen scheduled stops.

Just how long ago did we start flying the Atlantic?

The first transatlantic flight was made

E-117 4070



Above, Arrow Points to Robot Pilot; Below, Diagram of Mechanical Pilot and Its Operation, Together with Controls It Operates

by a group of United States navy fliers in the "N. C.-4" which made its Atlantic crossing from Trepassey, N. F., to the Azores and from the Azores to Plymouth, England. The first non-stop Atlantic flight was made by Alcock and Brown in June, 1919, flying from Newfoundland to Ireland in sixteen hours and twelve minutes. The famous "We" flight of Charles A. Lindbergh was next, from New York to Paris, nonstop, then Clarence Chamberlin's flight, New York to Eiselben, Germany. Another important record flight was from New York to Tokio, with stops in several cities of the old world, by William S. Brock and Edward F. Schlee. Among other notable flights we have the more recent ones of Amy Johnson and her husband Captain Mollison, who flew the Atlantic from England to the United States, and last, but not least, Paul Codos and Maurice Rossi, who established a long-distance record by

flying nonstop from Floyd Bennett field, New York, to Rayak, Syria, a distance of 5,630 miles. As we glance through the list of successful long-distance ocean flights and at the same time are mindful of those that failed, we must consider and appreciate the fact, that in addition to the remarkable skill of the pilots, the improvements in planes, engines, instruments and accessories, have made possible these numerous records. Such instruments as the bank and turn indicator, climb indicator, directional gyro, artificial

horizon, ice warning indicator and standard engine and navigational instruments constitute the usual equipment of an up-to-date plane. Without them it is all but impossible to fly for any great length of time through fog, or fly blind as it is termed. Airline pilots must qualify in instrument flying before they receive their pilot's rating from the department of commerce.

The controllable pitch propeller is another of the more recent developments. With it a plane can take off with a greater

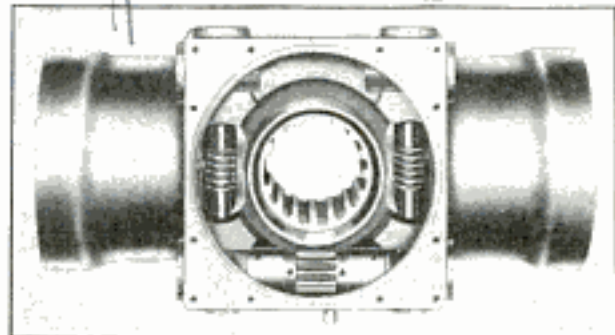
*1910. S. Latheal  
The first non-stop Atlantic flight was made by Alcock and Brown in June, 1919, flying from Newfoundland to Ireland in sixteen hours and twelve minutes.*

Smith Engineering Co C1174  
POPULAR MECHANICS  
1982. W. 74th Cleveland  
Ohio.

load and upon gaining the desired altitude, the pilot can increase the pitch angle of the propeller blades, thereby permitting greater flying speed at slower engine revolutions. The robot pilot is still another of the new accessories for aircraft. When adjusted by the pilot it controls the airplane, and keeps it on any set course, as well as the hand of the human pilot. Wiley Post used one of these robots in his "Winnie Mae" on his recent round-the-world flight and it proved of valuable service. Constant improvement in aircraft radios, both receiving and sending sets, coupled with the radio bea-



Century of Progress



Above, Jimmy Mattern and His Ship; Left, the Hub of a Controllable Pitch Propeller

con, must not be forgotten as they play a very important part in the daily operations of our airliners.

In the long list of ocean flights that have been attempted, some proved disastrous at the start due to overloaded conditions. The controllable pitch propeller has minimized this hazard. A few starters have disappeared after taking off and getting well on their way, apparently forced down in the ocean or remote places. Others have completed their ocean hops and come to disaster while attempting forced landings at night or in storms in unknown territory. To the people in the aircraft industry, these flights that end in disaster mean as much, if not more, than those that are completed successfully. Why?

Take the recent flight of Capt. Stephen

Darius and Lieutenant Garenus. They took off from New York with Lithuania as their goal. Their plane was fitted with all the modern proved flying instruments except radio equipment, which they omitted because of its weight. They crossed the Atlantic without difficulty and were precisely on their course all the way. After covering about 4,200 miles of their 4,600-mile trip they encountered a storm area and with the supply of fuel in the tanks quite low, it is believed they attempted to get below the storm clouds so they could see the lights of the towns. Because of poor visibility and the lack of an instrument that would show definitely their height above the ground, they flew into a forest near Soldin, Germany, and were killed.

Here we see the need for instruments that will indicate at all times the distance the airplane is flying above the ground. Altimeters now in use only indicate the height above sea level or above the field from which the plane started. These altimeters operate on the same principle as a barometer, so are affected by barometric

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changes which result in errors. Another instrument needed is one that would indicate to the pilot the speed the airplane is making in relation to the ground. This we might term a "ground speed indicator," for use particularly when the ground is invisible. An air-speed indicator merely indicates the speed of the airplane in relation to the air in which it travels and does not compensate for tail winds or head winds. If the air speed indicator shows an air speed of 150 miles per hour and there is a ten-mile head wind the air-speed indicator would indicate 150 miles per hour, but the actual speed in relation to the ground would only be 140 miles per hour.

It is not unreasonable to believe that these instruments will be developed and

it is not fantastic to predict that a radio-controlled, robot-piloted plane, will be an accomplished fact within a few years.

The regularity and precision with which ocean flights are now accomplished, has resulted in a definite demand for a trans-oceanic air-mail and passenger service. Within the next three to five years, I believe, it will be possible to post an air-mail letter in Chicago or New York on Saturday and be assured of its delivery in London or Paris on the Monday following, or even sooner. A large American air line has under construction some large fifty-passenger flying boats for use in trans-atlantic service and through the granting of special concessions by the various nations to air-line operators, a round-the-world service may soon become a fact.

### AIRPLANE IS FITTED TO MEET ARCTIC PERILS

When Colonel and Mrs. Charles Lindbergh went on their survey flight into the northern wilderness with a view to mapping a possible commercial air route across the Atlantic, they traveled in a seaplane equipped to meet virtually any emergency in the Arctic wilds. The ship is fitted with a 710-horsepower motor and a

controllable pitch propeller, instead of the standard equipment. There is also a ground speed and drift meter, a small outboard engine and other emergency equipment in case the craft were forced down in the northland. Fuel is carried in a large gravity fuel tank and there is also space for additional gasoline in tanks carried in the wings and the large metal floats. A radio and a radio direction finder, and other equipment also were carried.

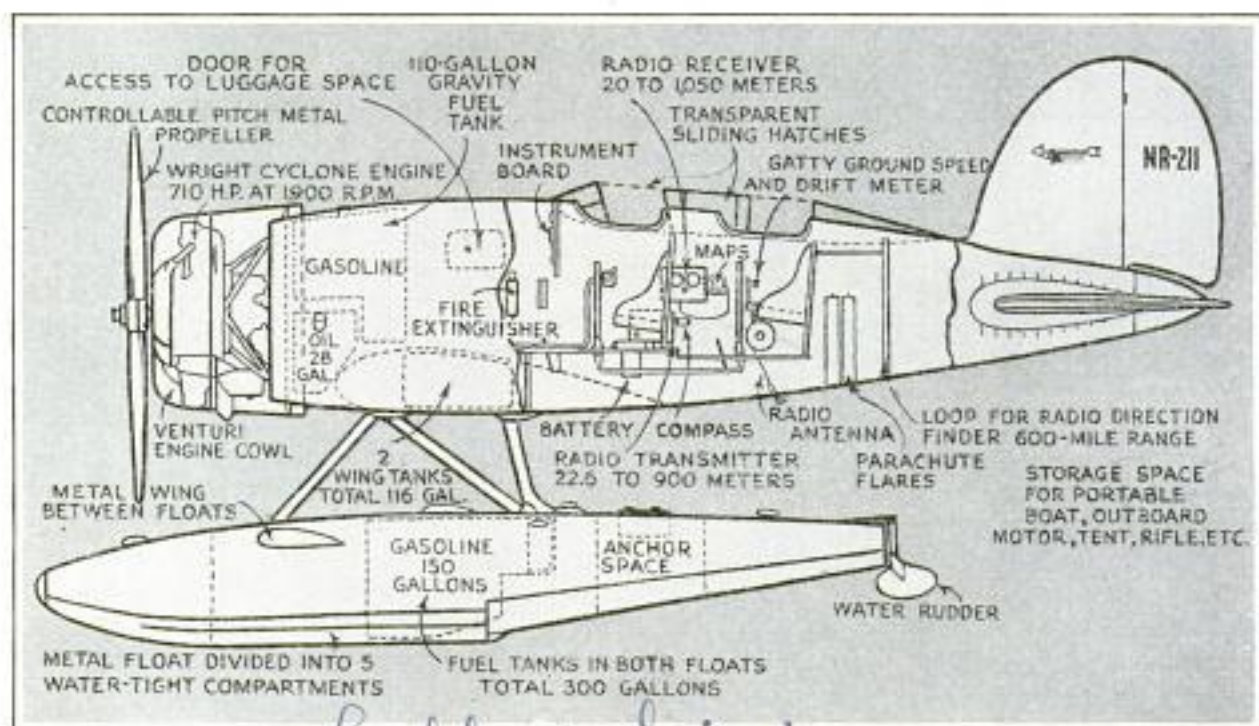


Diagram of Colonel Lindbergh's Plane in Which He Made a Survey of the Arctic; Note the Large Capacity for Fuel Which Is Carried in Gravity Tanks, in Wings and in the Floats

*Lockheed Sirius*  
 Lockheed Aircraft Corp.

*Copyrighted material*  
 Burbank, Calif.



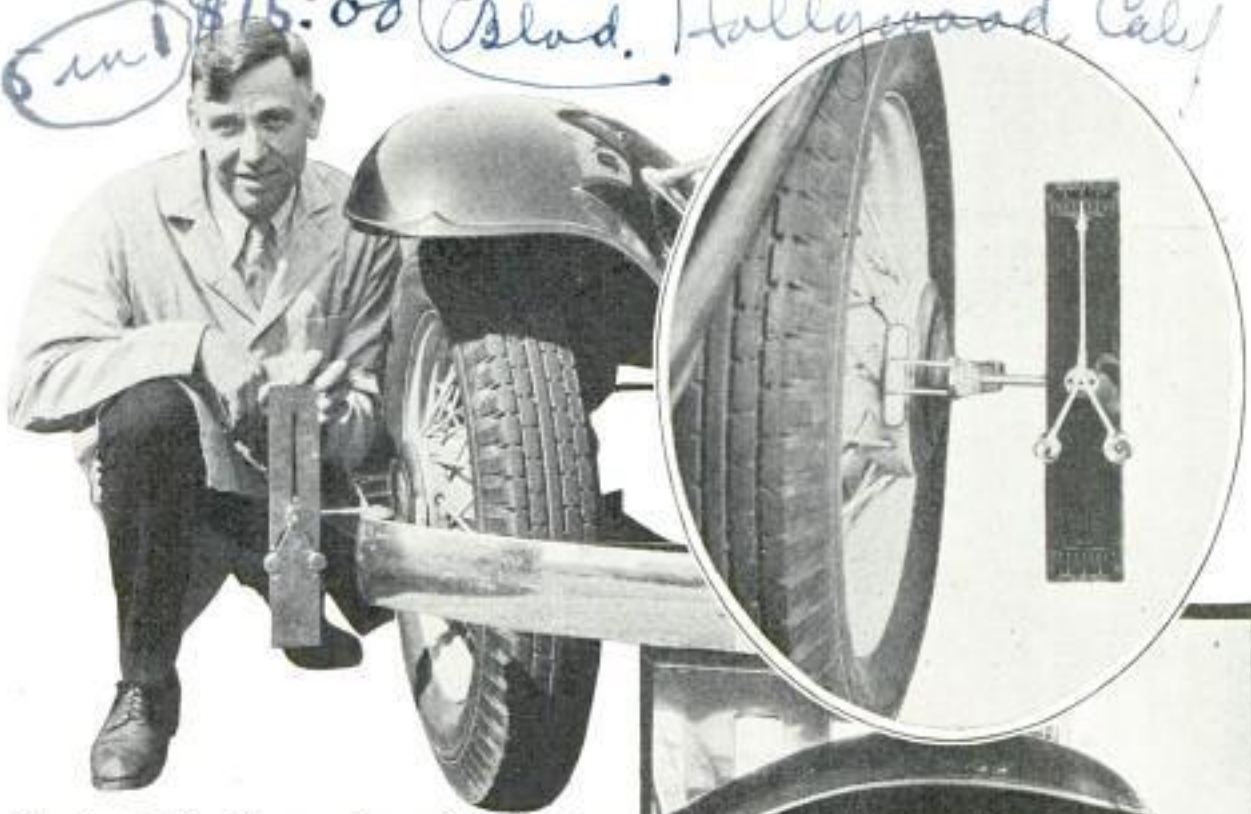
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POPULAR MECHANICS

Alignment Gauge Tests Wheels and Axles

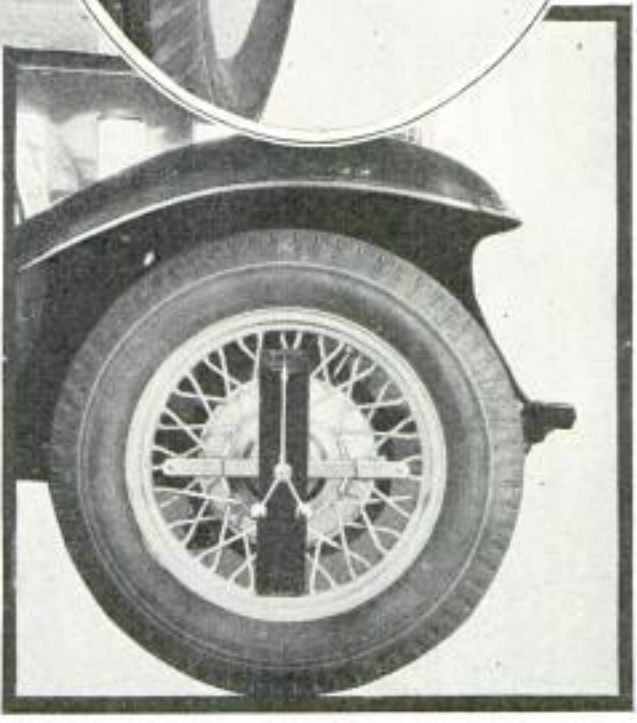
5 in 8/15.00

26650 Santa Monica Blvd. Hollywood, Calif



Wheel and Axle Alinement Gauge Which Checks Camber, Caster, Spindle and King-Pin Inclination

Wheel and axle alinement is quickly checked on any automobile with a gauge which shows camber, caster, spindle, king-pin inclination and radius. The complete outfit weighs only three pounds and is extremely simple to operate with the aid of a check chart showing proper readings for all makes of cars. Indicators give readings in degrees on a small scale, and a comparison of the actual reading with the specifications of the manufacturer makes correction easy.



Science News 8/5/33

C 1208

ROOM FOR A MILLION GALAXIES IN SPACE OCCUPIED BY ONE

All the galaxies were together a few billion years ago in a space no larger than is now occupied by one, but they began to separate and thus started the expansion of the universe. This theory has been advanced by Prof. William de Sitter, famous Dutch astronomer, who now believes that the universe contracted to a point at some definite epoch of time, the galaxies passing simultaneously through this point with the velocity of light. The galaxies, he pointed out, can easily penetrate each

other. If you put a million galaxies in the space now occupied by one, the stars would still have plenty of elbow room, for their mutual distances will still be of the order of 100,000 times their diameter. The theory is supported by several indications of a serious crisis three to five billion years ago, which is about the age of the planetary system, according to modern ideas. It is now believed some very critical event in the history of the galaxies at about that time subjected them to perturbations which were responsible for their rotation, their spiral structure and the distribution of matter in them.

before the Royal Astronomical Society in London.

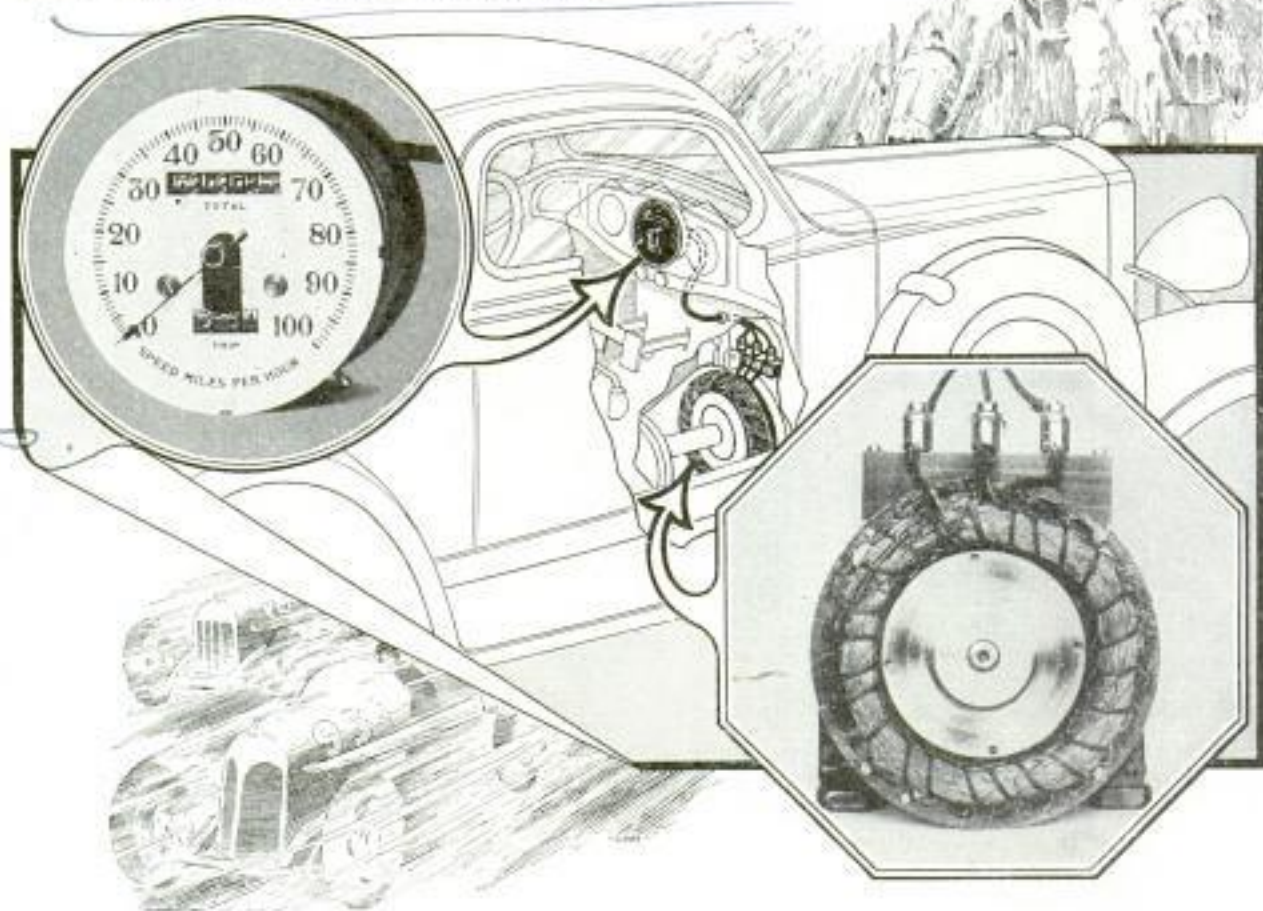
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# Electric Speedometer Has No Wearing Parts

Simple but efficient and dead accurate, an electric speedometer using alternating current has been developed for automobiles, busses, seaplanes and railroads by the Westinghouse Electric and Manufac-

Accurate Electric Speedometer Which Uses Alternating Current and Has No Parts to Wear Out

*East Pittsburgh, Pa*



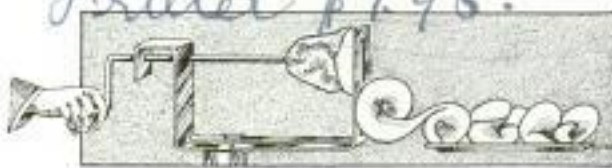
turing company. It has no brushes, no moving electric contacts, no flexible shaft, no driving gears, and often no bearings except those in the little meter—in other words, there is nothing to wear out. The generator is a magneto whose rotor is a powerful, permanent cobalt-steel magnet. It is mounted directly on the machine whose speed is to be measured and its

three-phase current output is taken over to the indicating instrument in which there are two tiny synchronous motors with permanent cobalt magnets. One is restrained by a spring which actuates the speed pointer like a voltmeter. The other, unrestrained, revolves in synchronism, and drives the gear train of the odometer which shows total miles traveled.

## POTATO CHIPS MADE AT HOME WITH VEGETABLE SLICER

Potatoes are converted into long spiral shavings with the aid of a simple and inexpensive vegetable slicer which makes it possible to prepare potato chips and other vegetables requiring very thin slicing at home. The potato, apple or carrot is attached to a holder and pressed against

two opposite edged steel knives. Turning the handle does the slicing, but the resulting slices are spirals rather than chips.



Vegetable Slicer Which Cuts Potatoes, Apples or Carrots into Elongated Ribbon Spirals

*Modern Products Co  
Harrisburg, Pa*

*Modern Products Co  
Harrisburg, Pa*

Wilson Western Sporting Goods Co. 7/15/33  
C/100

**NEWSPAPER MADE INTO TALKIE  
BY PRINTING SOUND WAVES**

Talking supplements to newspapers are visualized as the result of a demonstration in Madrid of a machine something like a phonograph but called a photoliptophone. It "plays" paper records which can be rapidly and economically reproduced by printing. In making the records, sound waves are photographed with the aid of the photo-electric cell. From the negative as many prints as desired can be made and, like other photographs, these can be printed in newspapers. In one test an address was reproduced from a negative fifteen minutes after the speaker concluded and the speaker's voice was reproduced as exactly as any phonograph could do the job. There is no scratching of a needle on a record. Instead a ray of light flashes on the photographed sound waves as these rotate over a revolving cylinder, to reproduce the sound. In reproduction, the process of impressing the sound is reversed, the waves being converted into sound.



Wedge World  
Moving-Picture Camera for Timing Air Races to One One-Thousandth of a Second

**ALL-RUBBER VALVE FOR BALL  
MAY BE REPLACED**



Detachable and replaceable, an all-rubber valve for sports ball bladders has been produced, eliminating the use of a dust cap. Part of the valve is anchored into the casing of

the ball to provide a seat into which the bladder valve is screwed. An expansion plug, made of a special, elastic long-wearing rubber, closes and seals the channel when the inflation needle has been withdrawn. The valve causes no bulging.

**TIMING CAMERA FOR AIR RACES  
NEVER MAKES A MISTAKE**

Airplane races are now being timed by a camera which never makes a mistake. The national air races were clocked by a timing system which photographs each movement, taking 125 sixteen-millimeter frames every second and clocking the

ships to one one-thousandth of a second. At the end of a race, the judges are shown the film, which is developed at once, and rely on the record of the camera when the finish is too close for the eye to pick the winner.

**GOLD PAN RECOVERS FINE DUST  
WITH AID OF MERCURY**

Fine gold can be recovered with a special pan and screen made for the purpose of redeeming the dust. The pan is hand spun from one piece of hard-rolled copper and heavily silver plated. When treated with mercury it forms a uniform layer which catches all the flour gold. After each clean-up the gold is swept into a closed cup in the center where it remains protected during further pannings. Circular riffles around the cup catch the coarser gold, which is forced into the cup with a semicircular rubber squeegee. The cup cover serves as a dish to receive the mercury when the pan is tipped over it.



Western Electric

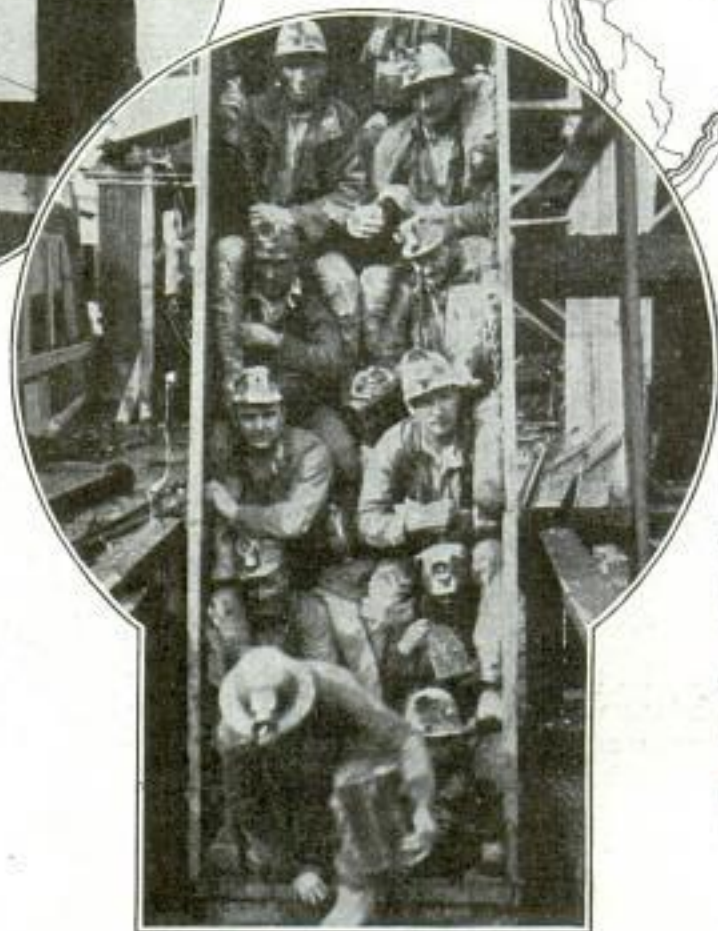
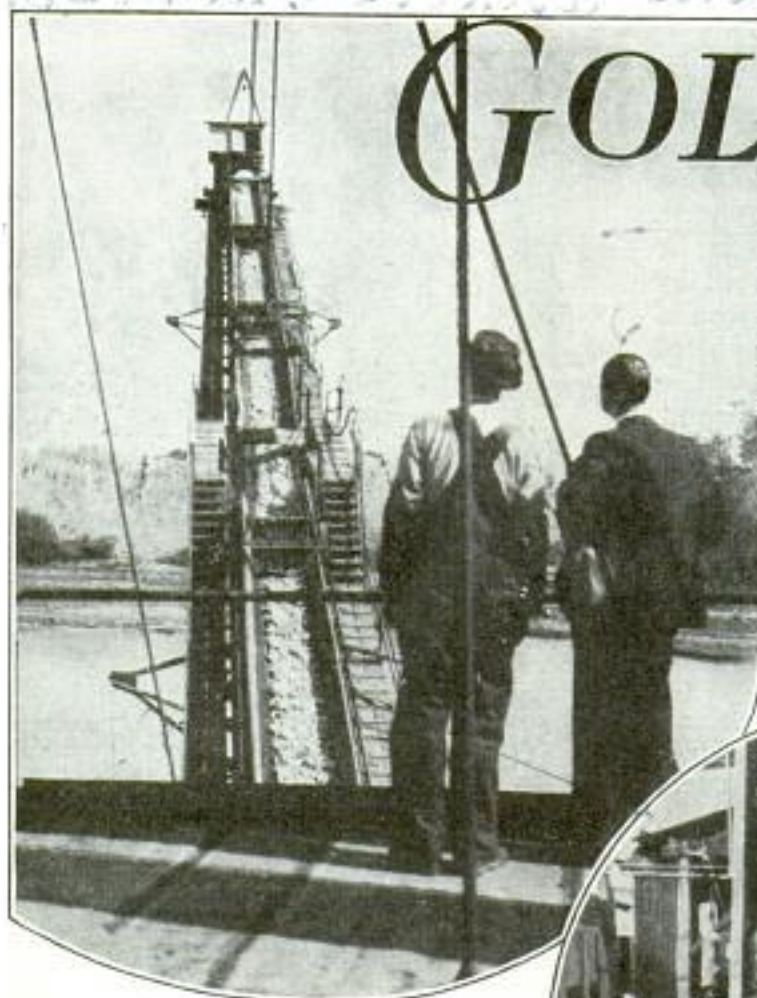
C. W. Searge  
Jenison, 408 N. 61st St.  
Seattle, Wash.

C/107  
C/1015  
C. W. Searge  
Jenison, 408 N. 61st St.  
Seattle, Wash.

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Carls, Iron Works  
Box 44, Alameda  
Calif

# GOLD...and



WITH nearly the whole world now off the gold standard, the monarch of the metals is more precious than ever. This, coupled with unemployment, has speeded up the search for the yellow metal to the point where the hills of California, Oregon and Mexico are alive with prospectors, as are the deserts of Arizona and Australia, the mountains of Canada, the jungles of the Malay archipelago, the heart of Africa and the Kolar fields of India's Mysore state.

Of the many tens of thousands of gold-mining claims staked out all over the globe, only a tiny fraction have ever been worked, and of this comparatively small number still another tiny fraction have actually produced more than \$1,000. Many producers of recent years, which were long since worked out underground, have given up a second fortune to those who worked over what was formerly called waste rock or tailings from old mills, ex-

Above, Stacker Arm of Gold Dredge and Gold-Producing Countries; Below, Miners Riding in a "Skip"

tracting with modern methods nearly all the remaining gold.

Since 1492 the world has produced \$22,937,640,000 worth of the yellow metal, more than half of which was turned out since 1902. Of this sum the United States

# still more GOLD

Since 1492 the World Has Produced \$22,937,640,000 Worth of GOLD More than Half of Which Has Been Produced Since 1902

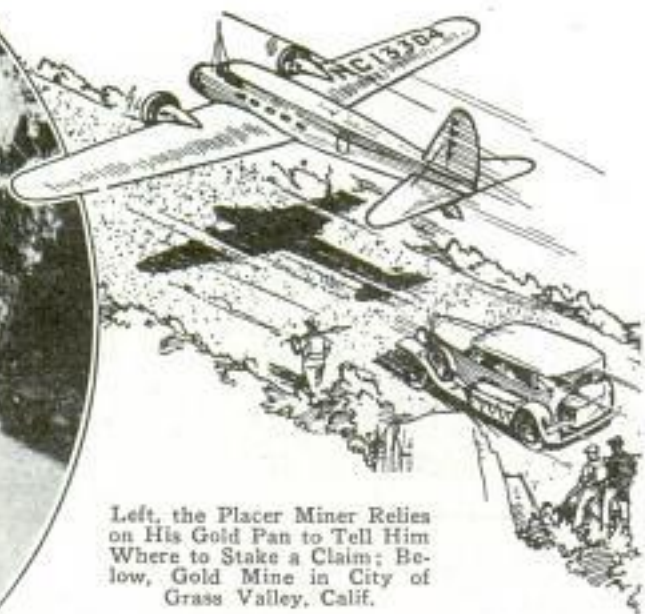


Above, "Snipers" at Their Sluice Box; Left: Samples of Gold in the Raw

held in monetary gold last April nearly four and one-third billions, the largest golden treasure ever possessed by any country. Last year's mine output was the highest in history—23,911,000 ounces valued at \$494,000,000. California, which has long led the states in gold production, turned out more in 1932 than in any year since the close of the gold-rush period, yielding \$11,803,000, almost a million more than in 1931.

It was the rocker and the pan, rather

than the drill and black powder that lured most of the early miners. But they soon gave way to the giant hose lines and "long Toms" of the hydraulic miners who washed down whole hillsides of gold-bearing gravel. Since their discovery, the California placers have yielded the princely sum of more than a billion dollars, a third of which has been caught in the sluice boxes of the hydraulic miners. Competent authorities estimate there are seven billion cubic yards of gold-bearing gravel in



Left, the Placer Miner Relies on His Gold Pan to Tell Him Where to Stake a Claim; Below, Gold Mine in City of Grass Valley, Calif.



this section, of which four billion could be worked by hydraulic methods. Judging from the past, this material should yield about \$600,000,000. Except in cases

where a given area is "proved" by hundreds of samples, such as river beds now worked by dredges or hillsides worked by sluicing, placer mining is superficial. It is different with lode mining. When the vein is found, miners follow it as long as extraction remains profitable. Far underground, air drills chatter as they put in a round of holes in the face of the drift. Into these holes go sticks of dynamite that rip out tons of ore. This is whisked to the surface where it goes to the mill. It is first crushed to uniform size, then fed to the stamps for fine grinding.

The stamp mill has been used in California for upward of fifty years and is still regarded as the best means of releasing "free" gold from its quartz envelope. At one mill there are eighty stamps, most of them weighing three-quarters of a ton apiece. This weight is lifted six inches 105 times a minute. To crush the daily "feed" of ore from the mine, a total weight of almost 10,000,000 tons has to be lifted daily.

A less picturesque but more direct

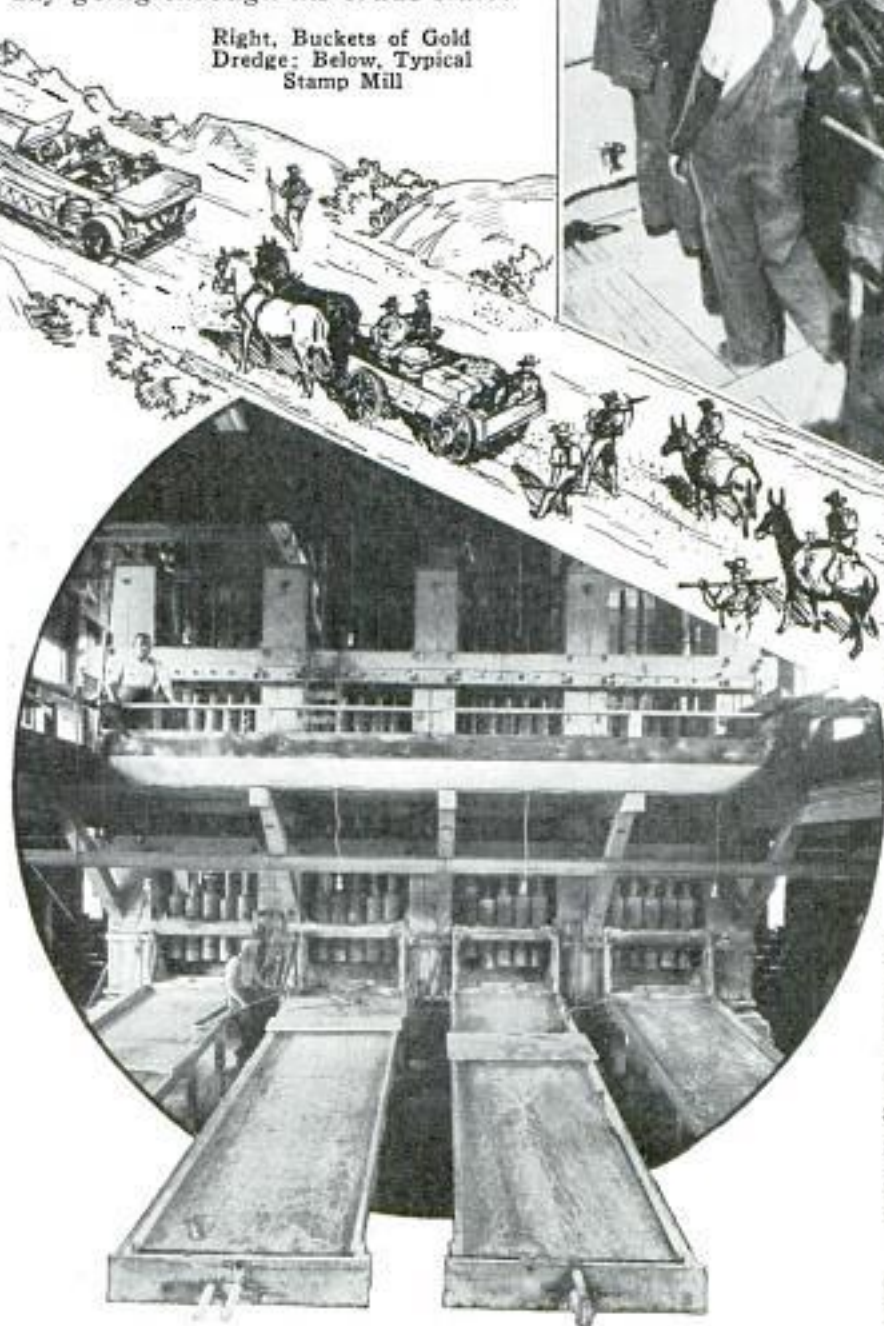
means of winning wealth from the rocks is by dredging. Along the Yuba river, at the base of the Sierra Nevada foothills, lies the most extensive deposit of gold-bearing gravel in North America. This material, in some places nearly 100 feet thick, is worked by floating dredges as big as ferryboats. Like some ungainly monster of prehistoric times, they "eat" their way along, gnawing at the bank ahead of them, and after they have gained their golden nourishment, redistributing the gravel behind them.

These big dredges are actually floating reduction plants, some drawing eleven feet of water and capable of working to a depth of eighty feet. One company operating in this area has worked over more than 375,000,000 cubic yards of gravel, or half as much again as was excavated in the cutting of the Panama canal. In their weekly clean-ups they have recovered in twenty-five years more than \$60,000,000. The gravel averages about ten cents worth of gold to the cubic yard. Under some conditions,

dredges can work profitably in ground carrying as little as seven cents a yard.

Compared with the thousands of yards of gravel handled daily by an electrically operated dredge, the efforts of the lone river miner or "sniper" appear almost ridiculous, with an average of about a yard a day going through his crude sluice

Right, Buckets of Gold Dredge; Below, Typical Stamp Mill



lous sums were recovered in a few months; then came the Chinese who washed the sands until they gave up no more than a dollar a day; and now the sniper is getting the rest, at the rate of fifty cents a day—with luck.

Even sea water carries some gold, varying from five to 267 parts per 100,000,000 of water. Consider-

box. Even so, it is estimated that almost half of California's million-dollar gain in gold production in 1932 over 1931 was due to the labor of 15,000 river miners.

Many of today's fortunes were founded on panning in the early fifties when fabu-

ering five parts gold per hundred million of water, this represents a sum so vast that the present world supply would seem insignificant. Many schemes have been proposed for extracting gold from sea water, but every attempt has failed.

C 1076  
534

lighted house plant fixtures  
POPULAR MECHANICS

Miller Co, Alt. Inc. P. Nation  
Mendon, Conn

# House Plants Thrive under Artificial Lights

From D.W. Milford, Editor of Service Bureau, New York, Cleveland Ohio



Examples of Lighting Effects Applied to House Plants to Enhance Appearance and Speed Growth

Through easily applied localized lighting, house plants may be kept anywhere indoors that fancy dictates and still retain their vitality. Exhaustive experiments by L. C. Porter and G. F. Prideaux, engineers of the General Electric company, prove that such lighting enhances the nighttime appearance of the plant and lengthens its indoor life. Among the plants which may be stimulated by artificial lights are begonia, salvia, geranium, African violet, genista, hyacinth, calceolaria, cineraria, cyclamen, tulip, all of which are the flowering type, and pteris, Boston fern, pandanus, ivy, dracaena, sansevieria, philodendron, jade plant, peperomia and other foliage bearers. Measurements of illumination on the tops of the plants show a wide range of beneficial intensities. On a standard holding five flower pots, the intensity varies from 150 to 300 footcandles when a sixty-watt lamp with an aluminum reflector and a parchment shade was used as the light-

ing unit. On a flower basket, the experimenters used ten-watt lamps with standard sewing-machine reflectors. A single hyacinth had a ten-watt lamp with a shield in front of it, lamp and shield being mounted on a single spike inserted in the earth in the pot. In general, the tests showed that it is better to have the lighting, when used regularly, come from above the plants. Otherwise, they have a tendency to lean toward the light source.

## WIND TUNNEL SHOWS SAVING IN STREAMLINING TRAINS

When designs were being studied for the lightweight, streamlined train now being built for a western railroad, the models were submitted to wind-tunnel tests and the results were astonishing, even to the experimenters. With trains now in use, the air drag consumes fifty horsepower at thirty miles an hour and 1,350 horse-

University of Michigan  
Ann Arbor  
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power at ninety miles. This air-drag consists principally of eddies and disturbances due to projecting parts although some is due to "skin friction," the action of the air against the sides of the train. By making the train in the shape of an elongated cigar, as is being done, the unit cuts a clean "hole" through the air which closes in behind it instead of producing a partial vacuum. The lighter weight and the streamlining will make it possible for the new train to use only 500 horsepower in attaining a speed of ninety miles an hour with a load of 120 passengers and 25,000 pounds of mail or baggage. With present trains, this would require 3,400 horsepower.

*C1057*  
**THOUSAND-WATT WIND PLANT  
 PRODUCES FARM POWER**

Rated at 1,000 watts, a wind-driven power plant generates sufficient electricity for the farm, dairy or summer resort. By tilting the blades several degrees back from the perpendicular, the plant is converted into something resembling a huge dart which constantly heads into the wind, thus eliminating the vane found on most windmills. A large generator starts charging at only 140 revolutions per minute, so no gearing is used. An automatic governor on the propeller assembly controls the speed of the plant in all forms of wind. An adjustment in the control may be made to increase or decrease the pitch of the blades, thus regulating the charging rate. The plant is supplied with batteries of sufficient capacity to carry the entire load for a week or ten days of calm.

*Exp. - M. Pagnet & Co. 17 Battery Lane*

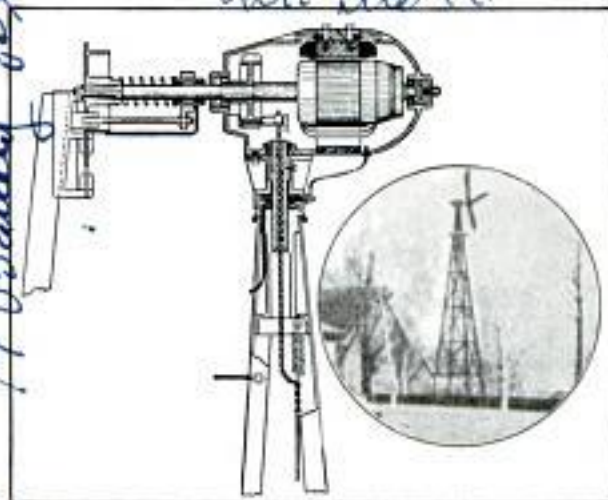


Diagram and Picture of Wind-Driven Power Plant Which Generates Electricity for the Farm

*Wind Power Light Co. Newton, Iowa*

Packing Cans of Refrigerant around Ice Cream



**REFRIGERANT SEALED IN CANS  
 KEEPS ICE CREAM COLD**

Sealed into cans, a refrigerant that freezes at two degrees above zero is being used to keep ice cream cold for three or four days. The cans, which are about two feet high, are triangular shaped, fitting in neatly around the ice-cream container in the drug store or into the milk or meat-refrigerator truck. After being in use for a few days, the cans are removed to a refrigeration plant for "refreezing" by being kept in the coldroom overnight.

*Reader says 48 hours is limit*

**SLOT MACHINE SELLS POLICIES  
 FOR INSURANCE COMPANY**

Insurance policies, properly stamped and signed, are handed out by a robot salesman that may be operated by inserting a coin. The machine looks like a clock. When the applicant drops in a coin and pulls forward the handle, a pencil slides out. The applicant signs at an opening and pushes back the handle, causing the policy to be released. Against the signature inside the machine is printed the exact date and the very moment at which the policy was issued. In case of accident within seven days, the insured applies for payment. If his name is on the register in the machine, the policy is paid.

*C1091*

*I used in England*

*C1033 Truck Co. drive  
 Waynesboro Pa.*

C 103 4

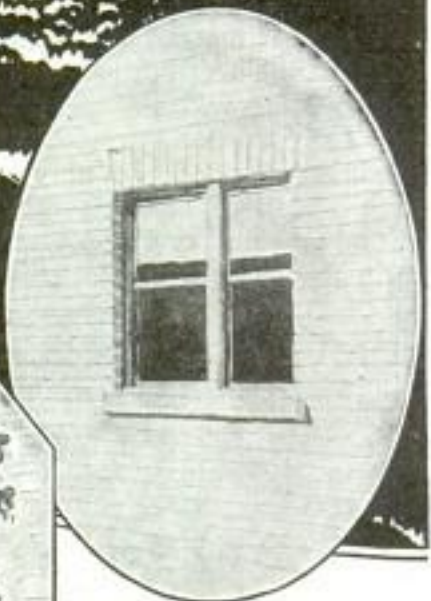
Architects - H. E. Sloan  
513 Aradale Ave  
Chicago

# IMPROVING

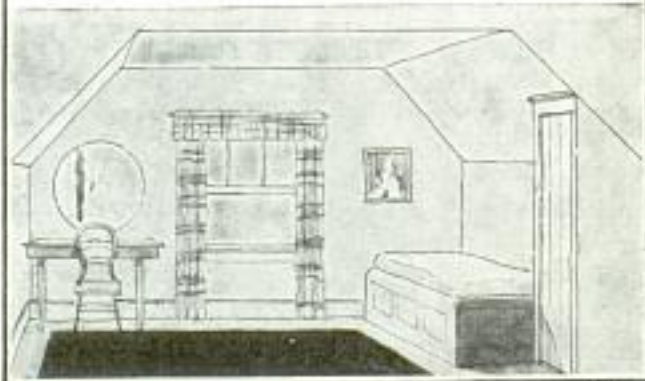
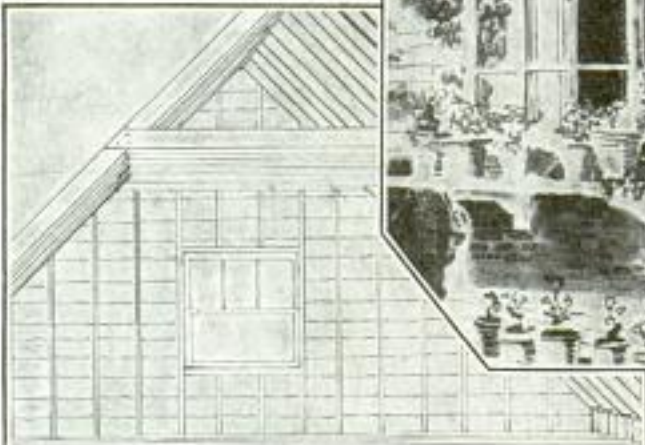
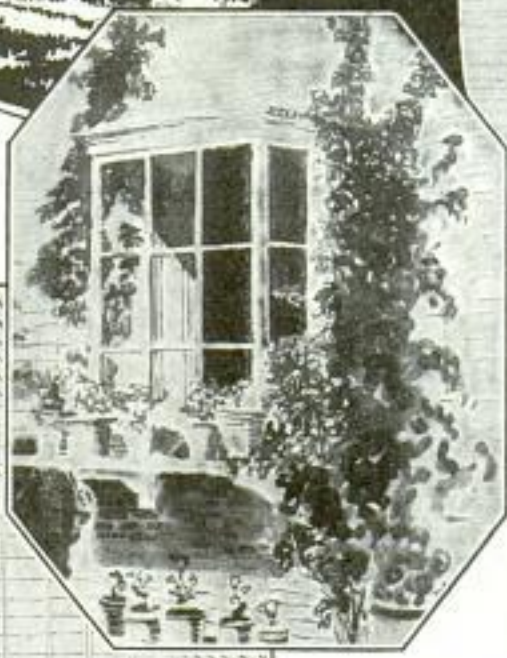


OLD

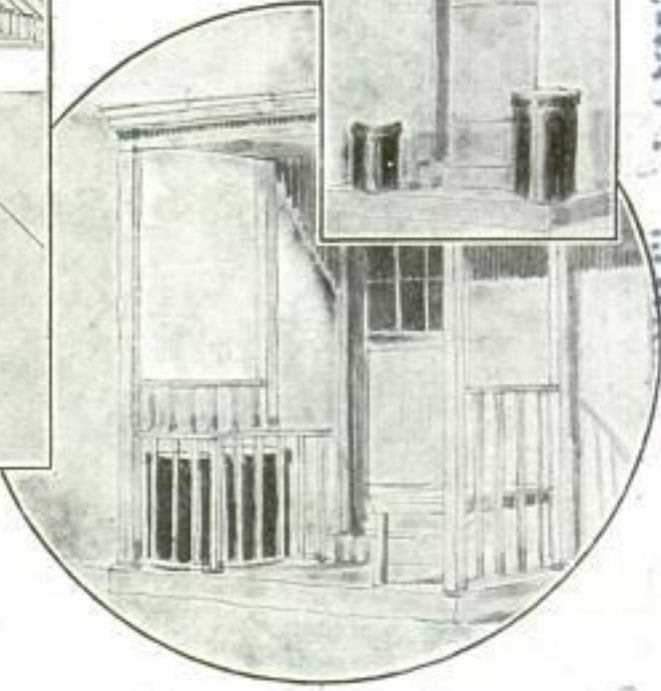
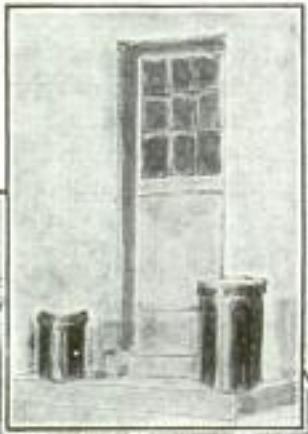
Above, a Porchless Home and, on Right Page, the Same Home with a Glazed Porch Added at Small Cost



Here's What a Little Bay Window Can Do; Above, an Ordinary Double-Hung Window; Left, the Bay Window Decorated with Flowers and Shrubbery



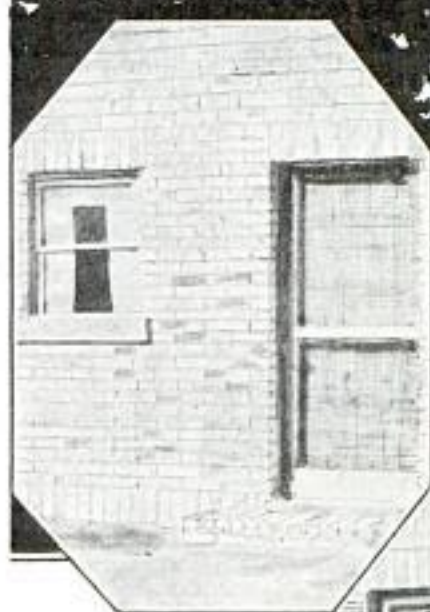
Above, an Attic Storeroom and the Same Space after It Was Transformed into a Comfortable Den by Covering the Walls with Insulation Board, the Floor with Linoleum and Furnishing It Simply; Right, Back Door Made over with a Small Porch Containing a Hiding Place for Trash Cans behind the Pickets and a Comfortable Porch Bench



Handwritten notes on the right margin, including "Back door" and "trash can".

@1034

# your HOME

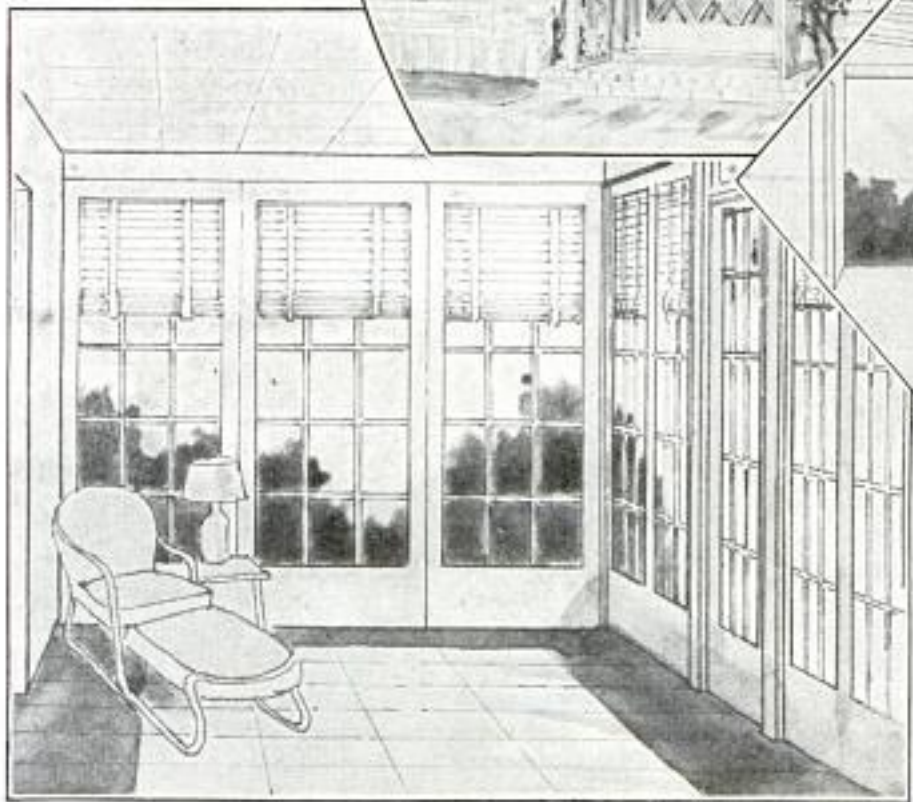
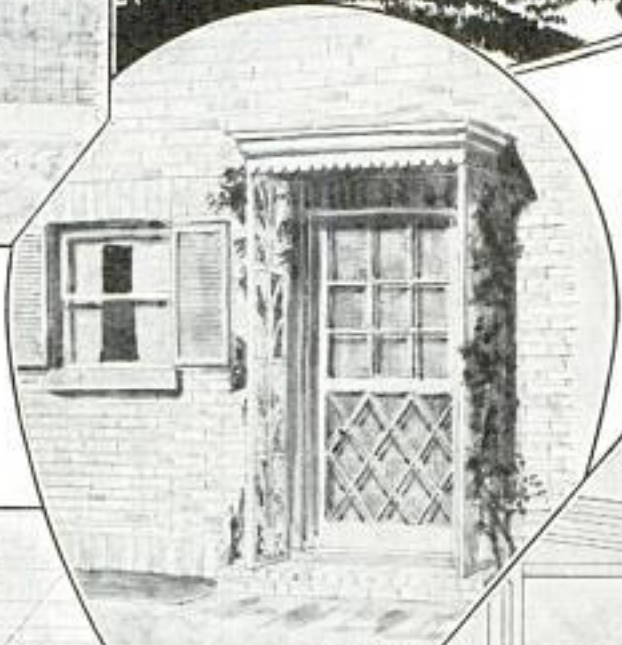


Above, a Door in a Wall and That's All; Right, the Same Door with a Trellis and Canopy and a Dolled-Up Screen Door Topped Off by Some Louvered Shutters for the Window

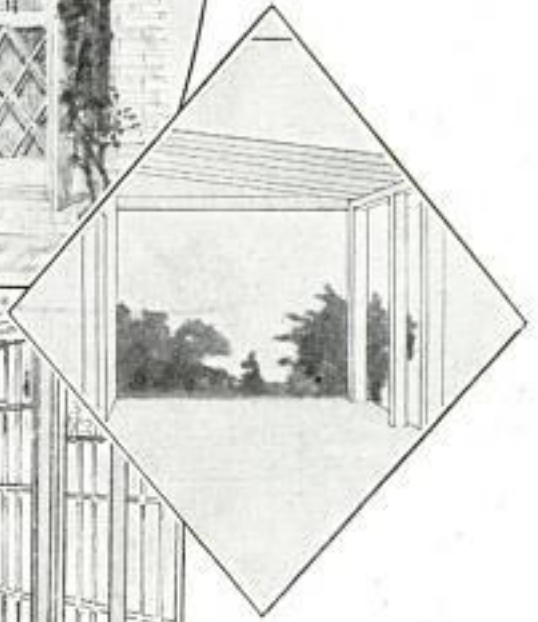


NEW

Above, the Same Home as Shown on Opposite Page with a Glazed Porch Which Becomes an Additional Living Room for Summer and Improves Exterior Appearance of the Home



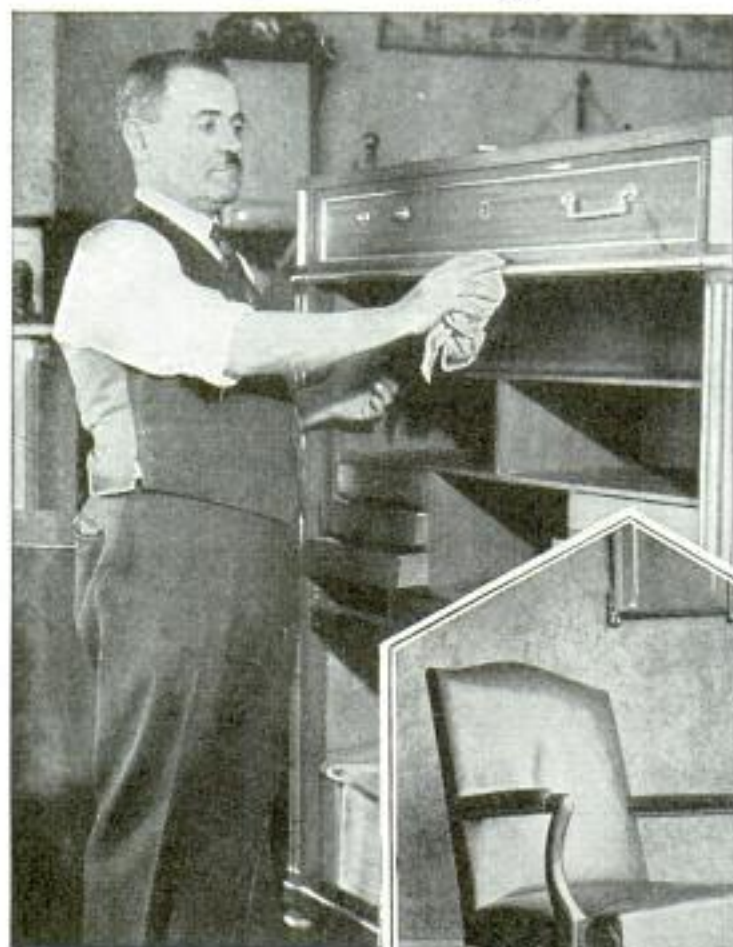
Above, a Plain and Not Very Inviting Porch; Left, the Space Made Over into a Glazed Porch with Venetian Blinds: Insulation Material Can Be Used on Ceiling and the Floor Covered with Linoleum, Rubber or Cork



copy to H. M. B. 10-7-19

machina suggest  
Venetian Blind  
Kawakita & Co.  
Copyrighted Material

# Old Furniture Copied for the White House



makers simulated the antique appearance of furniture by placing the working material under water for weeks, months and sometimes years. Today, these same effects may be obtained in two days by the fume, stain and filler process of treating the woods. Some recent copies made by the artist are those of several pieces of furniture that belonged to James Monroe, among which is the desk upon which President Monroe wrote his message to congress incorporating the Monroe doctrine.

*C1027*

## ENERGY OF SOUND RUNS CLOCK

Controlled by sound energy, a clock has been designed to transmit time more accurately than ever before. An error of less than one one-thousandth of a second per day is said to be the clock's record, compared to the most accurate timepiece now in use which cannot be



Copying valuable historical furniture so accurately that the old and the new cannot be distinguished is the hobby of Morris W. Dove, cabinetmaker, of Washington, D. C., who has made cabinet chairs and copied old pieces for the White House. Workmanship, the wood and the finish are considered the most important factors in his work. Scars, coloring and grain effects in the original are reproduced in the copy by special treatment. Finishing of antique copies requires that the pieces be gone over carefully to remove glue and bring out with fidelity the bruises, dents and other surface marks. Water stains, made by dissolving aniline colors in hot water, are used most successfully for staining and for bringing out the aged effect. Early cabinet-



Top, Finishing a Copy of James Monroe's Desk; Center, Finished Cabinet Chair; Below, Working on Delicate Carving

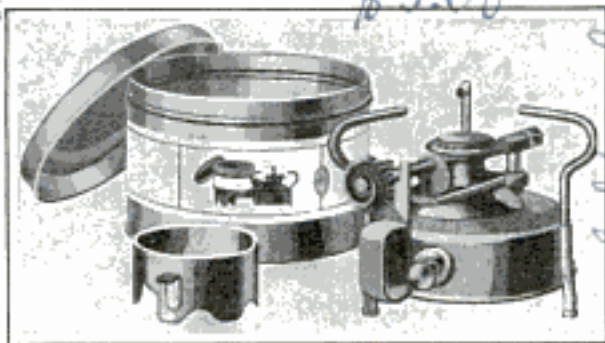
*1118-13th St N.W.*

set without an average error of three one-thousandths of a second. Designed to transmit time signals of the United States naval observatory, the clock is held to its high accuracy by the unvarying vibrations of a large quartz crystal. These vibrations control electric impulses, which rush 1,000 times per second into an electric motor that runs the clock. The crystal's vibrations are controlled in much the same way a slide trombone player makes music, by changing the length of a brass tube through which the sound waves are passing. Energy from a battery passes through vacuum tubes and is converted into sound by a loud speaker. The sound waves pass through the brass tube and strike the crystal. As long as they strike it with unvarying energy, the crystal vibrates at the same speed. Changing the tube's length by a sliding section offsets the change in the sound-wave energy resulting from "aging" of the vacuum tubes supplying the sound. This sliding action is performed automatically by a device invented at the observatory. The clock also will operate a device that automatically performs all switching operations necessary to send and record the time signals.

Jan 14/23 6/25/23

### SMALL ALCOHOL STOVE IN BOX IS HANDY FOR CAMPERS

Odor, smoke, noise and soot are eliminated in a small, pressure alcohol stove for motorists or campers. It is contained in a round tin box and one filling of one pint of fuel burns for three hours with a



Small Alcohol Stove for Campers Which Fits into Metal Box for Easy Handling

moderate flame or one and one-half hours with a full flame. It is six and one-half inches in diameter, is easy to regulate and the makers claim it will boil a quart of water in five minutes.

### MATCHBOXES USED FOR BRICKS IN MODEL VILLAGE



Model Church Constructed of 10,000 Matchbox "Bricks" Held Together with Glue

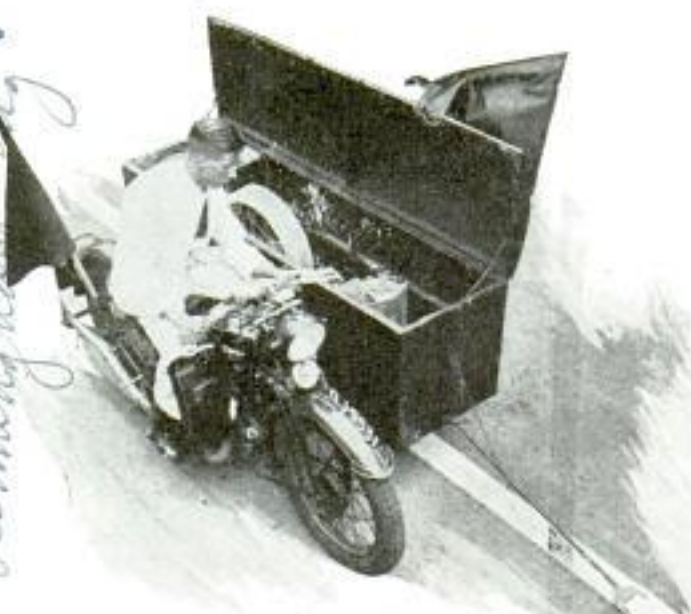
Nearly 10,000 matchboxes were used in the construction of a church in a model village. The matchboxes serve as bricks, being installed with glue. The entire village will contain about 4,000,000 matchboxes when completed. The builder spent two years collecting his "bricks."

### SKY "MIRROR" TELLS LOCATION OF PLANES IN FLIGHT

Intended to record on an airport map the exact minute-by-minute location of any airplane in flight, an elaborate model of a "mirror in the sky" was tested recently with the aid of a model plane. The model ship, with propeller whirling, was electrically sent circling a post to which were attached three microphones. At the other end of a table was a map of the United States, behind glass and in front of 325 tiny electric lights. The sound of the propeller was transmitted through the microphones, through a maze of wires and wireless equipment, and the location of the plane was shown automatically by lights appearing on the map. The inventor says it involves a binaural indicator and an ether-wave indicator.

Leslie Adams. Plymouth, Eng. Card  
 Chalont Parish  
 Daniel  
 365 Cleveland St.  
 Los Angeles, Calif.

Van Praag Sales Corp. 228 17th St. New York



© General Picture News  
Using a Motorcycle to Paint Traffic Lines on Pavement

**CYCLE PAINTS TRAFFIC LINES AS IT MOVES ON ROAD**

Painting traffic markers as it moves along the street or highway, a motorcycle with a sidecar is being used for painting and renewing the white road lines in an English city. Inside the sidecar is a tank from which a canvas-covered wheel takes up the paint. The wheel is lowered on the road and rotated by the movement of the cycle, thus spreading a white line. A revolving brush sweeps away dust and dirt.

**PRESSURE BURNER FOR ANY OIL OPERATES AT LOW COST**

Any kind of oil, including crude and sludge, may be used as fuel in a pressure burner developed for industrial use. A patented jet causes complete atomization in a mixing chamber that never gets hot and will not clog or collect carbon as long as the fuel is passed through strainers. There are no small crevices or holes that might be stopped up. The burner has the ability to care for a cold boiler, being equipped with a fan-blower assembly. When steam pressure is available, the burner will operate without the electric blower. Combustion is quick and



complete, control and adjustment of the burner are easy, the operation is economical and the burner's capacity has a wide range. In actual operation, the burner cares for a 350-horsepower boiler, using an oil that tests eleven gravity. Less than two per cent of the steam output is necessary to supply pressure for the burner.

**BOX SEAT FOR THE PET FITS IN AUTOMOBILE**

Motorists who like to take the house pet along on a trip can now provide the animal with a comfortable seat in which to travel. The seat, in the form of a shallow box, fits to the top edge of the front seat by means of straps extending down over the front cushion and permanently fastened to the wood frame below the cushion proper. Other short straps are attached to the back of the front seat below the robe rail. The long straps are run through loops in the bottom of the



Comfortable Box Seat for the Dog Mounted on Top of Back of Front Seat of Auto

tray and buckled to the short straps, holding the tray firmly on the top edge of the cushion. The box can be adjusted or removed quickly and provides a comfortable perch for the pet without interfering with the passengers.

Paris has a house of translucent glass three inches thick, the walls of which are cleaned by an automatic sprinkler system.

*c 1092.*  
*Public Works Dept*  
*Permy beam*  
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*Orange Ave. Orlando Fla.*  
*Auto Shop S. Cal. Co. 2795 S. W. 1st St. Phoenix, Ariz.*

*W. L. Sells, Bastian, S. C.*  
*564 Burr St. Kansas*  
*Screen Letter*  
*July 24, 1922*  
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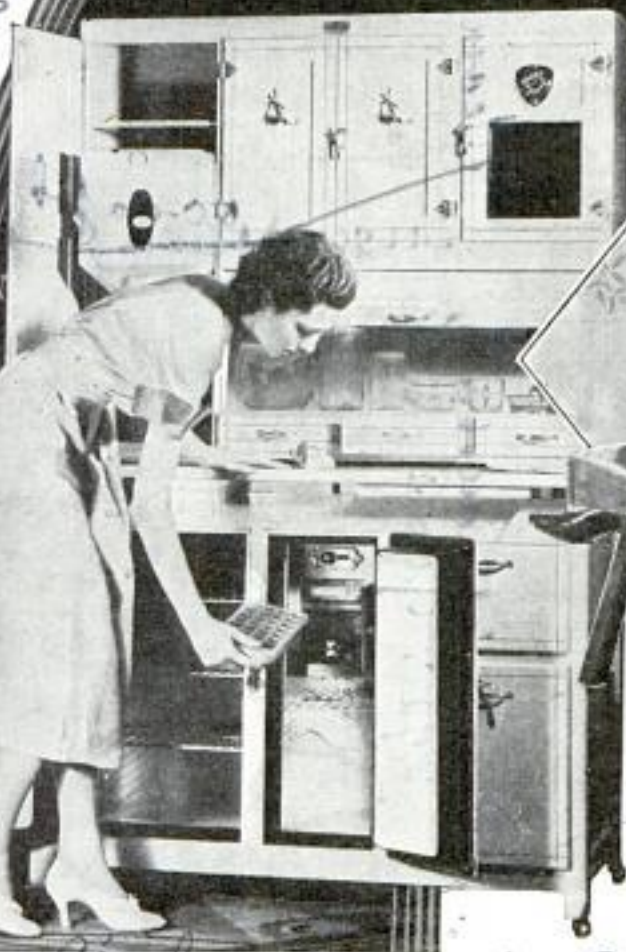
North Bennington, Vt.  
Conveniences for Kitchen and Living Room

C1096

Left, Tilted Magazine Rack with Built-In Handle. Right, Lever on Range Which Moves Broiler Out or In, Eliminating Burned Fingers



C1106



C1099

Left, Combination Electric Refrigerator and Kitchen Cabinet Which Takes No More Space Than Ordinary Kitchen Cabinet but Saves Many Steps for the Busy Housewife; Above, Coffee Table Modeled after Cobbler's Bench; Note Drawer as an Added Convenience

April Cabinet Co

April Cabinet Co  
Peru, Ind.

Cashman Mfg. Co.  
North Bennington, Vt.

Cashman Mfg. Co.  
North Bennington, Vt.

1024

This Model Plane, Powered by Small Motor, Stayed Aloft Twenty-Two Minutes

maker unknown  
cont. photo



MODEL PLANE SETS A RECORD OF TWENTY-TWO MINUTES

Powered by a one-tenth horsepower motor, a model plane built by a Philadelphia boy set a world's record for such craft by flying twenty-two minutes. The small ship made its flight during the National Championship Model Airplane contest.

HOURS OF LABOR ON FARM CUT BY MODERN EQUIPMENT

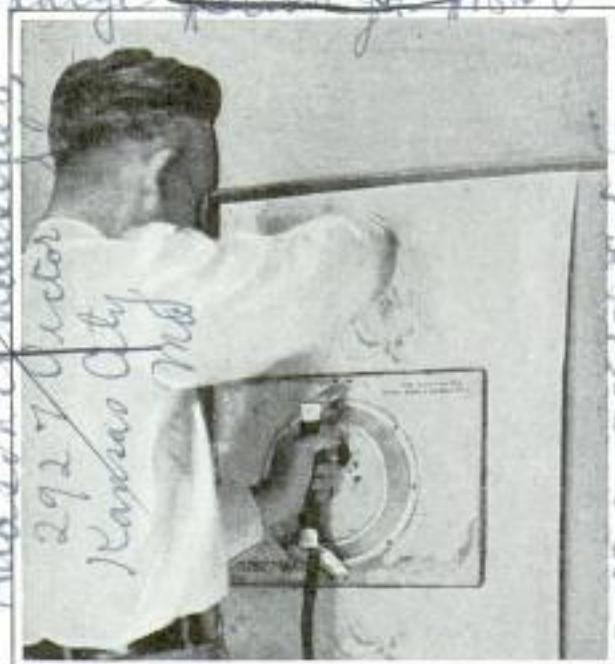
Power and machinery on farms caused a reduction in labor requirements in wheat and corn production of more than fifty per cent in some localities in the last thirty years, and a considerably higher percentage since 1840. A survey of the department of agriculture shows that power and machinery have not affected labor requirements in cotton as much as in the small grain and corn regions, except in some areas where large-scale methods and equipment are used. In these regions, labor was reduced thirty per cent in the last thirty years. With the sickle and flail about forty-seven man-hours were required to cut, bind, shock, thresh and clean an acre of wheat. The binder and thresher reduced the labor to about six man-hours, and the combined harvester-thresher and motor trucks for hauling reduced the labor to about two man-hours. In 1855 at least ten man-hours were re-

quired to cultivate an acre of corn with a one-horse shovel plow. The two-row tractor cultivator cut the time to two man-hours an acre. To husk forty bushels of corn per acre by hand, today, including hauling to the crib, requires from six to ten man-hours and with a two-row tractor operated corn picker, but two man-hours.

STEAM REMOVES WALL PAPER

Operated by electricity, a wall-paper remover that is easy to use has

been introduced for cleaning walls of the home for repapering or other decoration. It weighs only three pounds. An extension cord connects the remover with an electric-light socket, and a long rubber tube conducts water from the kitchen or bathroom faucet for the generation of steam. Applied to the wall paper with a gentle pressure the steam penetrates rapidly, loosening the paper for peeling off. The machine is said to work as well in washing off calcimine.



Using an Electric Wall-Paper Remover Which Generates Steam to Take Off Old Paper

Maxwell B. Bossert  
Oaklane, Phila.

U.S. Dept. of Agriculture  
Bureau of Agricultural Engineering

Bureau of Agricultural Engineering

Steam master  
Industrial

1088

2927 Victor St. Kansas City, Mo.  
Volcano Corp.

2927 Victor St. Kansas City, Mo.  
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U.S. Daily  
6/24/33

C/O 8,6 - Percy Turnstile  
Co. 101 Park Avenue New York

### QUAKE TEACHES LESSON OF SAFE BUILDING BY DESTRUCTION

By tearing down houses, earthquakes are teaching safe building. Properly designed structures in which the material and workmanship are good withstood the recent earth shocks in California, while those in which the workmanship was shoddy or indifferent and the material inferior, were shattered or rendered unsafe. This is the verdict of C. H. Kromer, structural engineer, division of architecture, department of public works of California, after a study of buildings at Long Beach, where the most severe shocks occurred. In his report, he points out that buildings of steel-frame structure may be expected to resist earthquakes without failure, except possibly of plaster. Buildings of reinforced-concrete construction, properly designed and of good-grade concrete, also are listed as safe. Many masonry walls would have withstood the shocks better, according to the engineer, if advantage had been taken of cross-stud walls by bolting them to the main brick wall, thereby providing lateral support. Parapets or fire walls should be eliminated, Engineer Kromer says.



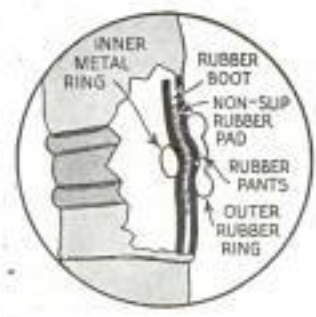
Passenger Bus Equipped with a Turnstile Which Does Not Admit Passenger Until He Drops Fare in Slot

### TURNSTILE TAKES UP BUS FARE AND ADMITS PASSENGER

Inconvenience of waiting while the driver collects fares will be eliminated in automotive buses by an automatic coin collector that does not admit the passenger until he has deposited his fare. The "spokes" on the turnstile do not swing in a circle, but drop down and to the right as they are pushed forward by the passenger. Then they rise immediately behind the person who has just passed through. As the fare is dropped in at the top of the turnstile and the passenger is admitted, the device automatically counts the passenger and registers the fare.

### BOOTS ATTACHED TO TROUSERS BY WATERPROOF JOINT

Rubber boots and trousers connected by a waterproof joint offer fishermen lightweight, waterproof waders at low cost. When the angler finds the water too deep for his regular rubber boots, he dons a pair of shoulder-high, lightweight, waterproof trousers equipped with a special arrangement for attaching just below the knee to the boots. He inserts a ring inside the boot, brings the trouser leg over it and slips a tension ring



over the trouser leg to form a tight joint and a serviceable pair of waders.

### SLEEP INDUCED BY SUBSTANCE FORMING IN BRAIN

When your eyelids begin to get heavy, a strange substance, called hypnotoxin, is forming in your brain. Dr. Henri Pieron, of Paris, has succeeded in isolating hypnotoxin from the brain and spinal fluid of animals after they have gone without sleep for a certain period. The substance appears to accumulate in the brain as a result of the lack of sleep. Some of the hypnotoxin was injected into sleepy animals and animals that had just awakened, making both sleepy.

University of Paris, France  
Iowa, with over 1,000,000 horses, has more than any other state.

C/O 64  
C/O 29  
Science Letter 6/24/33  
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Idea of Duppe Co. 997 State St. Bridgeport, Conn.

© 1965

# Electric Eye Indicates When to Change Oil

\$75.00



of the oil, a thirty-mile pace giving ten times more service from good oil than speeds of sixty to seventy. The oil-sediment meter is easy to operate and requires only the replacement of batteries about every three months. It can be carried to the automobile for test purposes.

## SEAWEED AS FERTILIZER

Seaweed is a complete fertilizer because it is essentially potassic and contains amounts of nitrogen and other elements of plant food. The Canadian agricultural department has made an analysis of such weeds from the Atlantic seaboard and it has been found that the value of seaweed as a fertilizer is greatly increased because of its ready decomposition in the soil, for the quick decay liberates its constituent parts in forms available for plant nutrition. Apply direct to the soil.

Chas. Chemist

Whether to change the oil in the crankcase or not has long been a matter of guesswork to the automobile owner. Usually, when the filling-station attendant suggests a change, the motorist feels that the suggestion is made merely to promote oil sales. Now, the owner can see for himself the condition of the oil in the crankcase. A testing instrument, which includes a photo-electric cell, takes the guesswork out of the oil business by revealing the sediment content of the oil in the crankcase. A few drops of used oil are placed on a glass slide and inserted between a light source and the photo cell, with the result in terms of quality showing on a sensitive micro-ammeter. Given a similar test of clean oil, the motorist is able to decide at once whether a change should be made. Experts say that one-per-cent sediment, which is composed of road dust and carbon, is extremely harmful to the motor. Fast driving causes rapid sedimentation



Above, Making a Test with the Oil-Sediment Meter and Allowing Motorist to See Result; Below, the Compact Instrument for Testing the Motor Oil

Chas. Montague

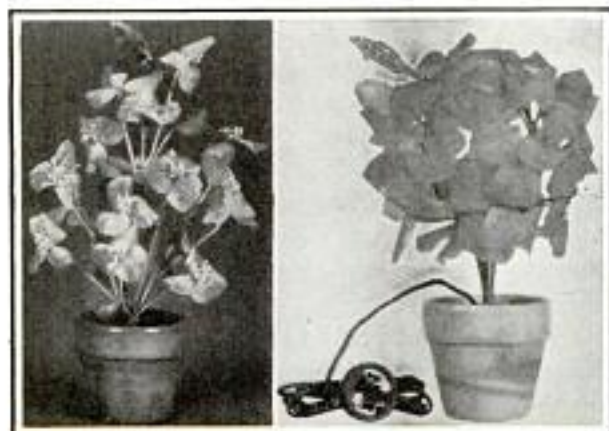
31163 / *Emb. Kenneth P. Wood*  
 110 W. 49th St  
 Phila.

**FIRST AIR FLIGHT IN AMERICA VIEWED BY WASHINGTON**

George Washington viewed the first successful balloon ascension in this country of which there is any record. It was made in 1793 by Jean Blanchard, French aeronaut, who took off from the jail yard in Philadelphia, rose to a height of several hundred feet and traveled fifteen miles in forty-six minutes, descending near Woodbury, N. J., where he displayed a letter from General Washington asking that he be treated kindly. Before Blanchard made his ascent, two Philadelphia scientists constructed a balloon in which they persuaded a carpenter to risk his life. The carpenter was not air-minded, however, and became panic-stricken when he reached a level of the house tops. He cut loose and broke an arm when he struck the ground. Another amateur had even less success for he was spilled out of the basket of a hot-air balloon before he had risen above the wall of the jail.

**FISH SCALES USED FOR MAKING LAMPS AND FLOWERS**

Deodorized and tinted in a variety of pastel shades, fish scales are being used in making artificial flowers and electric lamps in floral designs. Translucent and unbreakable, the scales curl up in warm weather and straighten out when it is cold, but retain their original texture. In an electric lamp, the bulb is concealed by the fish-scale petals. An indentation in the bulb is provided for perfume, making it possible to spread a pleasant aroma in the room when the lamp is lighted.



Flower Plants Made from Fish Scales; an Electric Light Is Concealed in the One at the Right

*Magnum Products, Inc.*  
 104 W. 27th St.  
 New York

*C1127 L.J. Warner*



*68 Broadway  
 North  
 Chicago  
 Ill.*

Pan Holder with an Extension Handle Which Is a Useful Utensil for the Camper

**EXTENSION FRYING-PAN HOLDER COOKS OVER CAMP FIRE**

For cooking over a camp fire or removing pans from a hot stove, a holder with an extension handle is now available. By manipulating the lever on the handle, the jaws of the holder can be widened or closed to grasp the sides of any pan with a projecting lip. The holder will telescope into a length but little longer than the wooden section of the handle.

**GREEN BOTTLES GUARD FLAVOR OF FRUIT JUICES**

Fruit juices have an affinity for green and green-glass bottles provide better protection for the liquids than those of any other color, D. C. Carpenter, of the New York state agricultural experiment station, has found. Experimenting with apple and fresh-kraut juices, he found that light through red, orange and yellow glass darkened the juice color, while blue light faded it. Juice exposed to green light more nearly retained its original hue. Green-blue and blue diminished both aroma and flavor while red, orange, yellow and green affected these qualities favorably. In general, green-glass containers were found best. For those who do not like green glass because it conceals the color, it has been suggested that clear glass be used and the container wrapped in transparent green cellulose.

*C1154*

*Iseneva, N.Y.*

c960 Cont. Jacob H. H. H.  
R. 2240, 500. 5 M Ave  
New York

# A MOVIE LOT



Front and Back Views of Standard Navy Diving Suit Worn by Actor in Making Picture on the Bottom of the Sea

He made it, and the result was an automatic camera housed in a water-tight compartment and sent down elevator-fashion on greased rods. Aside from adjusting the focus, with relation to the diving bell containing the two actors, which was carefully figured and set before the camera went down, all the operations of the camera under the water were controlled

by electricity from aboard the yacht which served as the base of operations. The camera weighed 450 pounds.

The speed of the automatic camera as it was moved up or down by weights and pulleys had to be uniform, a task made rather difficult by the fact that at each successive lower level to which it was sent a stronger pull was required. It was found, for instance, that at the depth of 100 feet a tension of more than 1,200 pounds was needed. When completed, the camera was self-compensating for the differences in water pressure at the various depths.

Since the actors in the diving bell came up frequently for rest, it was necessary now and then to shift the "elevator" camera in order to maintain a uniform focus throughout the entire action, although great care was taken each time to send the bell down to exactly the same spot as before. Precautions against the camera sticking in its descent were also taken.

The diving bell contained a man and a woman, together with a small motion-picture camera which was operated by the former in the role of a scientific photographer. The bell was of half-inch steel, four and one-half feet in diameter and seven and one-half feet high. It was made to withstand water pressure at thirty fathoms, and was equipped with air lines,

*"Below the Sea."*

A MOVIE lot on the sea bed is the latest proof of the ingenuity of the picture makers. When the picture-company officials required a "set" thirty fathoms under water, they found that, among other things, they would require a diving bell to hold two actors and a small motion-picture camera, a smaller diving bell for a cameraman and his camera, a self-operating automatic camera, and a live octopus to battle the submarine-diver hero. Besides this equipment, there were the difficulties of under-water photography to be studied and mastered.

Chief among the tasks faced by Roy Davidson, mechanical director, was the making of a camera which would work by itself when sent to the bottom of the sea.

C960

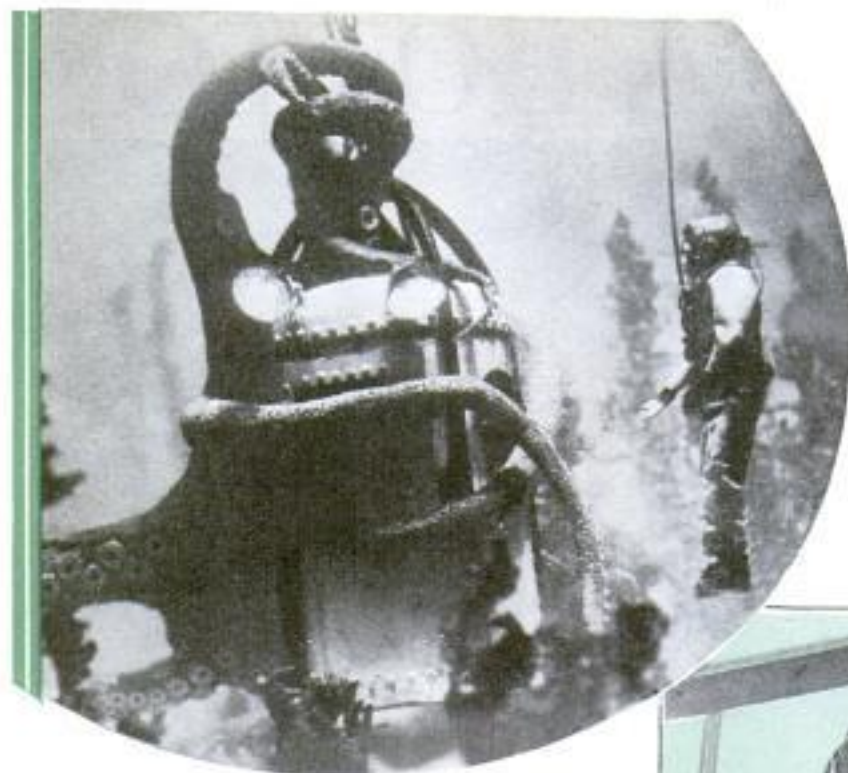
# on the SEA BOTTOM



Above, an Under-Water Shot Showing Actor Battling with Octopus, and Diving Bell Used in Making the Film Disengaged from the Hoist; Below, Diving Bell Being Lowered

emergency flasks of oxygen, a telephone to receive instructions from the director on shipboard and to send up reports, and with a microphone attached to a soundwire for "talkie" recording. With a heavy flooring of lead, the bell weighed 4,700 pounds and was lowered by steel chains.

Entrance to the diving bell was by a door in the rear, and in front was a window two and one-half feet square, of two and one-half inch plate glass, through which the "scientific photographer" aimed his camera lens at the flora and fauna of the deep, while from the outside, in a "half-bell" of his own, just large enough to hold himself, his camera and some extra reels of film, the regular cam-



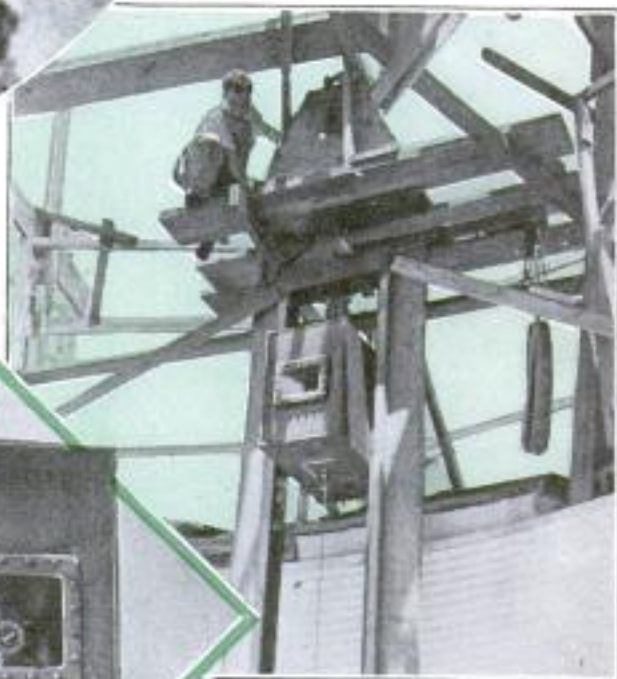
Above, Picture Taken under Water Showing the Diving Bell, the Octopus and the Diver

eraman took pictures through this window of the action and facial expressions of the actors within. Fixed outside the shell and above the large window were two large electric lights in reflectors, moved by means of swivel handles from within. The interior of the large diving bell was brilliantly lit by bulbs fastened in its rounded top. This lighting not only assisted the cameraman in photographing the actors inside the bell, but also helped the scientific photographer since the light flowed out into the deep not only through the large window but also through two side portholes nine inches in diameter. This lighting was supplemented by a new and powerful water ray shooting out through the window and penetrating water for great distances and made good under-sea pictures possible through the use of the most sensitive film.

Another problem was the octopus, which in the picture attacks the large diving bell

containing the actors. Four were captured and each died in turn. It was learned that they had been the victims of the "bends" because of a too-sudden rise from great depths. The next octopus was brought up by easy stages, permitting its body to adjust itself to the decreasing pressure as it approached the various depths.

While the actors in the bell had to be trained to move about on the sea bottom, their training was



Above, Automatic Camera in Waterproof Case Sliding Down Greased Rods to Take Pictures under Water; Left, Front View of Camera

tame compared to that experienced by the actor-diver. He wore the regulation navy diving outfit, and had to master, in addition to the problem of moving about in it, the supplementary task of operating an under-water torch, with which he battled the octopus. While it will not burn in water this torch does burn under water. Considerable skill is required to keep it blazing, a pocket of compressed air around the flame preventing it from becoming extinguished. Should the pocket be de-

stroyed, the flame goes out and the torch has to be sent to the surface to be relit.

In devising his automatic camera the director had to contend with the scientific obstacle that water magnifies, the magnification at ten feet being 100 per cent, so at this distance from the camera a six-foot man appears twice his height. He also had to figure to hairline exactness the proper distances which should intervene, for focusing purposes, between the bell housing the actors, the elevator camera, and the half-bell containing the cameraman and his camera.

To select the site for the action, he had to keep in mind that clear water and white sand are essential to under-water photography, and that while it is possible to light up small areas of the deep by under-water lights, bright sunshine is required for wide action, the white sand at the bottom acting as a reflector of the sunlight. This necessity for bright sunlight made it possible to "shoot" for only four hours a day. In addition, the site had to be photographically attractive and the sea growths had to be thinned to avoid interference with the camera.

For the base of operations, he had to locate a yacht large and strong enough to stand being equipped with powerful winches for lowering the diving bells, and for housing the staff and the diving equipment, which included a compression chamber. Even with every detail thought out and tested, twice the length of film was used as for the usual feature picture of 7,000 feet. The undersea picture consumed 150,000 feet. This was partly due to the fact that continuous shooting was not possible. Although only about half the action was filmed under water, the shooting time on the sea-bed lot was five times that devoted to the other half of the picture.

#### FLAT TIRES INFLATED ON ROAD WITHOUT USING A PUMP

Roadside tire repairs can be made without resorting to inflation with a hand pump if the motorist is equipped with a simple air-transfer accessory which consists of a length of high-pressure hose with a screw cap at one end and a plain, unthreaded brass head like that on an air hose at the other. To use it, the screw-



Using Air-Transfer Tube to Divert Part of Air from an Inflated Tire to a Flat One

cap end of the hose is fastened to the valve of the empty tire, and with the other end of the hose enough air is taken from the inflated tires to bring all to equal pressure. Little space is required for carrying and the transfer of air requires little labor. The device can also be used for inflating inner tubes or beach balls with air from the tires on the car.

#### FIVE-TON PRESSURE EXERTED BY SMALL BOLT CUTTER

Although it is only six and one-half inches long, a small bolt cutter exerts a pressure of more than 10,000 pounds and will clip one-half-inch cable, snap off three-eighths-inch bolts or split nuts up



to seven-eighths of an inch in diameter. Its compact size makes it easy to introduce it into tight places

where the average cutting tool cannot be used. The cutting edges have been treated to prevent chipping, thus prolonging the life of the blades. It is intended particularly for the garage or general mechanic

Public Auto Service Co.  
5224 Arch St.  
Phila.

Mueller Products Corp.  
853 Oakdale Ave.  
Chicago

MOTOR USED FOR LIGHT WORK  
IS ASSEMBLED AT HOME

*Racine Wis*



Above, Winding and Assembling Small Motor for Light Work. Below, Some of Its Applications

Suitable for many types of light work, a small motor which is wound and assembled at home can now be obtained. One such motor is rated at six volts, another at 115 volts. Assembly instructions are easy to follow and the finished unit can be used to operate a hedge trimmer, movie projector, buff and emery wheel, electric fan, scroll saw or for other tasks about the home or workshop.

"FLOATING GOLD" FOR PERFUME  
STILL DIFFICULT TO FIND

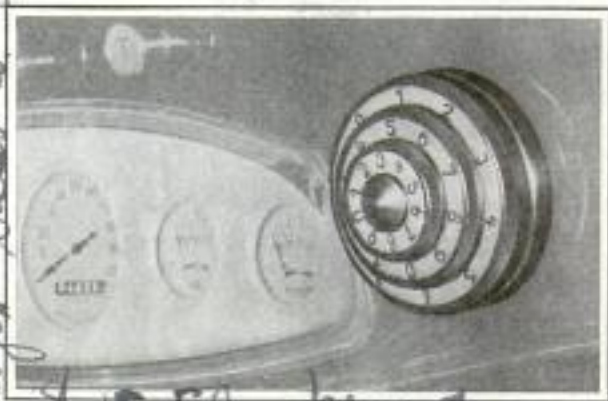
Ambergris, that strange substance which is the basis of the finest perfumes and is known as "floating gold" because it is almost worth its weight in the yellow metal, is sought by many but found by few and sometimes it fools even the experts. During the last twenty years, scores of "prospectors" have written to Dr. Robert Cushman Murphy, of the American Museum of Natural History in New York, sending samples of what they believed to be ambergris. Rarely are they correct in their guesses. Sometimes they submit wax or resin and once in a while someone picks up soap and believes he has found riches

*Indianapolis Star*  
7/23/33

on the beach. A Massachusetts woman, while cleaning her attic, found a jar of a substance left by a sea captain who had occupied the house. It looked like ambergris and had the cloyingly sweet odor of musk but chemical tests proved it to be merely carbon which, somehow or other, had been impregnated with an odor similar to that of ambergris. Even in these days, ambergris sells for from fifteen to twenty dollars an ounce so it is worth finding. The price explains the \$5,000 meal of an Alaskan wolf. A man strolling along a beach near Nome interrupted a wolf eating what at first appeared to be carrion. The wolf fled and the man examined the remains of the meal. It was a chunk of ambergris which had been washed ashore and weighed thirty-five pounds. The piece the wolf had bitten out was estimated to have been worth \$5,000.

C/128  
COMBINATION LOCK FOR AUTOS  
PROTECTS AGAINST THEFT

Protection from auto thieves is offered in a combination lock which not only locks the motor but sounds an alarm if the car is tampered with. No key is required and the dial lock on the instrument panel can be changed to a new combination at will. When leaving the car a turn of the dial not only locks the motor but places in operation the alarm system connected to car doors, trunk, spare wheel and other parts of the car likely to attract thieves. If these parts are moved, the car horn sounds a warning. When entering the car, it is only necessary to dial the secret com-



Combination Auto Lock Which Locks Motor and Also Sounds Alarm If the Car Is Touched

ination to put the alarm out of action and prepare the car for starting.

*Cintofix Sales Co.*  
*3600 S Oakley*  
*Chicago*

*Curator of oceanic birds*

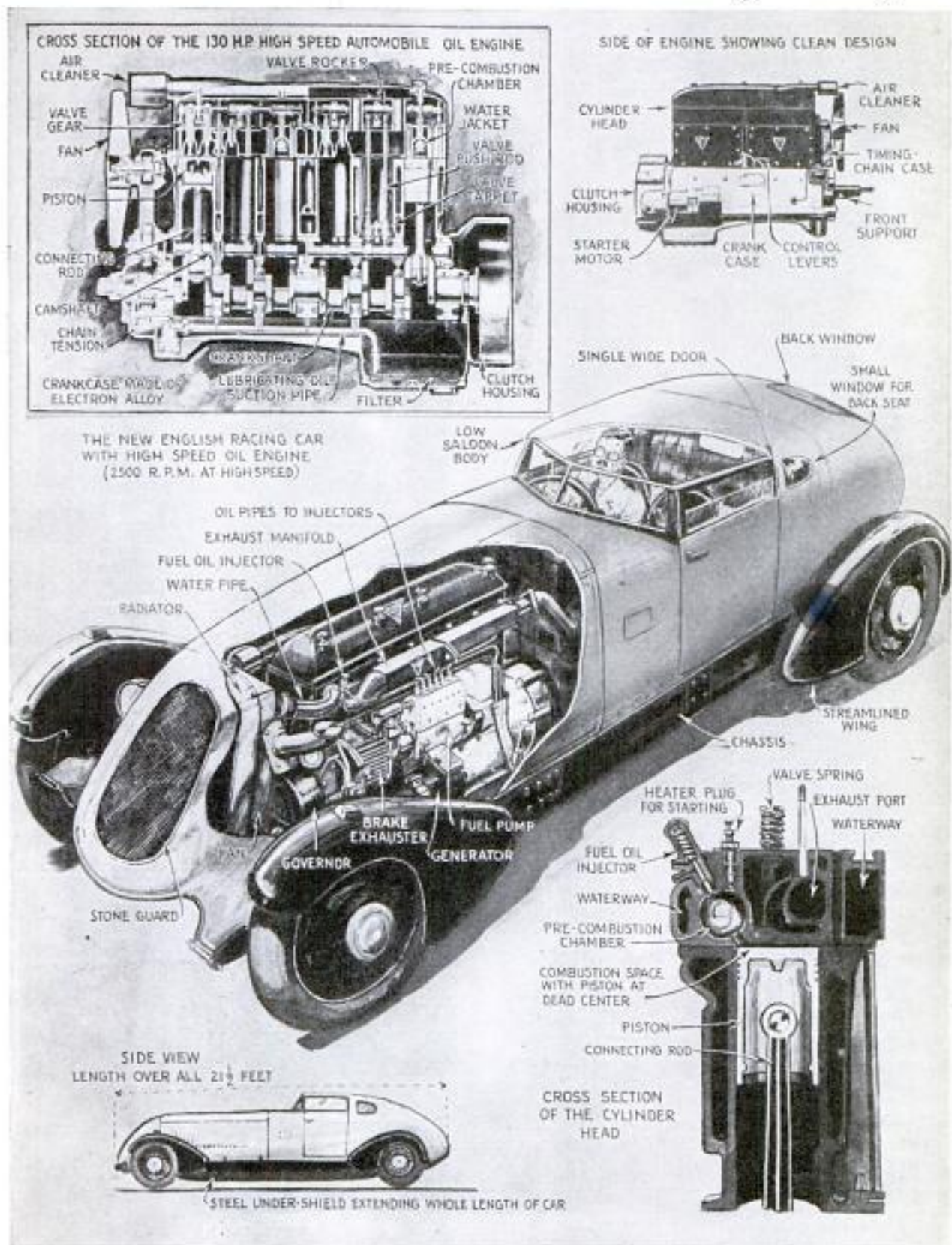
*Cintofix Sales Co. 3600 S Oakley Chicago*



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Conf. H. H. Davis Esq.  
Lymington, Hants. Regal  
POPULAR MECHANICS 551  
Ewell Surrey England

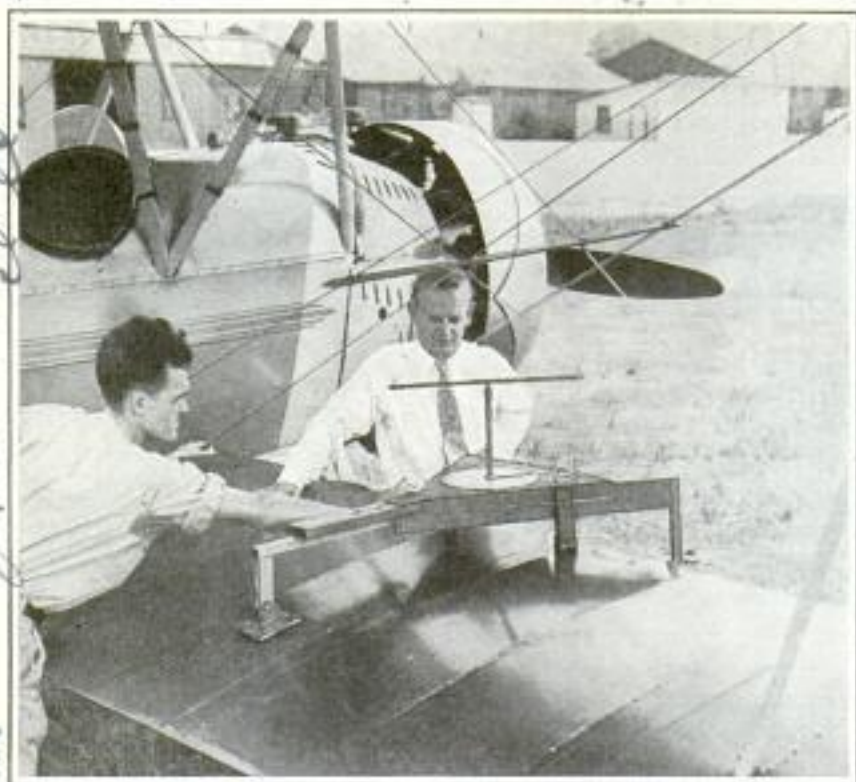
# Racing Car Driven by High-Speed Oil Engine



drawn. Capt. George Eystone

England Is Experimenting with a Racing Car Powered with a High-Speed Oil-Burning Engine. Diagrams of Which Appear Above; the Motor, Built by Associated Equipment Company, is Virtually the Same as Those Used in London Omnibuses, Except That Maximum Revolutions Have Been Increased from 2,000 to 2,500, so the Feet Is Almost as Unusual as Converting a Draft Animal into a Race Horse; Despite the Enormous Compression, the Weight of the 130-Horsepower Engine Is Not Much in Excess of a Gasoline Engine of Similar Power; It Is Claimed Knocking Has Been Virtually Eliminated and When Running under Load, the Engine Makes Little More Noise than a Gasoline Power Unit

Product of Associated Equipment Co. Ltd.  
Northall, near London, Eng. Copyrighted material



Instrument Mounted on Wing of Plane for Compensating Aircraft Compass in a Few Minutes; the Task Formerly Required Several Hours

### COMPASS OF PLANE CORRECTED BY SIMPLE INSTRUMENT

Compensating an aircraft compass now requires about fifteen minutes instead of three or four hours by using a simple instrument designed for that purpose. It is light and portable and is mounted on the wing or any nearly level portion of the ship which has a straight edge at a known angle to the fore and aft line of the craft, the leading edge of the wing being ideal. By its use, the compass can be compensated and checked at thirty-degree stations in a few minutes. In principle it is similar to the pelorus of seagoing craft. It has a sighting piece two feet long, mounted on a vertical shaft so the two move together. At a lower station on the shaft is a pointer which moves over a rotating graduated disk. An index on the frame base is graduated into degree units to permit any setting of the disk. A stake is driven into the field and the operator observes the sun when it is due east and moves the sighting piece, holding the same bearing to find a ground object also due east. If variation is east, he selects a magnetic bearing south of the true by the angle of variation, correcting a west error

in the opposite way. The operator makes a record of this point, which is due east magnetic, and uses it for reference. He then determines the bearing of several prominent objects at least 2,000 feet from the stake for use in case one is obscured. The rotating disk is set at ninety degrees and the sighting pointer at zero. In this position the ship, with tail up on a dolly, is pulled around until the object selected comes into the sights, the instrument being over or near the stake, but a variation of ten feet will not introduce any appreciable error. In this position, the compass is set to zero by the compensator. The pointer is set at ninety

degrees, the ship swung until the selected object comes into the sights and the compass set to east. The rest of the corrections are carried out in similar manner.

### MOVIE FILM REWINDS ITSELF IN PROJECTOR ATTACHMENT

It is now possible to show the same reel of film over and over without the need for



Cylinder on Top of Projector Contains Apparatus Which Automatically Rewinds Movie Film

rewinding or rethreading if the projector is equipped with an attachment which does this task automatically. The continuous projector is intended for use particularly in demonstration booths or display

*Victor Animatograph Corp. Manufacturers*

*C1117  
Norman A. Anderson,  
St. Louis College, St. Louis, Mo.*

*C1116*

*material  
d own*

©1040

windows where the same film is shown repeatedly. It consists of a cylindrical box placed above and in front of the lens. If the film breaks, an automatic switch stops the projector and turns out the light. It can be used with either a silent or sound-on-film projector.

*Science News Letter 7/22/23*  
*1149*

**EGGS ONE MILLION YEARS OLD WERE LAID BY OSTRICHES**

Eggs laid by giant ostriches in desert sands about 1,000,000 years ago are being found in several parts of China. These fossil eggs are more than six inches long, being much larger than those laid by the ostrich of today. The eggs also have thicker shells, some of them nearly one-eighth inch in thickness. Doubtless these giant birds raced in prehistoric days with the three-toed horses, for both the bird and the horse of that type have been found buried together in clays dating back a million years. The fossil ostrich eggs are much larger than the dinosaur eggs found in Mongolia several years ago, but they are not nearly so old by many millions of years.

— *©1109* —

**SIREN WHISTLE FOR DRUMMER IS USED IN ORCHESTRA**

To assist the drummer who likes to produce unusual orchestral effects, a siren whistle made of bakelite is now offered. It is equipped with a small turbine which gives the instrument the sound of a siren when the drummer blows on it.



Whistle Equipped with Tiny Turbine Which Gives It the Sound of a Siren When Blown

*John Lanterbach*  
*Utica, N.Y.*



*Wide World*  
Propeller on This Paddle Boat Is Turned by a Crank Which Is Operated by the Bather

**TINY PADDLE BOAT FOR BATHER OPERATED BY HANDLE**

German bathers are enjoying a new form of water sport—paddle boating. The craft is shaped like a tiny boat and is attached to the swimmer. When it is strapped on, he can float in the water with safety, or can propel himself through it by means of a handle at the side which operates a propeller at the rear.

*©1140*

**DISEASE FEATURED BY HUNGER IS OPPOSITE OF DIABETES**

Excessive hunger is the chief symptom of a recently recognized disease which, according to Dr. Seale Harris, of Birmingham, Ala., is the exact opposite of diabetes. In diabetes, the pancreas supplies too little insulin for the body's needs. In the new disease, named hyperinsulinism, the pancreas produces too much insulin. Besides hunger, the patient may suffer from weakness, nervousness, tremors, sweating and mental lapses. A diet low in carbohydrates and high in fats is advised for mild cases with removal of part of the pancreas in severe cases.

*Science News Letter 7/24/23*

Half the insects of the world are harmful to man; the other half serve him.

*7/18/23 Saena*

*© Mrs. E. Hubbold  
W. Anisee, Germany*

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Cont. Hon. Klase man.  
55 W. 86 St  
New York

# Mighty MYSTERIES



Left, an Example of Ancient Stone Carving; Below, Nebula as Seen through One of the World's Largest Telescopes; Man Still Knows Little About Outer Space



**E**ACH day the eyes of the world open to behold new knowledge. On land, sea, and in the sky men are wresting the real truths from nature. But the more man searches and the more he discovers and invents, the more he multiplies the mysteries about him.

Science and invention were pretty simple affairs in ancient times. Only three elements were recognized, fire, rock and water. One man, Aristotle, knew more about nature than all other men together. He laid down laws and described their operation. Everything was easily understood.

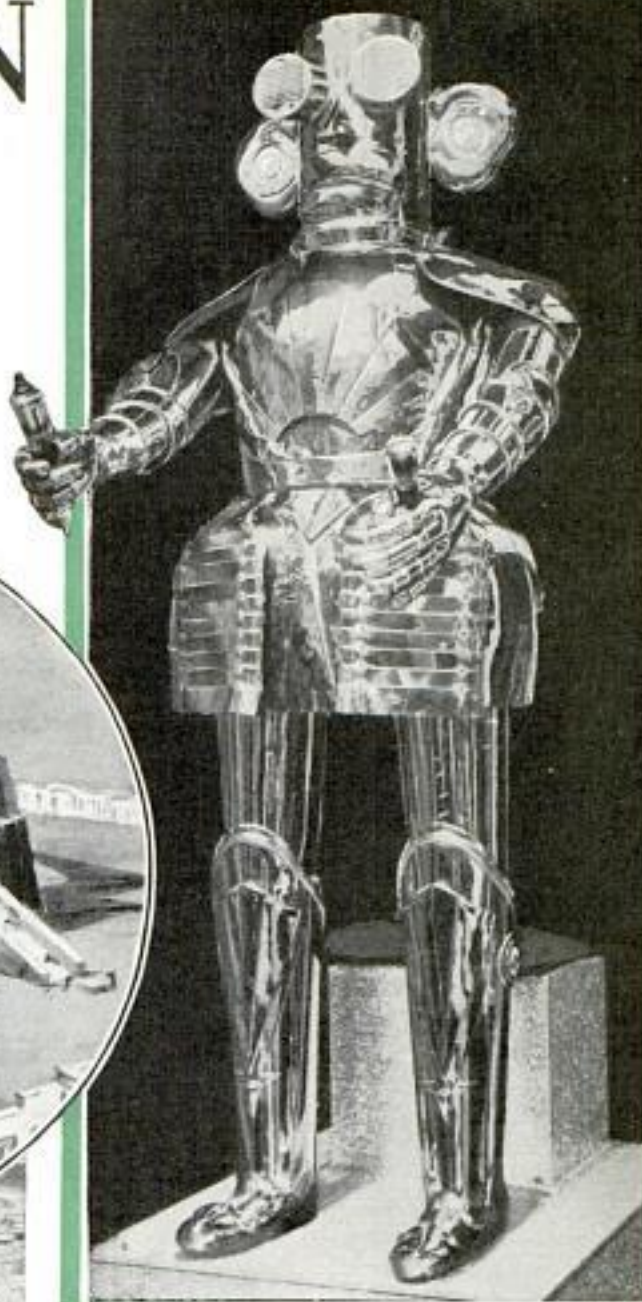
Is the world so simple after all? The three original elements have given way to ninety-two elements! The few compounds have multiplied to a million or more. The single gas, air, is supplemented by thousands of other gases. We are swamped by endless varieties of newly discovered invisible waves. Muscle power has yielded to myriad forms of mechanical power. We have come to know thousands of species, visible and invisible. From seeing one solar system, our vision has grown until we see millions of solar systems. From primitive surface transportation, we have developed aerial, underground, and submarine transportation.



Aerial View of Rock Island Dam on Columbia River Which Eventually Will Make Available 250,000 Horsepower in Electric Energy

# for MAN

The universe and life are more mysterious now than ever before. All the naturalists and scientists of past centuries were cocksure individuals, but there is no creature more doubting, more skeptical than the modern scientist. We may well say that science, truly understood, marks the birth, not



the death, of mystery. What are these riddles confronting man? If you place the chief mysteries under seven convenient heads, you arrive at something like this:

Can man tap new sources of power?

What is life and what was its beginning?

Can we solve the mysteries of the earth?

Can we solve the mysteries of the sea?

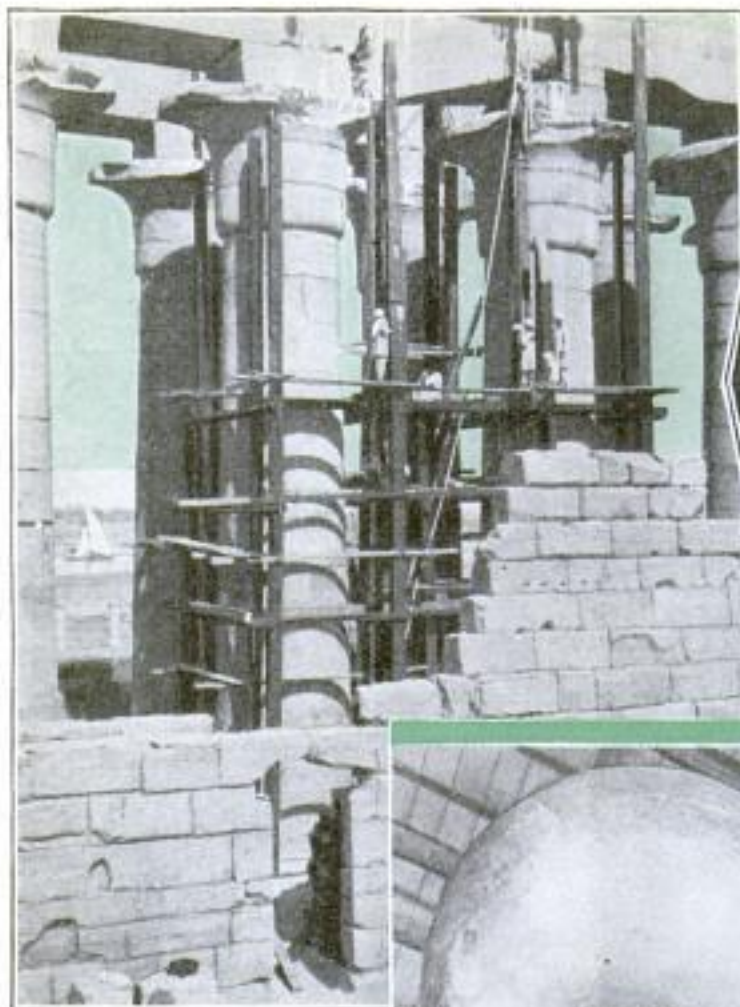
Can we solve the many mysteries of the cosmos?

Can we solve the mysteries of the mind?

What was the true character of ancient man and his vanished civilizations?

At present we derive most of our power from coal and natural oil and waterfalls. At the present rate of consumption and

Above, a Robot, Exemplifying Man's Mechanical Genius; in Circle, Restoration of Mesopotamian Tower, One of Many Ancient Wonders



increase, we cannot expect our coal and oil reserves to last indefinitely. When coal and oil reserves are exhausted can we rely on waterfalls? If all the natural water power of America were turned into electricity by 1940, only one-third of the power demands of the country could be met. Recognizing this grave deficiency men have organized an intensive search for new power.

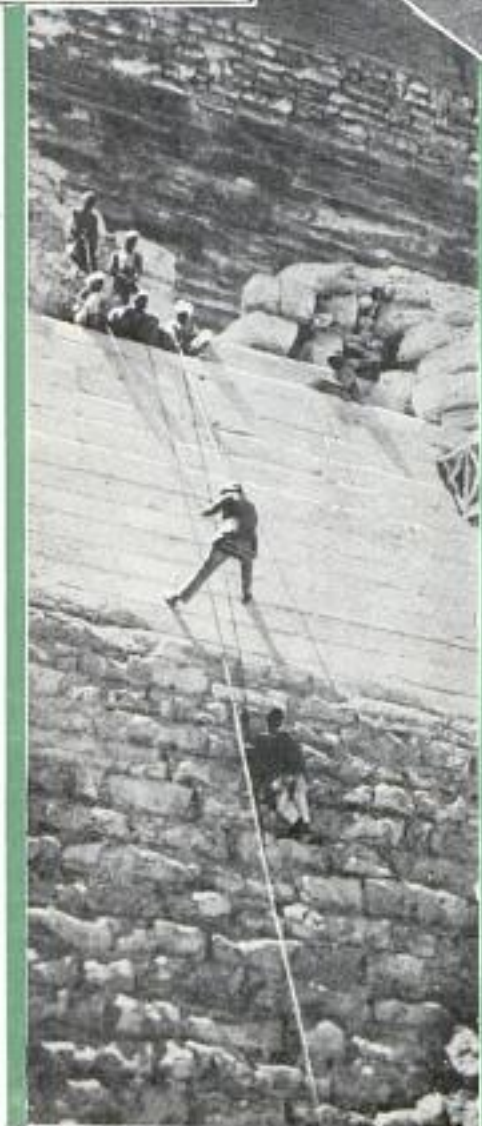
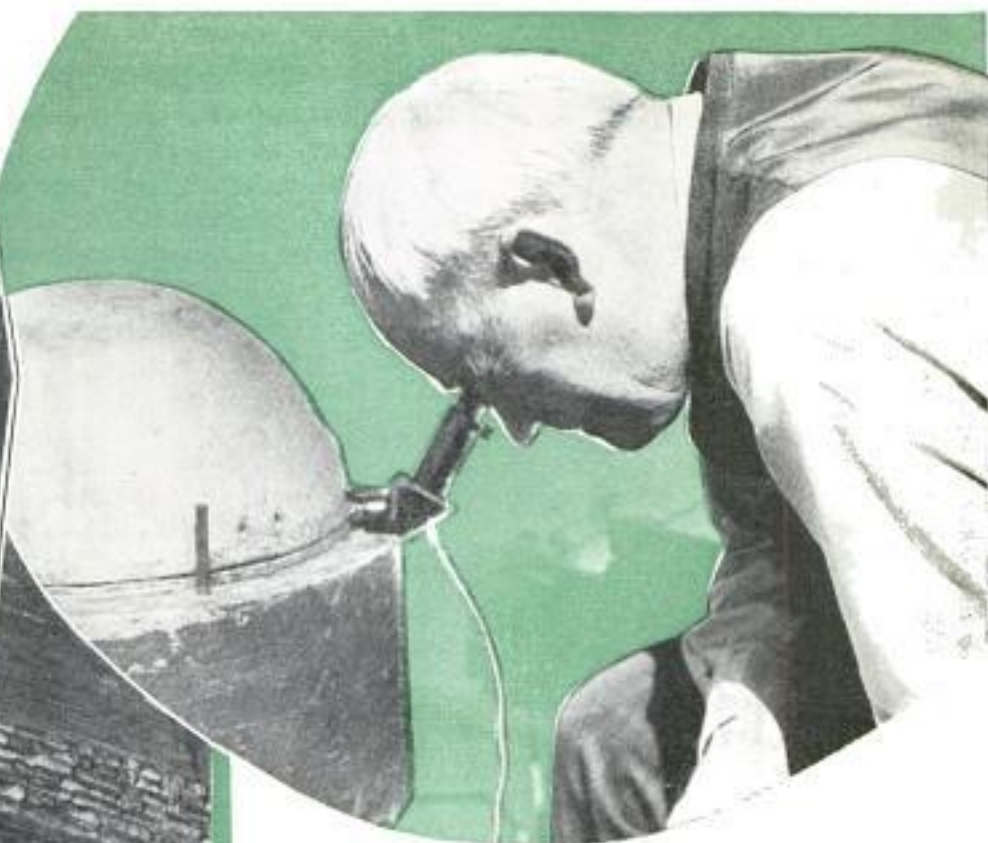
Here are some possibilities: They might, following Georges Claude's experiment in Cuba, utilize the differences in temperature of tropical sea water for generating steam and driving turbines. On the other hand, they might utilize the range of temperature which exists between moist air and dry air. And they also look enviously at the stupendous amount of energy going to waste in radiation of the sun. In one

year the sun's heat is sufficient to melt a terrestrial layer of ice 424 feet thick. An efficient solar engine would take care of mankind's power needs indefinitely. But there are even other possibilities in photochemistry, which is the source of power for plant life. By a photochemical process it is possible to make synthetic sugar out of carbon dioxide and ultraviolet rays. What are the power possibilities? Can we manufacture cheap sugar for fuel purposes?

The moon, while it throws off no heat has the power nevertheless

to raise formidable tides of water, even as high as ten feet. Why not devise a method of impounding this wall of water and make it turn turbine wheels as it seeks its common level? Besides the moon, we still have the force of waves and currents as power possibilities. Even today a great deal of power is generated by the wind. A wind rotor ship made a successful crossing of the Atlantic. But we must find a way of storing the energy of the

Above, Left, Repairing Ancient Temple of Luxor; Right, 10,000,000-Volt Artificial Lightning Discharge; Below, Looking Up at One of Terminals of a Huge Electrostatic Generator



Top, Using Electroscopes to Study Cosmic Ray; Below, Making Accurate Measurements of Stones on Face of One of Pyramids

wind in convenient containers so that it can be used at will. Atomic power is another possibility. Science holds there is enough power in a drop of water to give 200 horsepower for a year.

Now consider the mysteries of the earth. Although its diameter is about 8,000 miles, we have explored only a thin skin on the surface. But there are projects on foot—and they are humanly possible—of driving shafts ten or fifteen miles into the earth's crust. There is another project for driving a shaft into the bottom of the sea. There are a thousand mysteries about mother earth, but what we should find out first is what kind of material makes up the sub-crust of the earth. From that knowledge we may derive information bearing on the origin of the earth and the origin of life. There are also commercial sides to this undertaking. When we blast a hole into the sub-crust we will unleash the power of a horde of wild horses. Heat is power. At a depth of three miles, our subterranean explorers would find a temperature of 250 degrees Fahrenheit, and for every additional sixty to seventy feet thereafter, the temperature will rise one more degree.

Then we have the ancient riddle of the age of the earth. The most modern "earth clock" is radioactivity, which gives our planet an age of about 2,000,000,000 years. Undoubtedly, this estimate will be revised. A subterranean laboratory will

(Continued to page 122A)

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Made by Zeiss Co. Jena Germany  
POPULAR MECHANICS  
a week

# Telescope on Auto Is Portable Observatory

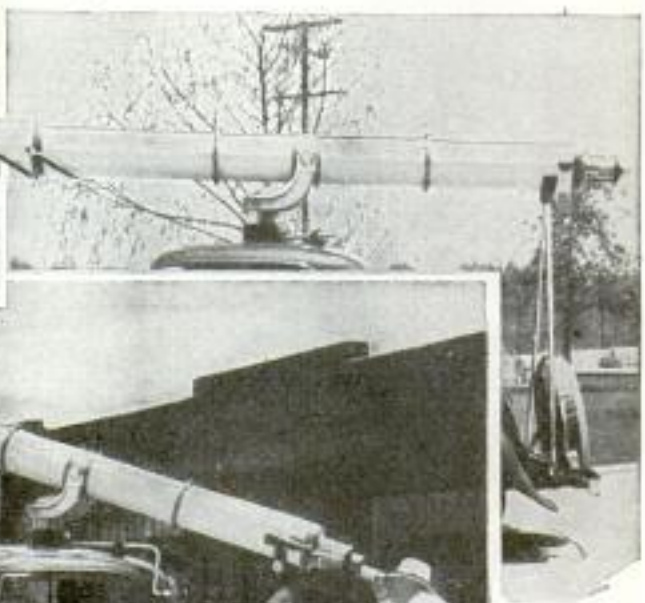
S. M. Stoddy Whittier Calif  
at Stoddy plant.



Telescope Mounted on Frame on Auto Gives Access to Most Favorable Places for Observation

Mounted on top of a small coupe, a telescope more than thirteen feet long provides a portable observatory for a California man who put the instrument on wheels in order to have access to locations with the most favorable atmosphere for making observations at any particular time. It also offers unusual scenic views. It is of the refracting type with an objective lens measuring nine and one-half inches. It is more than 1,000 times as powerful as the average human eye and mag-

nifies from sixty to 716, depending on the focal length of the eyepiece used. It is equipped with a finder, a binocular eyepiece enabling the observer to use both eyes, a camera and a revolving disk of colored glasses for observing bright objects. There is a special cabinet for all the accessories. The instrument is mounted on ball bearings and pivots on a casting. It is elevated by means of a crank and gears, and



an adjustable platform enables the observer to look through it when it is in a horizontal or inclined position.

## HUMAN BLOOD HOLDS SECRET OF MAN'S INTELLIGENCE

In the constancy of man's blood lies the secret of his intelligence. This is the assertion of Prof. James Barcroft, British physiologist, who adds that the development of this intelligence, aided by the blood, begins before birth. Studies have shown that as the child develops before birth it requires more and more oxygen.

At first this need is supplied by the blood of the mother, but finally this does not suffice and birth takes place. This demand of the blood for oxygen, Professor Barcroft says, results from the fact that man has developed to the point where his blood adapts itself to the needs of his body which is not the case with lower animals. The blood of a human being is built up to a certain unchanging condition, so that its oxygen content, temperature, alkalinity,

San Diego Union 6/27/33

Cambridge University  
England



e1137

sugar content and other conditions vary little. This process, beginning in the unborn child, is the reason for the high intelligence of man as compared with the lower animals, for the human brain cannot function properly unless the blood remains unchanged. Differences in human intelligence might be explained by slight differences in the blood, he believes, although no tests of this have been made.

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METAL BOAT BUILT LIKE A TUB HOLDS NINE PEOPLE

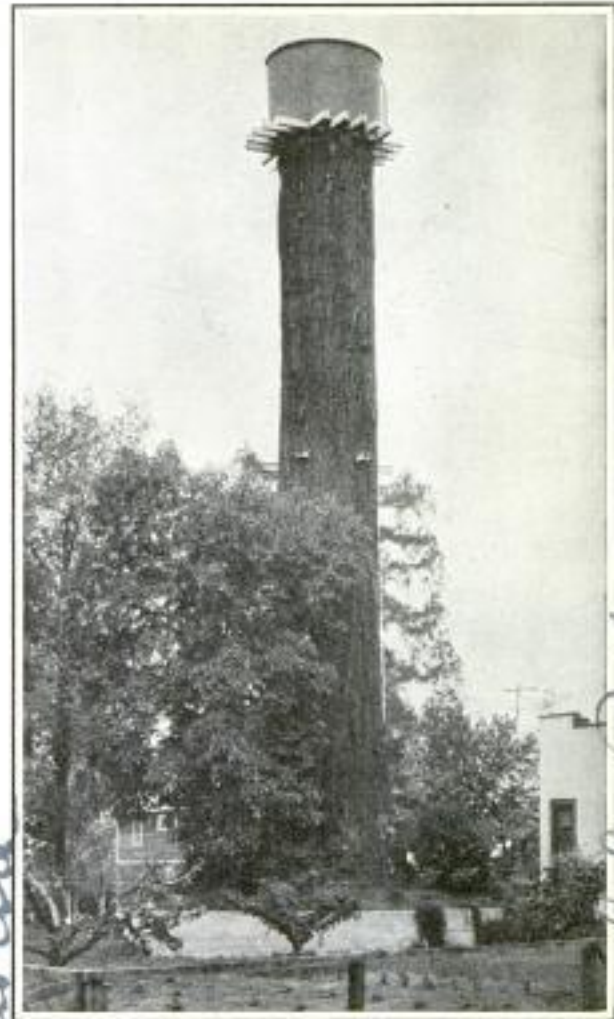
Nine feet in diameter and made of sheet metal, an "unsinkable" boat which looks like a tub accommodates nine persons and is intended for a pleasure craft on small lakes or streams. As a house boat it is equipped with a stove, blankets, ice box and other supplies which are stored under the seats. The inside section usually is raised as a table but can be lowered to a level with the seats to provide sleeping quarters. Curtains render the sides rain-proof and a ventilator supplies fresh air when they are drawn. Besides the storage space, there are four air-tight compartments around the sides as well as space for an outboard motor and a twelve-gallon tank of fuel. The craft can be steered from in front with a wheel, or from the motor in the back of the boat. When not in use the motor can be placed inside and the whole boat locked. The craft can be carried with ease on an ordinary trailer.

drw. builder, owner - Dr. W. Ross  
4128 W. Warwick, Kansas City, Mo



Nearly Round Metal Boat Made of Sheet Metal; It Weighs 800 Pounds and Holds Nine Persons

drw. and owner - Dr. W. Ross, 4128 W. Warwick, Kansas City, Mo



Water Tank Mounted on a Tree Stump Fifty Feet above Ground; Note Bird Houses Half Way Up

WATER TANK ON TOP OF STUMP IS RESERVOIR FOR HOME

When a resident of suburban Seattle, Wash., wanted running water for his home and garden, he utilized a large fir stump for a tower, building a tank on top of it. This was done to obtain the necessary pressure, and the top of the tank is about fifty feet above the ground. Bird houses set half way up the stump give the tower a unique appearance.

dr. no. Charles H. Lubbs, 5529  
5529  
5529  
5529

Emb. L. E. Paterson, 790. Hoffman St. S. Sacale Wood

PERMANENT STRIPES FOR ROADS LAID BY HIGHWAY MARKER

Placing colored stripes on highways to indicate traffic lanes is greatly simplified with a marker which does a permanent job. It lays an inlaid ribbon of white cement sparkling with silicate sand and it is said such a stripe, besides being permanent, is visible when the pavement itself is concealed by darkness or fog.

e1147

de - R. H. G  
Copyrighted Material  
Los Angeles

Carl Rene  
Leinhardt, 11a J  
Immenweg, Berlin  
West Germany



Light on Locomotive Is Reflected by Mirrors on Signal Tower Back to the Engine and Strikes Selenium Cell, Which Applies Brakes

### OPTICAL CONTROL FOR TRAINS OPERATES AUTOMATICALLY

Any desired prearranged communication can be transmitted over an optical train-control system, the heart of which is a selenium cell. The system, designed by a German engineer, is adapted to the giving of acoustic signals on the locomotive, the automatic application of brakes, to control from the track the speed of the train, or to giving notice of diversion of the train from one line to another. The carrier of the message is the light traveling, with the aid of optical devices, to and fro between locomotive and signal. The source of light and the sender are on the engine. On the signal is only a mirror reflector which catches the light and throws it back to the receiver on the locomotive.

The mirror alters its attitude with the position of the signal. The "sender" is a searchlight projecting a cone of light nearly vertical. The mirror is so arranged that it has a fixed relation to the track. As receiver there is a selenium cell behind a small lens close beside the searchlight. The cell has the property of altering its electric state under the influence of light and the weak current thus produced operates, through amplifiers, the relays to bring about the desired effects. Where several effects are involved, the system of mirrors sends pencils of light back to the locomotive, these falling on cells controlling particular effects. The system is protected from outside sources of light. The actuating apparatus on the engine is electrically driven and should anything go wrong, the engineer receives a signal. If he fails to take action or switch off the apparatus, the

brakes are set automatically. The system can also be connected with lights in the cab, so the engineer merely watches the cab lights to ascertain if the track ahead is clear. The mirrors are protected from the weather and the searchlight is kept free of ice or snow by steam heating. By setting the mirrors at various angles, each angle representing the activation of a particular selenium cell connected to the throttle, the speed of a train can be governed, or the train can be stopped by setting the mirror so that it falls on the cell operating the brakes. Signal wires move the mirrors and these are operated by a dispatcher by remote control.

¶ If a man could jump as far in comparison to his own weight as a California flea, he could reach the moon in ten hops.

Scene Service

7/23/33

### SLUGGISH BATTERY ACID CAUSES HARD STARTING

Sluggishness of chemicals in the battery is one of the causes contributing to slow starting of automotive engines in winter weather, according to tests made by the bureau of standards. It has been found that the sluggishness of the acid in battery solutions containing from ten to fifty per cent sulphuric acid tends to become higher as the temperature drops. All other things being equal, free movement of the acid is essential to proper starting and when the temperature drops, the acids tend to "freeze." This action, together with thickening of the motor oil, forms the chief obstacle to proper starting in cold weather. While hot weather may adversely affect the mechanics, or construction, of the battery, it does not harm the chemical action. Instead, the battery, by reason of the fluidity of the acids, functions more nearly normal in hot weather.

### BABY'S BOTTLE HEATER IN AUTO SAVES TIME IN TRAVELING

Nursing and feeding bottles for the tourist baby can be heated quickly and conveniently as the family automobile travels along the road, by a warmer that is installed in the usual six-volt system. Wire from warmer is plugged into outlet provided under instrument board, while the warmer is suspended from any convenient projection on the dash. In ten or fifteen minutes, the bottle's contents will heat to the correct temperature for using.



Nursing Bottle Warmer for Auto Which Is Plugged into the Ordinary Six-Volt System



Floodlight for the Yard or Garden Which Is Equipped with Weatherproof Reflector, Socket and Cord

### FLOODLIGHT FOR HOME GARDEN IS MADE WEATHERPROOF

Constructed with weatherproof reflector, socket and cord, a new floodlight is particularly adapted for illuminating the home garden or yard and for Christmas lighting. The reflector is nine and one-half inches in diameter. An adjustable bracket permits convenient mounting.

### PLANE'S GAS SUPPLY SHUT OFF BY MAGNETIC VALVE

Fire hazards on airplanes are reduced by an electromagnetic fuel valve which shuts off the gasoline supply when the pilot turns off the ignition. The valve, invented by an engineer of the Westinghouse Electric and Manufacturing company, consists of a steel core inside a tube, the latter forming an integral part of the fuel line. An electric current passing through a coil of wire wound around the tube of the valve exerts a magnetic pull on the core and holds the valve open against spring pressure. When the pilot shuts off the ignition current, the current to the electric switch is also cut off, and the core is closed by the spring.

*Dep't. of Commerce 6/14/33*  
*Philad. 7/19 5 W. of Rochester*  
*Job Philad. 7/19 5 W. of Rochester*

*Syman & Biggs 1006 N. M. Lane*  
*Director @ 949*  
*118 W. 36th St. Los*

*mech*  
*3.50*  
*4.50*

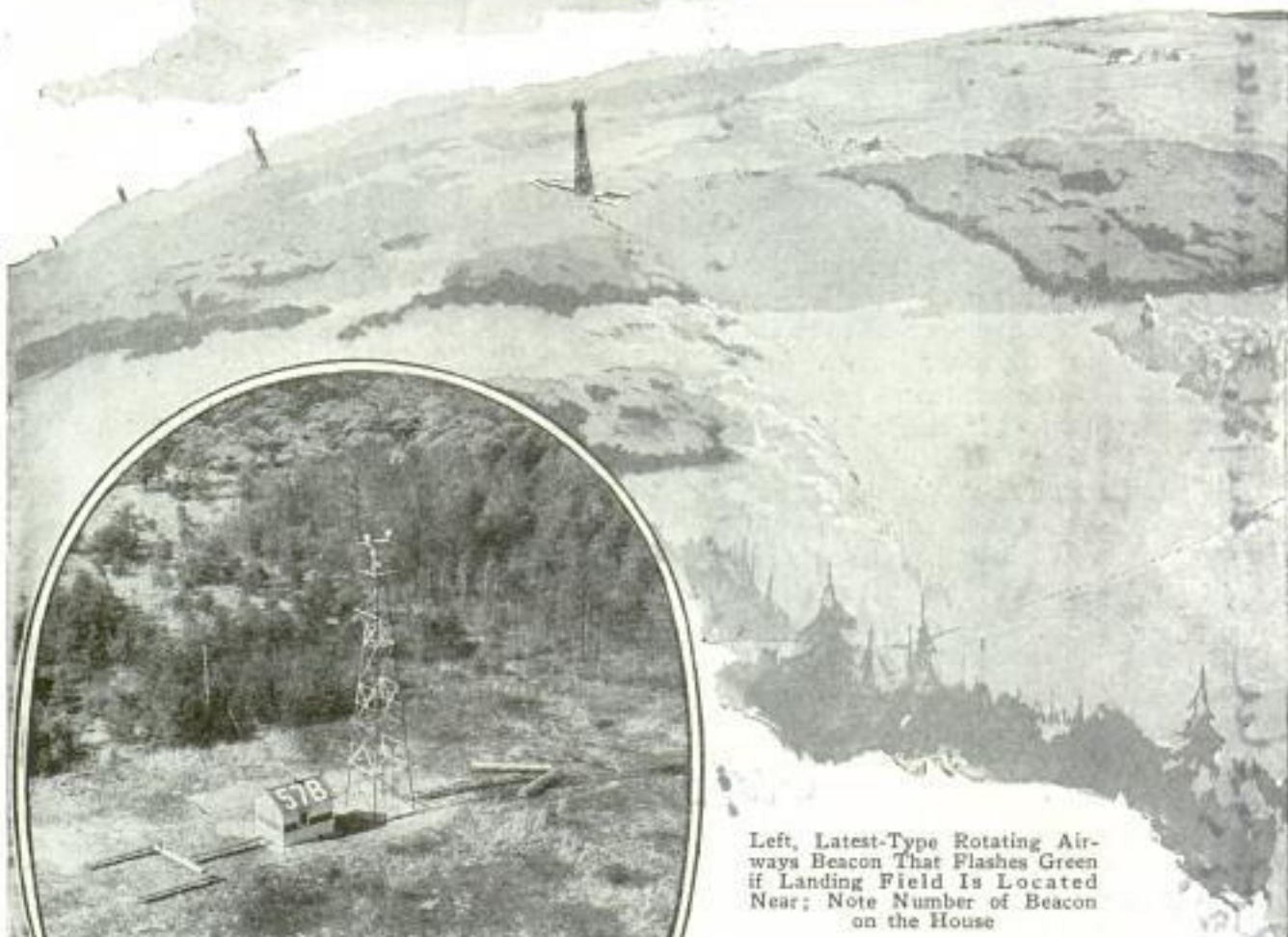
*c/1065*

*Flexo Heat Cords*  
*no steel address*  
*Philadelphia, Pa.*  
*Copyrighted material*  
*Riley Engineer*

820

# "TRACK-WALKERS"

13/1/1933



Left, Latest-Type Rotating Airways Beacon That Flashes Green if Landing Field Is Located Near; Note Number of Beacon on the House

By JULIAN LEGGETT

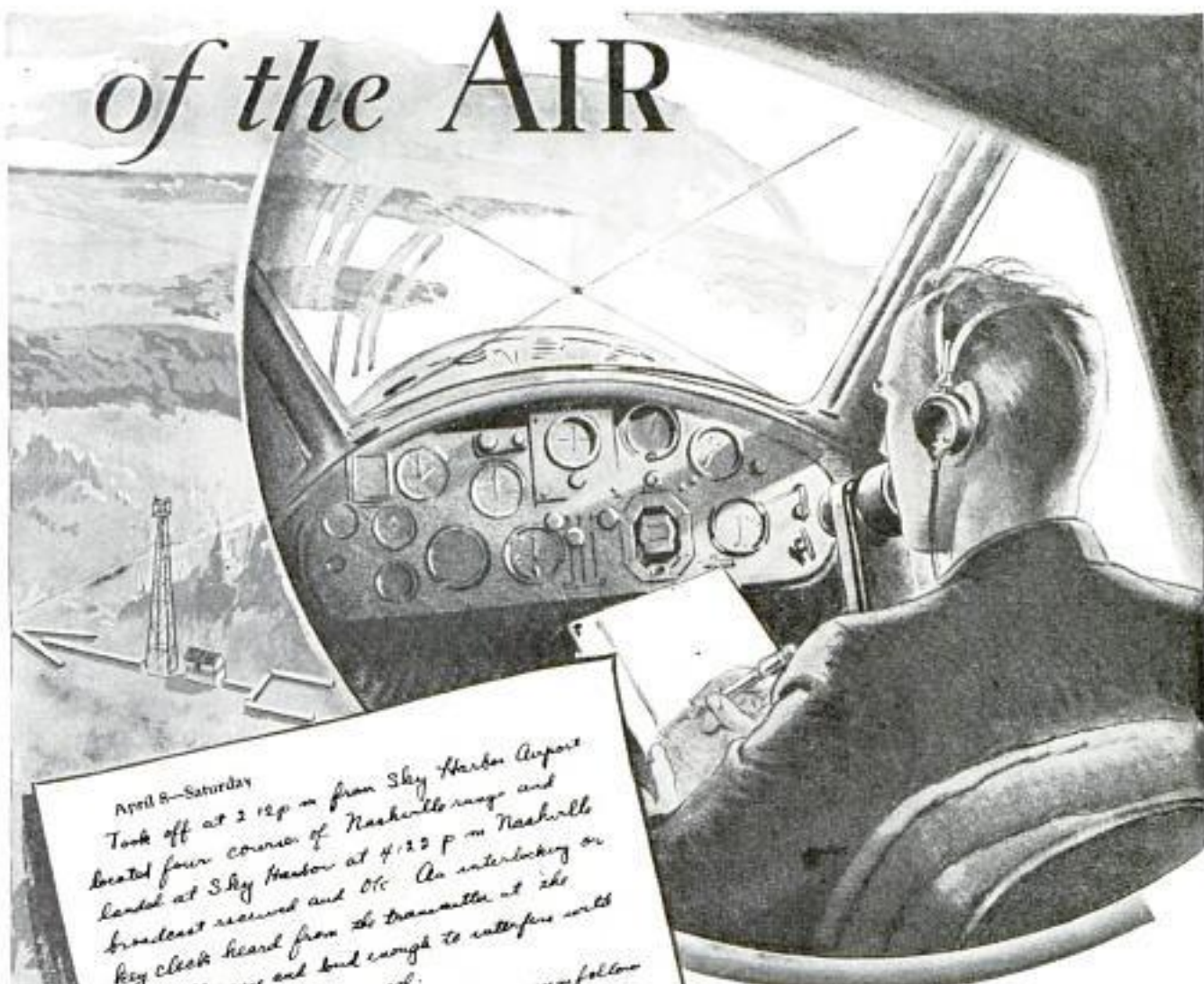
WHEN the modern passenger train speeds through the night, the lives of hundreds of passengers depend upon the attention with which the track-walker has inspected rails, roadbed and signal lamps. A few loose spikes might cause a rail to turn under the tremendous weight of the locomotive, wrecking the entire train, so the track-walker's job is full of responsibility.

Aircraft are not bound to man-made tracks, but there are definitely established

routes which airmen follow, routes plainly evident to the pilot day or night, even if he is forced to fly for miles through a solid layer of clouds or fog. And, like the railway, the pilot's "tracks" must be kept in the best possible operating condition.

To this responsible job have been assigned six pilots of the airways patrol, organized by the aeronautics branch of the United States department of commerce. Each of these "track-walkers" of the air has a territory including 3,000 to 3,500 miles of the 19,500-mile federal airways system and he spends many hours, day and night, making certain that those who fly the airways will be served adequately by the beacon lights spaced at ten to fifteen-mile intervals, the intermediate landing fields every forty to fifty miles between airports, the radio-range beacons giving

# of the AIR



April 8-Saturday  
 Took off at 2:12 p.m. from Sky Harbor Airport  
 located four courses of Nashville range and  
 landed at Sky Harbor at 4:12 p.m. Nashville  
 broadcast received and OK. An interlocking or  
 key click heard from the transmitter at the  
 Nashville range and loud enough to interfere with  
 reception of beam signal.  
 Course location of the Nashville range was follows

North Course  
 Center line 1/2 mile E of Adamsville Ky  
 Center line 1 1/2 miles W of 3rd No 27

South Course  
 Center line 2 1/2 miles NE of Monticello Tenn  
 Center line 3 miles SW of Signalite, Tenn

East Course  
 Center line clustered on Marcks, Tenn  
 Center line 1 mile S of Huntington Bridge

West Course  
 Center line 1/2 mile N of Jingo, Tenn  
 Center line 1/2 mile S of Balkoven Tenn  
 Comments on the efficiency of the ranges

Top, Airways Pilot Following Air "Track" across Country; Left, Facsimile of Page from Patrol Pilot's Log

and offering additional opportunities for two-way radio communication.

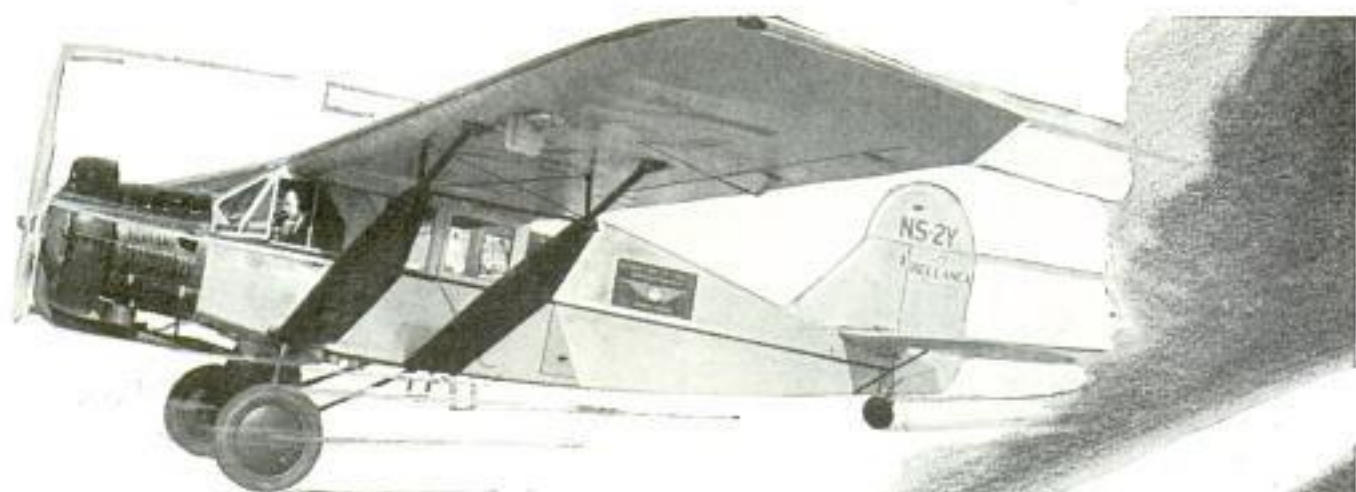
Airways Superintendent W. T. Miller supervises activities of the patrol.

How important the track-walker of the air is to commercial aviation is demonstrated by the experience of two transport pilots flying the Chicago-New York route. The west-bound pilot was flying the radio range, listening to the dot-dash signals in his headphones as he kept to the right side of

directional service in all conditions of visibility, the radio station broadcasting weather information and communicating directly with pilots in flight, and the radio-marker beacons indicating strategic points

the course and maintained a lookout ahead. Approaching Cleveland, he glanced for a moment at an order that was to be carried out after landing. As he looked up, another transport ship, east bound,

CA 20  
564

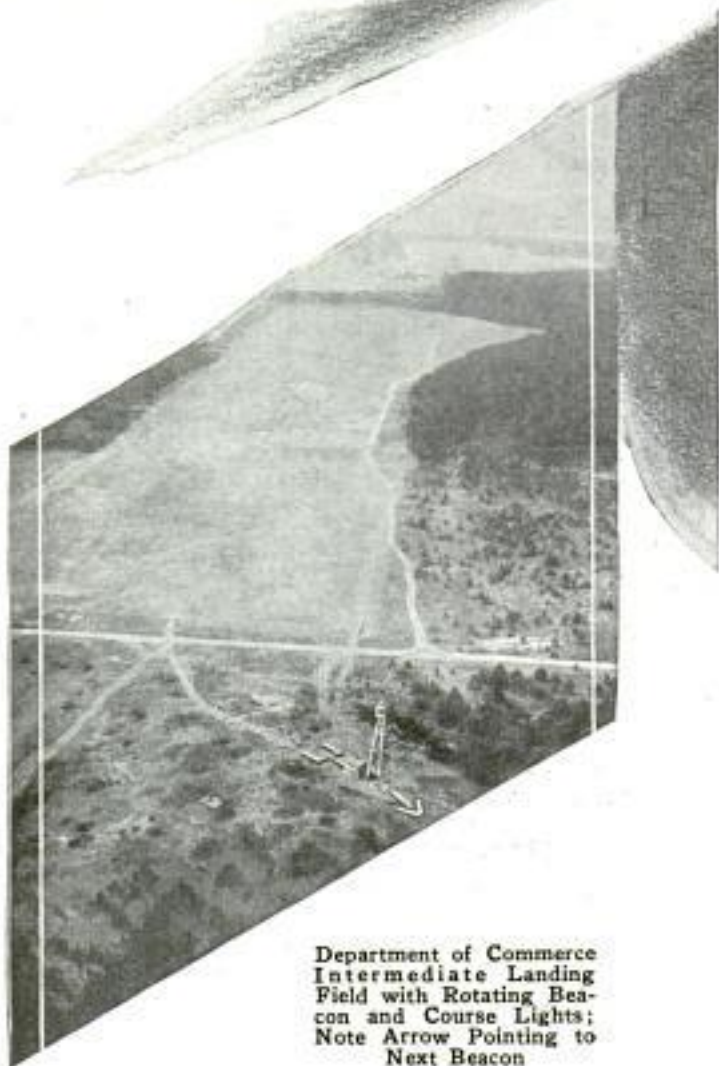


Type of Plane Used for Patrolling the Federal System of Airways

swung around a cloud and roared past his left wing, so close that he could almost see the stitches in the fabric covering the other plane's fuselage.

When the incident was reported, the airways patrolman found that the east-bound pilot had been following the light beacons, instead of the radio-range signals. On a flight over that route, the patrol pilot followed the direct line of lights and tuned in the radio signals on his receiver. As he had suspected, he found that the radio-range course had swung very slightly to the south, introducing an error which was not sufficient to carry an airplane far out of its way, but enough to bring the west-bound ship, flying the radio range, almost into the path of the east-bound plane, following the lights. A report resulted in immediate adjustment of the radio transmitter to line up the radio-range course.

The air patrolmen are prepared to meet any emergency in connection with operation of the airways, but their chief duties are concerned with such matters as checking the relative brightness and elevations of beacon-light beams, orientation of radio-range courses and transmission of proper signals, correctness of speech and transmission of weather broadcasts to planes in flight, operating principles and procedure of airways radio stations in carrying on communications with aircraft, reception of marker beacons and two-way radio communication service from the marker-beacon stations, the functioning of facilities and condition of landing areas at department of commerce in-



Department of Commerce Intermediate Landing Field with Rotating Beacon and Course Lights; Note Arrow Pointing to Next Beacon

intermediate landing fields, and investigation work pertaining to all phases of aeronautic facilities on the federal system. The pilots also are called upon for special work in connection with relocations and selection of adequate landing fields, straightening and improving the airway lights and making recommendations for replacement and respacing of aids to air navigation by new and improved types to bring about increased efficiency with reduction in

C820



Left, Drawing Showing How Citizens Used Shotguns to Stop Annoyance from Beacon; Top, Operator Transmitting Report by Teletypewriter

sweeps around the sky, because this beam can be seen only three or four miles. The direct flash, however, is visible thirty to forty miles from the beacon, provided it is pointed in the direction of the observer. As the projectors are sharply focused, it is necessary to adjust elevations accurately to make the flash apparent at the required distance and altitude.

Sometimes it is difficult to prevent the powerful beacon light from annoying citizens of a town or city near which it is located. One patrolman found a beacon elevated so high that it could not be seen until he was within two or three miles of the tower. The beam was describing a small circle directly above the light. The pilot reported and the light was adjusted. Flying the same route the next night, the pilot found the beam again pointed skyward and he repeated his report.

When the airways mechanic returned the following day, after adjusting the light twice, he found the glass lenses and bulbs shattered and the metal parts of the beacon covered with scratches and tiny pits, mute evidence of blasts from shotguns in the hands of citi-

maintenance costs. In checking beacon lights, the pilots have found it difficult to get the beams low enough. The airman is not interested in the pencil of light that

(Continued to page 120A)

U.S. Army Air Corps

Chas. G. W. Boss  
1962  
Crosby Ave  
Brooklyn N.Y.  
C985



*Wide World*

Army Pilot Leaving the Cockpit of a Modern Bomber through a Trapdoor in Nose of Ship, Eliminating Need for Clambering over Side.

### TRAPDOOR FOR AIRPLANE PILOT IS IN NOSE OF BOMBER

Army flyers using the latest Douglas bombers enter and leave the ships through trapdoors. The door into the cockpit is located in the nose of the ship, eliminating the necessity for clambering over the side to get in or out.

*see Sept. 1934 385*

### OLDEST LIVING THING IS A TREE GROWING IN MEXICO

As far as is known, the oldest living thing in the world is a cypress tree growing in an Indian village a few miles from the city of Oaxaca in Mexico. This is the opinion of Dr. Herman Van Schrenk, consulting timber engineer, who made two studies of this tree, thirty years apart. He estimates its age at over 4,000 years, basing the figure on a boring from another giant cypress. The ring count of the second tree showed it to be about 1,000 years old, and a comparison of its size with the larger specimen convinced him that the bigger tree is at least 4,000 years old. The Mexican cypress is of extremely slow growth. The ancient tree is now about 140 feet high with a circumference of about 117 feet forty inches from the ground. The true circumference is hard to measure because of the unevenness of the trunk, causing people to believe the tree is three trunks grown together. Botanists, however, say it is a single trunk.

*Santa Maria  
Feb-June*

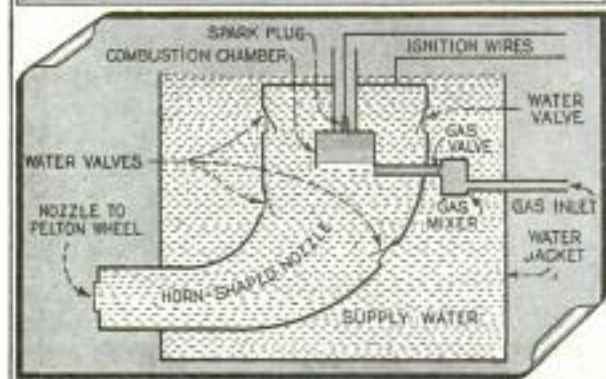
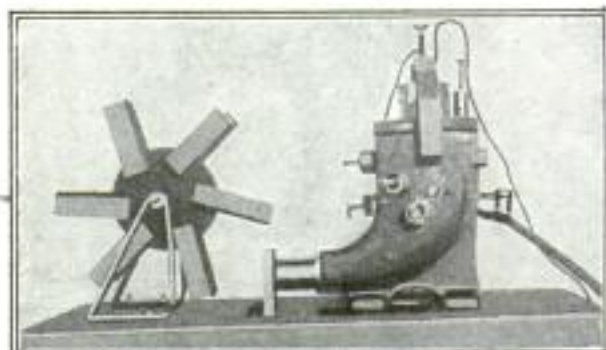
*St. Louis Mo*

*Scene New Teller  
7/8/33*

### WATER IN ENGINE DRIVEN BY GAS TURNS WHEEL

Gas explosions in the center of a horn-shaped iron vessel filled with water provide the force to turn a power wheel in a new turbine tested in Germany. As the gas explodes, the water is forced toward all sides with equal force. A nozzle is the only outlet, so the water rushes through that small opening to strike the blades of a wheel, causing it to revolve rapidly. Immediately after each explosion, the nozzle is closed by a sliding valve.

A partial vacuum resulting from loss of water inside the horn-shaped vessel draws in more water through automatic valves in the outside wall. Just before the end of this influx of water, the fuel gas is pressed through a special mixer into the explosion chamber and ignited by a spark plug. The turbine has been used with good results for propulsion of small boats by being so mounted that the water from the nozzle strikes the water in which the craft rides.



Power Wheel Turned by Water Forced against Blades by Gas Explosions; Diagram Shows Operation



Dr. J. George...  
Asst. Curator  
D. Fish

**TINY FISH MAY REVEAL CLUES TO EARTH'S HISTORY**

Tiny fish, members of a family which renders large areas of the world suitable for human habitation, may shed new light on the history of the earth. The fish are known as top-minnows. One member is the mosquito-catching fish which exists by the billions throughout the southern states and without whose aid much of the coastal country from North Carolina to Texas would be almost uninhabitable. The other is the guppy, familiar in household aquaria. These fish are being studied at the Smithsonian Institution in the hope that clues may be found to the distribution of animals over the earth. Most of these fish live in fresh water and die quickly when placed in salt water, hence they could not possibly have crossed an ocean. Members of the family are found in Europe, North America, South America and Africa. The European and North American forms are very similar, while the South American and African forms resemble each other. Thus is presented evidence that a land connection once existed between South America and Africa.

U.S. News 6/24/33

Dr. W. Cap...  
518 N. 6th St. Wash.

**DISPENSER FOR THICK LIQUIDS FITS ON BOTTLE**

Safe and sanitary, a dispenser for viscous foods fits on the bottle, eliminating residue from the neck of the container. Thick liquids are handled easily with a minimum surface exposure. The device does not permit dripping on cloth or table and its snout may be adjusted to the user's convenience.



C/1015

pend

C/1032

**FURNACE UNIT GRINDS UP COAL FOR USE AS POWDER FUEL**

Ordinary slack coal placed in the hopper of a new burner unit for the furnace is ground to a fine powder and then blown into the furnace to be burned in a manner similar to gas. The hopper holds ap-



Furnace Hopper Which Grinds Up the Coal as It Is Fed Automatically into the Heater

proximately one week's supply of coal, 500 pounds, which is delivered in dust-proof paper sacks, eliminating handling by the householder. The flame is started by a high-tension electric spark and, due to the fineness of the coal, the flame shooting from the burner resembles a gas flame. The unit produces no objectionable noise. Its operation is automatically controlled by a thermostat or pressurestat.

**ELECTRIC ROOF OF THE WORLD FOUND WITH THREE LAYERS**

That the electric "roof of the world," electrically charged layers of the upper atmosphere which reflect wireless waves, contains a third or intermediate layer has been established by J. P. Schafer and W. M. Goodall of the Bell Telephone laboratories. The first layer is at a height of sixty to seventy miles, the second at 115 to 180, while the new layer is between. Senator Marconi is said to be conducting experiments which may reveal another layer still higher in the atmosphere. Using ultra-short wavelengths, Marconi has communicated by radio over distances up to 100 miles. These ultra-short waves pass through all the electric layers in the upper atmosphere, so far known.

C/10174

Some news letters.  
4/15/33

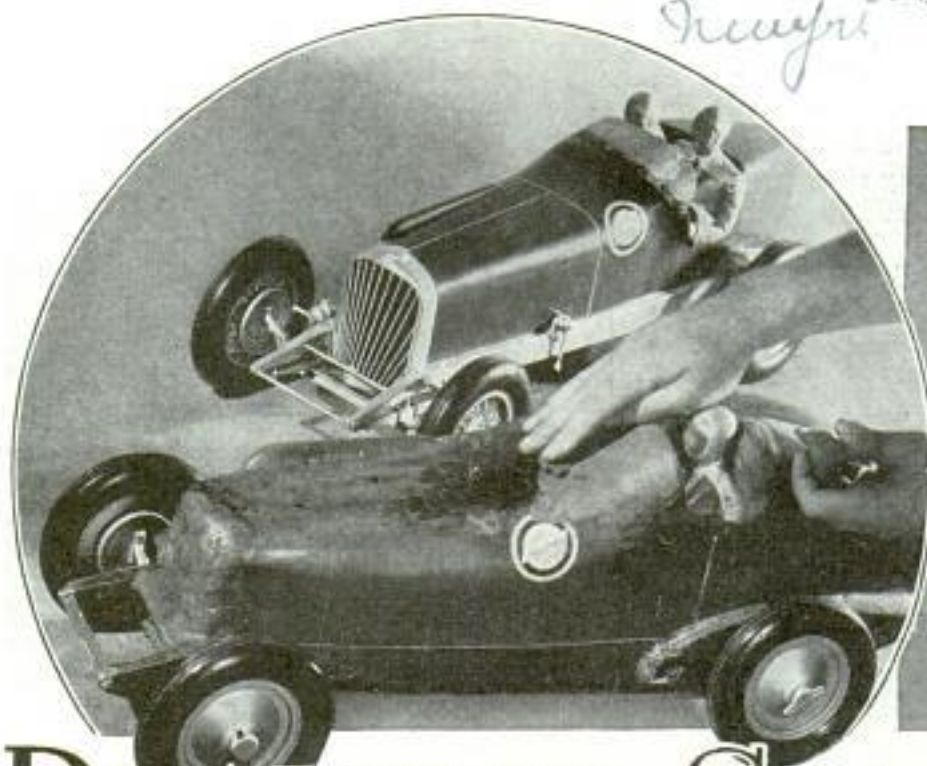
Reader  
page 50, B

(Powder Co. Inc.  
Colorado Bldg  
Denver, Colo)

Real. H. J.

C/1021

Hand World Photo  
279 in '43  
Newspaper



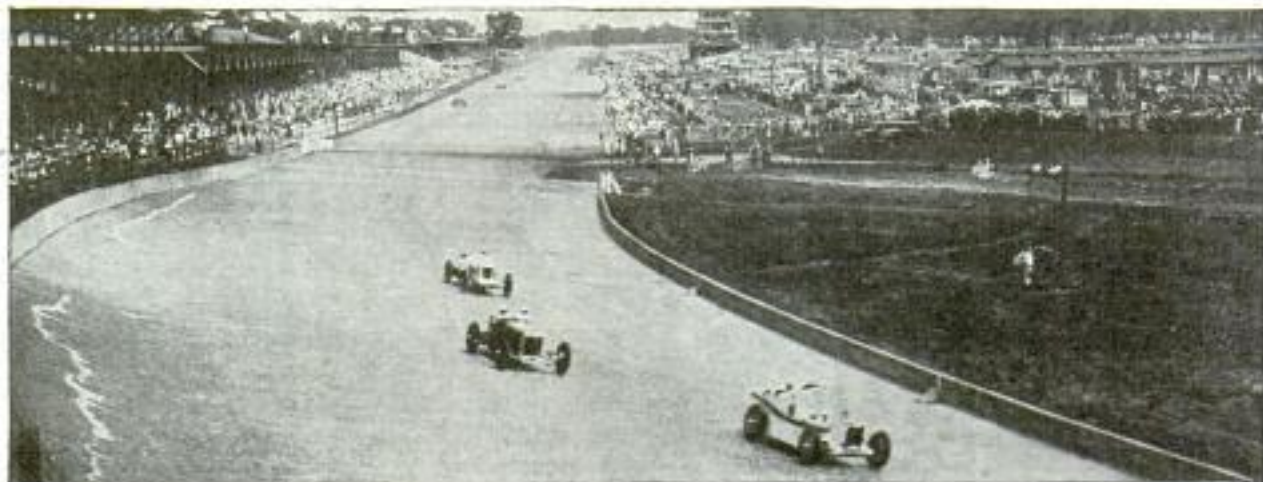
# PLAYING SAFE at

"DRIVE as fast as possible, but don't take chances; win if you can, but keep your cars between the walls and on the track for the entire 500 miles; bring them home and under their own power!"

In a nutshell, those were the orders issued to the drivers of a five-car team entered in the 1933 Indianapolis Speedway classic. Victory was to be sacrificed, if necessary, for safety in order to prove

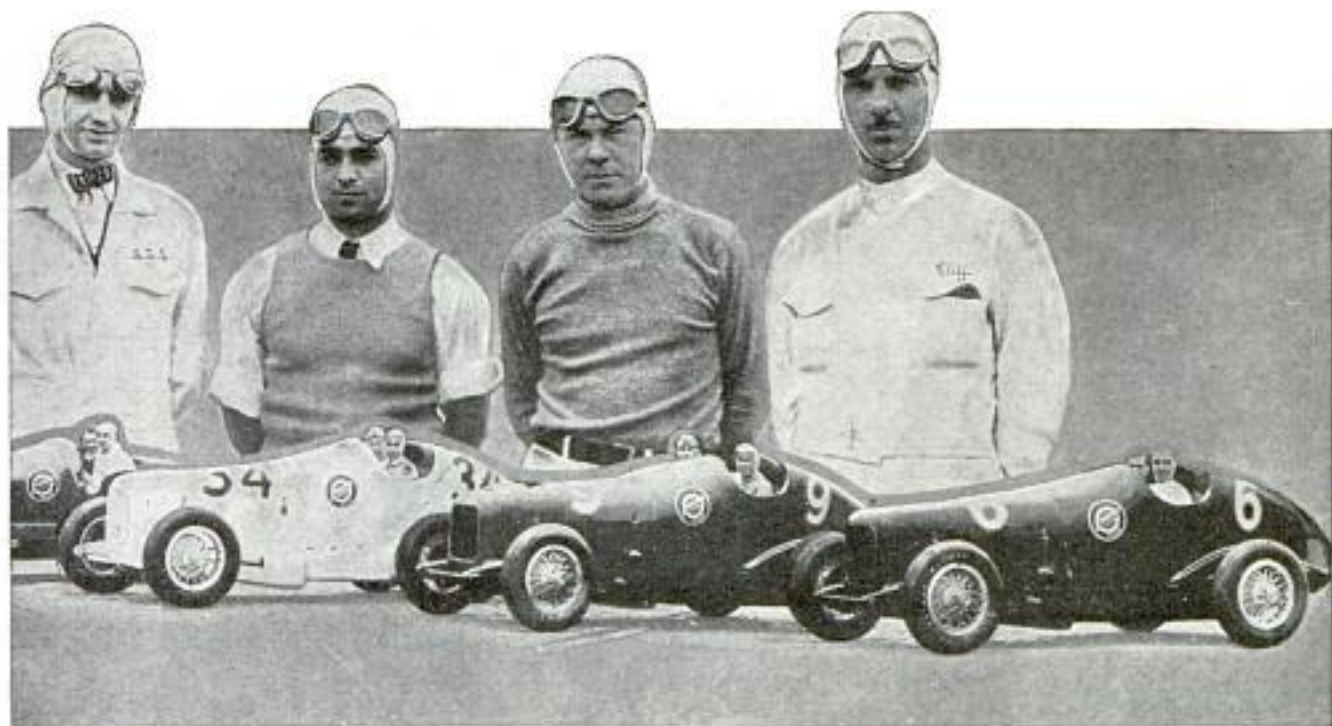
that this set of diminutive speedsters could "go the distance" at a killing pace.

It was no easy job for those drivers, for this year's race was the fastest and most dangerous ever run. Before many minutes of the event had been run, cars were hurtling off the track, going into spins and tangles and cracking up with mechanical troubles. Three men were killed in accidents and the track was lit-

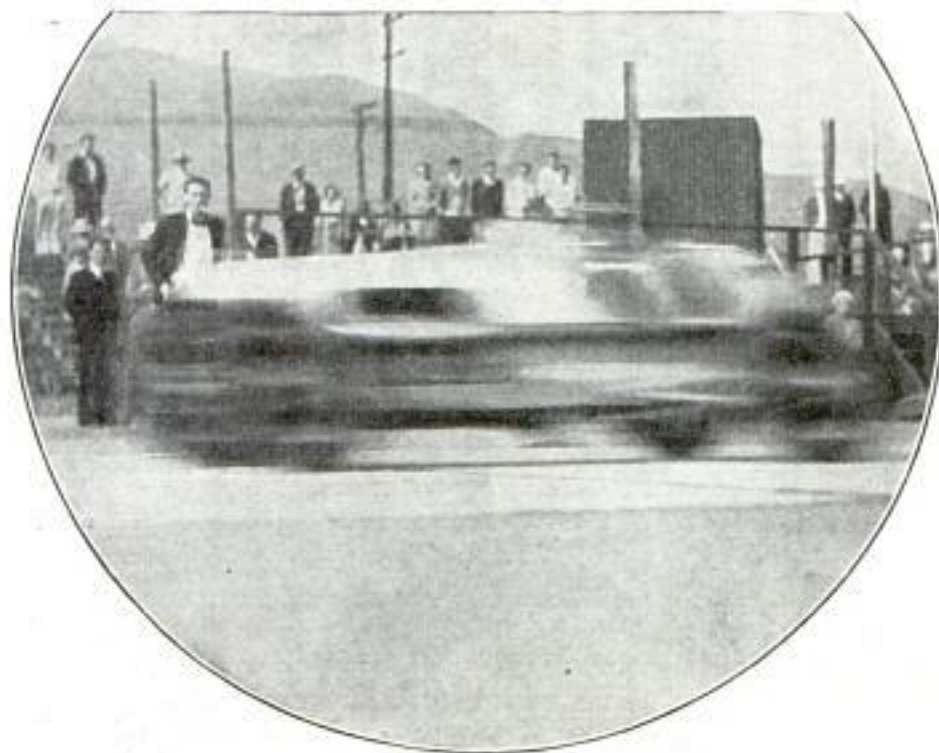


Top, Circle, Hand of Science Models the Racing Car to Reduce Wind Resistance; Note How Plastic Is Applied for Test; Bottom, Down the Stretch into One of Those Dangerous Turns at the Indianapolis Speedway

C-1021...



# 100 MILES *an* HOUR



Top, Left to Right, Johnson, Corum, Gulotta, Meyer and Berge with Cars They Drove in Race; Left, Doing Close to 100 Miles per Hour

once was one of the cars near danger, not once did one go into a skid and not once did one participate in a hair-raising "zooming match" on a curve. The drivers brought them all home through the toughest field of twenty-one years of racing at Indianapolis, to finish almost together in seventh, ninth, tenth, eleventh and twelfth places. That is as near a like performance as possible, considering the human element. It is an even more remarkable

performance when it is considered that not one of the five cars stopped at the pits for mechanical repair.

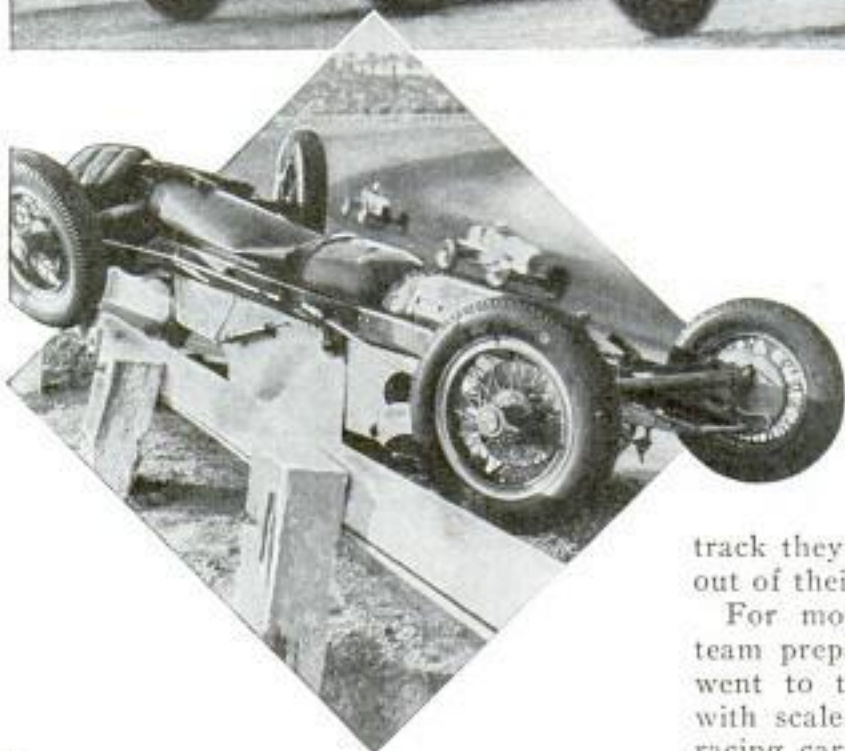
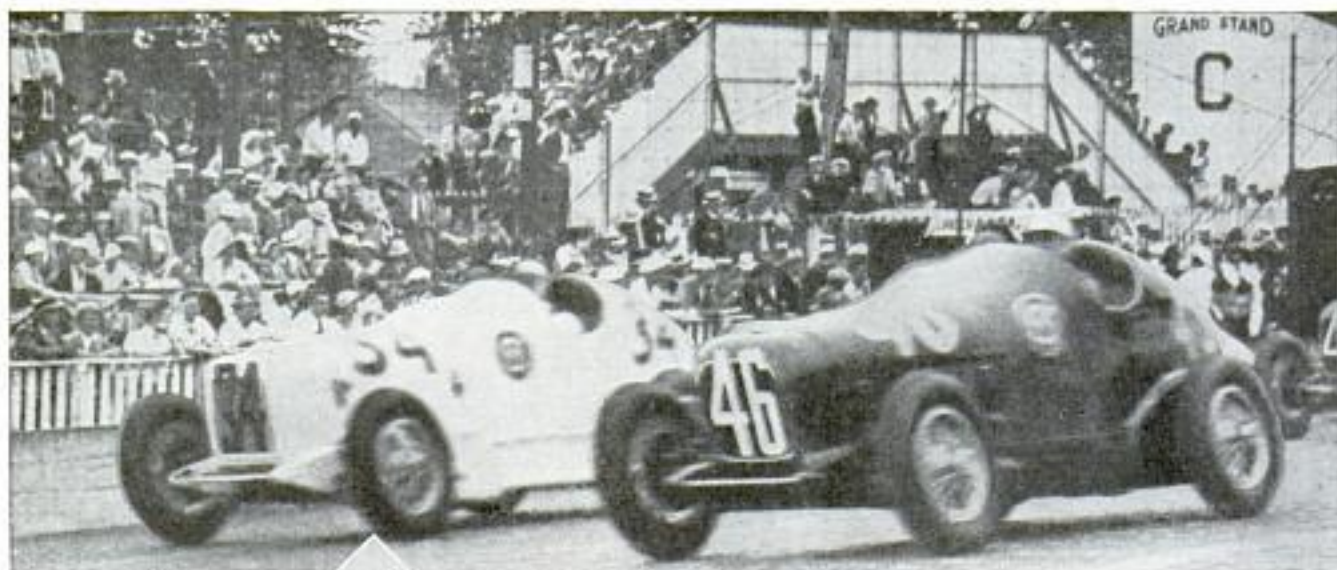
tered with wreckage, which time and again caused officials to hang up the yellow flag which signals the drivers, "Slow down and keep your positions until the track is cleared."

But through all the jamming, these five drivers steadily toolled their mounts. Not

Science rode these little racing cars at Indianapolis. Everything was planned, nothing left to luck or circumstance. For example, engineers prepared charts show-

performance when it is considered that not one of the five cars stopped at the pits for mechanical repair.

Science rode these little racing cars at Indianapolis. Everything was planned, nothing left to luck or circumstance. For example, engineers prepared charts show-



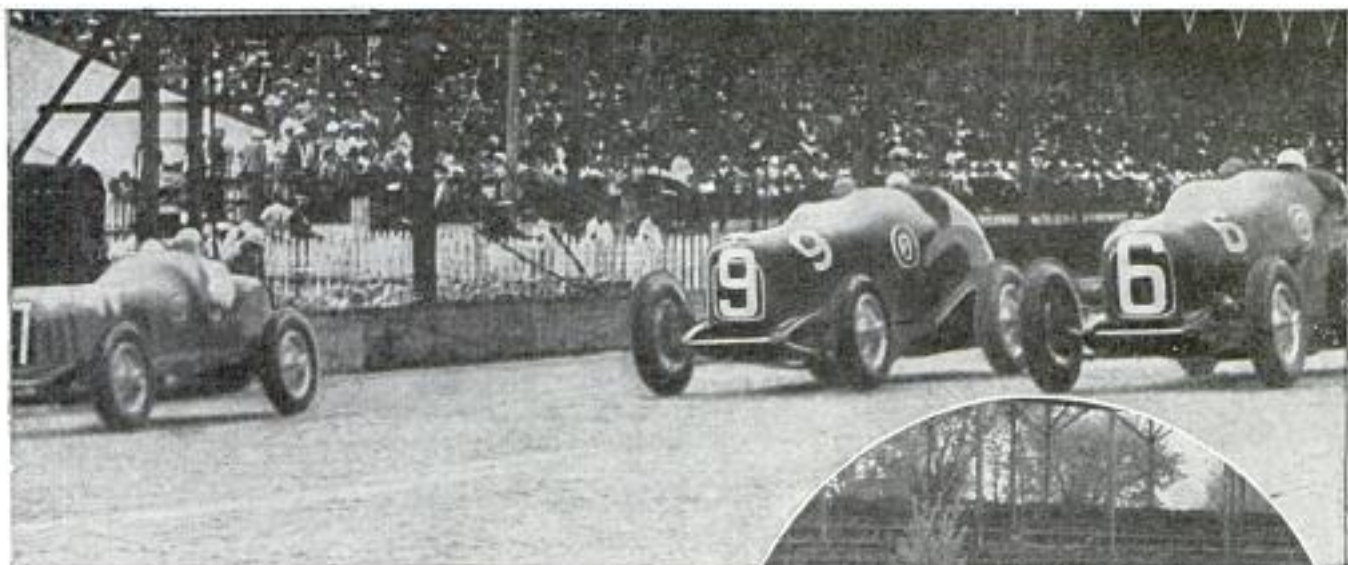
Top, on This and Opposite Page, Passing the Grandstand; Center, What Can Happen on a Turn; Bottom, Spectacular Accident with Car in the Air

ing the actions of the cars while lapping the track at various rates of speed, a most unusual procedure in automobile racing. The drivers could see at a glance just how fast they could go into the curves at various speeds, where to shut off the motor after the mad dashes down the straightaways and just how far up or down on the

track they should ride to get the best out of their cars on each curve.

For months before the race, this team prepared for its job. Engineers went to the University of Michigan with scale models of various types of racing cars. These were submitted to exhaustive tests in wind tunnels and a new type of body with greatly lessened resistance to the wind was developed, resulting in higher speed and greater fuel economy. One interesting fact revealed by these tests was that properly designed disk wheels would reduce wind resistance at that point by thirty-three per cent. However, the cars eventually were equipped with wire wheels because the engineers found that disk wheels interfered with steering at high speed.

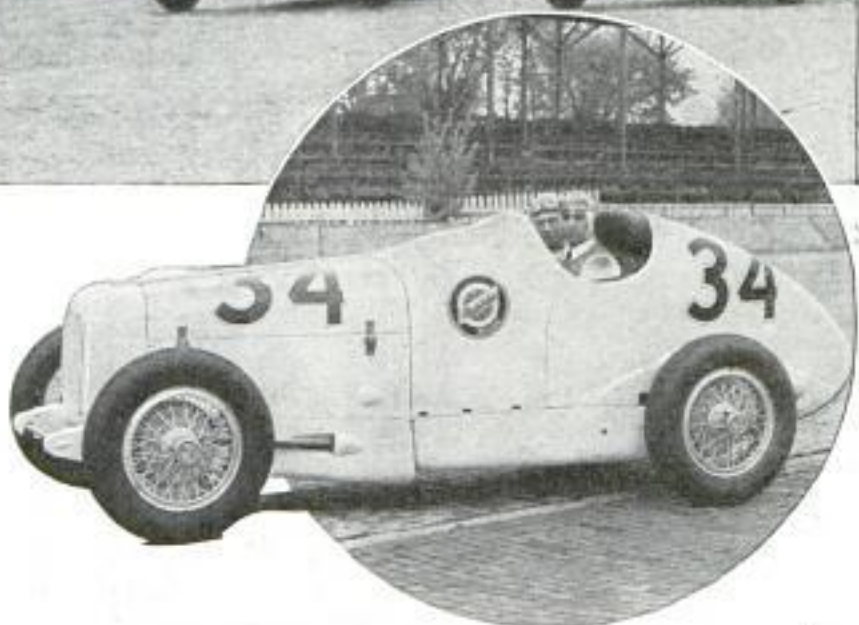
So carefully were the five engines for the team cars groomed for their work that each used only five-eighths of a gallon of oil in the 500 miles, an amazing performance when it is remem-



bered that in other races the cars frequently used three and four times the capacity of their crankcases. Drivers were forced to a minimum oil consumption in the 1933 race by a limitation of six gallons two quarts of oil to each car.

Tests of the five racers before the event to find out how gasoline consumption varied with speed showed some startling results. At 100 miles per hour, the cars averaged 12.5 miles per gallon, the direct result of reducing wind resistance. When the speed was increased to 106, the gasoline mileage decreased to ten miles per gallon, while at 108 miles per hour, the mileage was nine to the gallon. For the race, the best of the five cars averaged 11.8 miles per gallon and the worst, 8.20 miles per gallon.

The "luck of the track" plays an important part in every automobile race. For example, one car at Indianapolis this year lost out when the radiator cap became loosened and slipped off. Another driver's failure was caused by a mistake at the pits, the car being kept on the track without refueling until it stalled more than a mile from its gasoline supply. However, the engineers who designed the five cars and ruled their running in the race felt that, with a few exceptions, these "breaks" could be foreseen and provided against. In other words, their conclusion was that



Circle, Tony Gulotta, Who Drove Fastest Car in Team to Seventh Place, Shown with His Mechanic; Note Streamline Design of the Racer

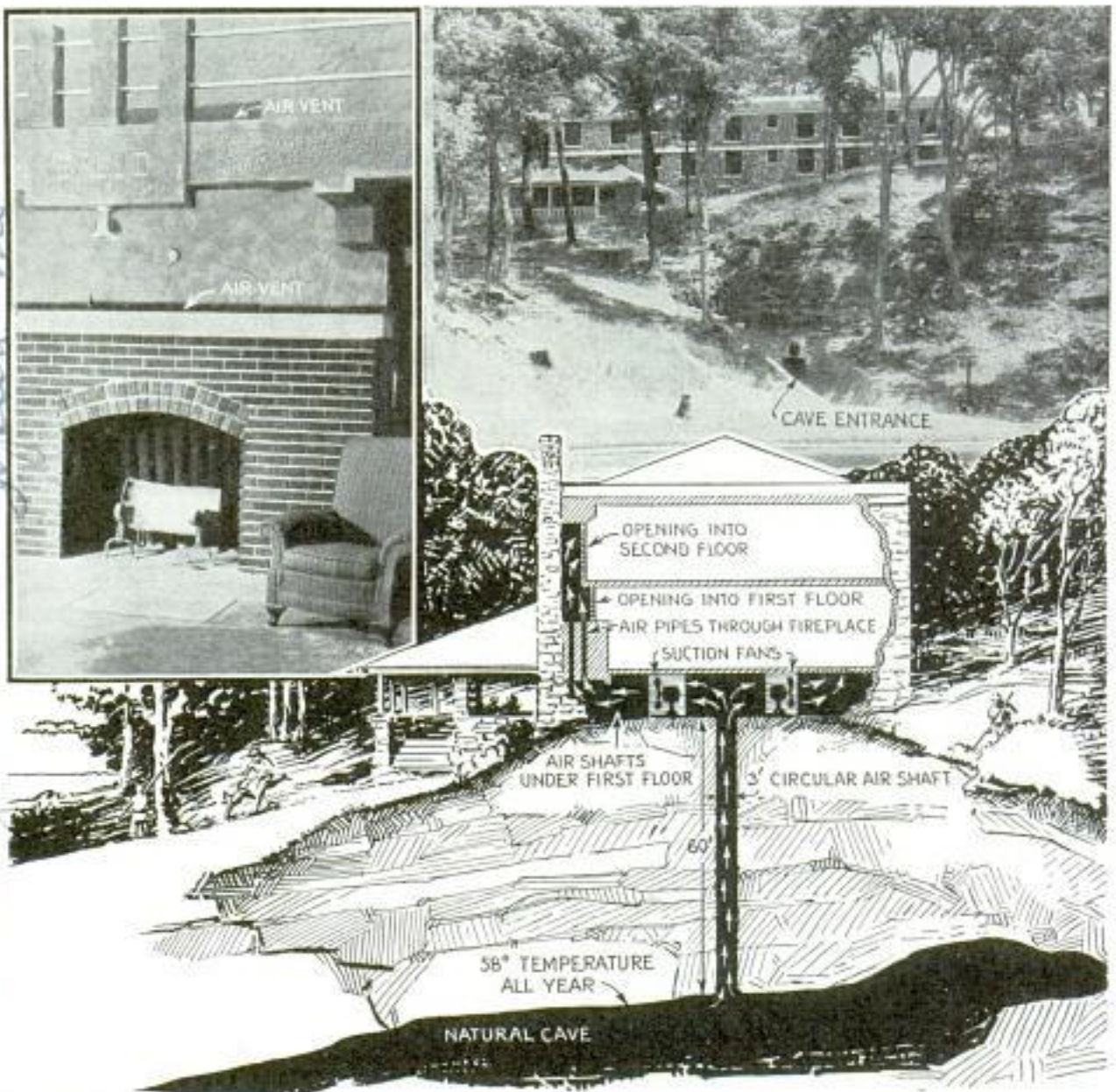
science could lick the mechanical problems, leaving the human element as the only unknown factor. This, too, they tried to conquer by selecting five veteran drivers, men who had piloted entries at Indianapolis for years and who would follow instructions.

The cars were sent to the track. In the field of sixty-three entries, the forty-two fastest were to start, provided there were forty-two able to travel twenty-five miles at more than 100 miles per hour. The five drivers were instructed to qualify between 110 and 115 miles per hour—and they did, early on the morning of the first qualification day. Then, on race day, they stepped into their small speedsters under orders to "bring them all home."

That they did is a matter of record. The fastest averaged 99.071 miles per hour and the slowest 96.527. That means that each car had to exceed 100 miles per hour almost every second that it was on the track.

(Continued to page 122A)

# Air from Cave Cools Hotel Sixty Feet Above



Hotel Cooled in Summer by Air Drawn through a Sixty-Foot Shaft from a Cave, and Diagram Showing Operation of System; Air from the Cave Helps to Warm the Hotel in Winter

Natural air brought through a sixty-foot shaft from a cave is used in cooling a Missouri hotel in summer and in helping to heat it in winter. In the cave is found a natural year-round temperature of fifty-eight degrees Fahrenheit. Connecting the hotel with the cave is a shaft, three feet in diameter, driven through solid rock. At the end of the hotel lobby, a large fireplace is fitted with a double bank of three-inch iron pipes, to which the air tunnel is connected. The front row of pipes terminates in an opening directly over the fireplace, while the rear bank has its outlet

on the balcony directly above. In ordinary summer weather, the natural circulation is sufficient, but on extremely warm days, two suction fans speed up the circulation, holding the temperature to seventy degrees, or lower if desired. For winter use, the air from the cave is warmed as it passes through this pipe bank, which is heated by the fire in the fireplace. An increase of only sixteen to eighteen degrees is sufficient to bring the hotel temperature to a comfortable point of around seventy-five. All guest rooms open directly on the lobby and each is supplied with a

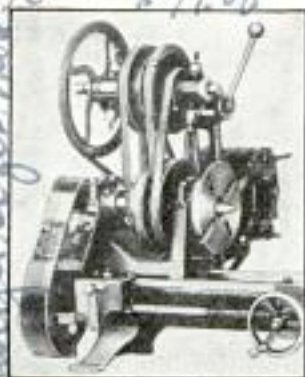
25.  
 Sugar mountain, near Johnson, Mo.  
 managers, Grand Wagon, Johnson, Mo.

ventilator set in the wall near the floor. To complete the circulation, each room has a warm-air outlet near the ceiling to carry away the warm air as it is replaced with cool air. The cave supplying this cool air is more than three miles long. A room measuring thirty by 120 feet is the base of the air shaft extending upward to the hotel.

*c/05*

**SIX-SPEED LATHE HAS A VEE-BELT DRIVE**

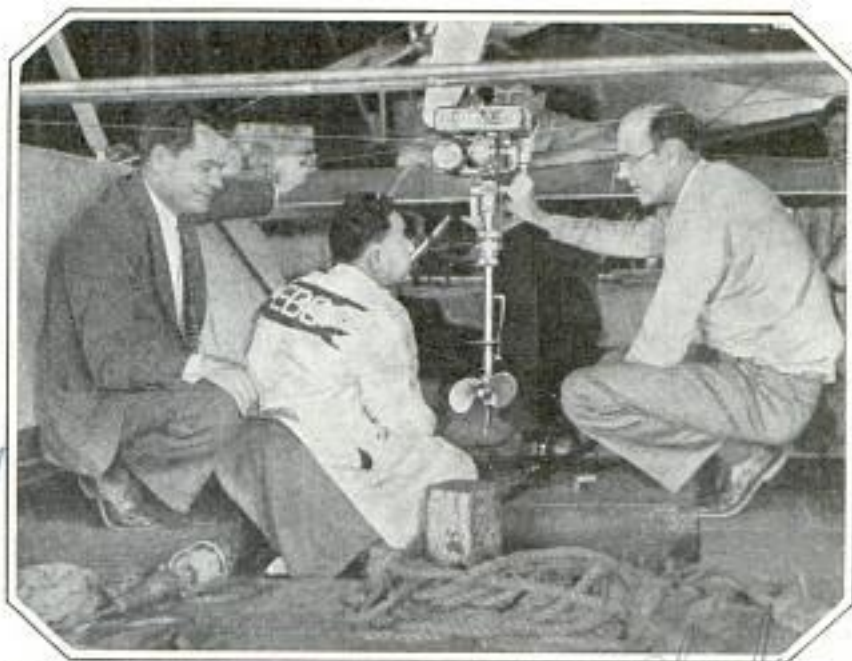
Change of speed is quickly accomplished in operating a bench lathe with a vee-belt drive. All that is necessary is to shift one belt to a new position in three step-cone pulleys. There is a clutch on the countershaft which, when disengaged, puts the drive directly from the motor through these pulleys and thence to the spindle. When the clutch is engaged this drive is compounded by means of the other two belts through speed-reducing pulleys. Therefore there are six speeds for the lathe, three direct and three compounded. The pulleys act like back gears and eliminate chatter as the belt drive is smoother and there is no back lash. The lathe contains more than forty parts cast from a special alloy which has been found to be about twice as strong as cast iron, the material usually used for such parts. It is also lighter in weight and has wearing properties actually superior to steel when run dry, as is the case in a lathe. The tool is entirely self-contained, the countershaft being an integral part of the lathe and mounted above the headstock where it is in view of the operator. The driving motor rests on brackets behind the headstock.



*36 - \$79.00*

*Atlas Press Co. Kalamazoo, Mich*

*Atlas Press Co  
Kalamazoo, Mich*



Outboard Motor Fitted to Pontoon of Colonel Lindbergh's Plane to Aid in Maneuvering the Ship in Crowded Harbors

**OUTBOARD MOTOR FOR PLANE FITS ON PONTON**

Fitted to the pontoon of the monoplane in which Col. Charles A. Lindbergh and Mrs. Lindbergh began a flight to Greenland and Iceland was an outboard motor. In crowded harbors, the motor aids in maneuvering the plane.

**BRAIN OF MAN ADJUSTS BLOOD TO FIT THE WEATHER**

*c/035*

Man's superior brain makes it possible for him to live in a world of extreme kinds of weather and other varying conditions. The highly evolved human brain holds unconscious control of the blood's chemistry and physics, according to Prof. James Barcroft, British physiologist, who points out that the resulting constancy of the blood conditions makes man independent of heat, cold and other changes. In the evolution of life, efforts of the lowest organisms to make themselves more at home in the world were at first aimed merely at so arranging their own lives that outside conditions would be less hard on them. Higher in the evolutionary scale, Professor Barcroft believes that the first steps toward internal changes were chemical. Then control by the nervous system began to assert itself until finally the brain became dominant in maintaining the continuing uniformity of the blood.

*Cambridge  
Univ. Eng.*

*Science News Letter*

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# New CONVENIENCES for



Left, Circular Shower Fixture Which Fits on Rim of Bathtub and Affords a Gentle Spray; Curtains Are Not Necessary and Water Is Not Splashed on the Floor; a Simple Extension Arrangement Permits Fitting the Shower to Any Tub; Below, Kitchen Table with Open Storage and Cupboard Space on All Sides for Cooking Utensils; It Has a Top of Either Chromium or Porcelain



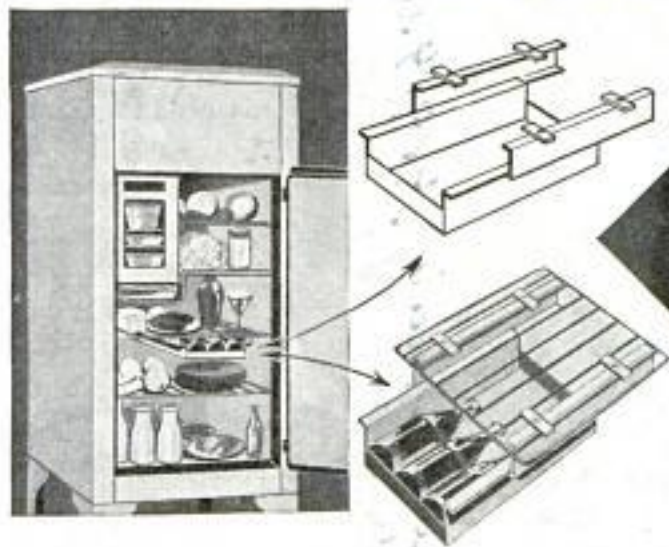
Right, Turning the T-Handle of This Sink Fixture Converts It Instantly from a Stopper for Retaining the Water to a Drainer for Emptying the Sink; the Handle Is Always Below the Level of the Sink and the Fixture Is Mounted in a Strainer Cup; It Can Be Fitted into Any Type of Sink, Replacing the Conventional Fixture in Use



Left, Range-Canopy Ventilator Equipped with a Fan for Forcing Out the Trapped Heat and Cooking Odors; There Is Also a Light under the Canopy Which Provides Indirect Illumination on the Working Surface of the Stove; Above, Baby Harness for the Perambulator; It Is Made of Soft Webbing, Has a Lock, and Is Light, Cool, Comfortable and Washable



# YOUR HOME



Above, Bottle Tray Which Can Be Attached to Under Side of Refrigerator or Shelf and Is Easy to Remove without Disturbing Other Contents of Box; It Is Easy to Install and Can Also Be Used as a Serving Tray; Below, Package of Flour with a Built-In Sifter; the Flour Is Sifted Directly from the Container in Which It Is Purchased through a Fine Screen Rating 25,000 Openings per Square Inch

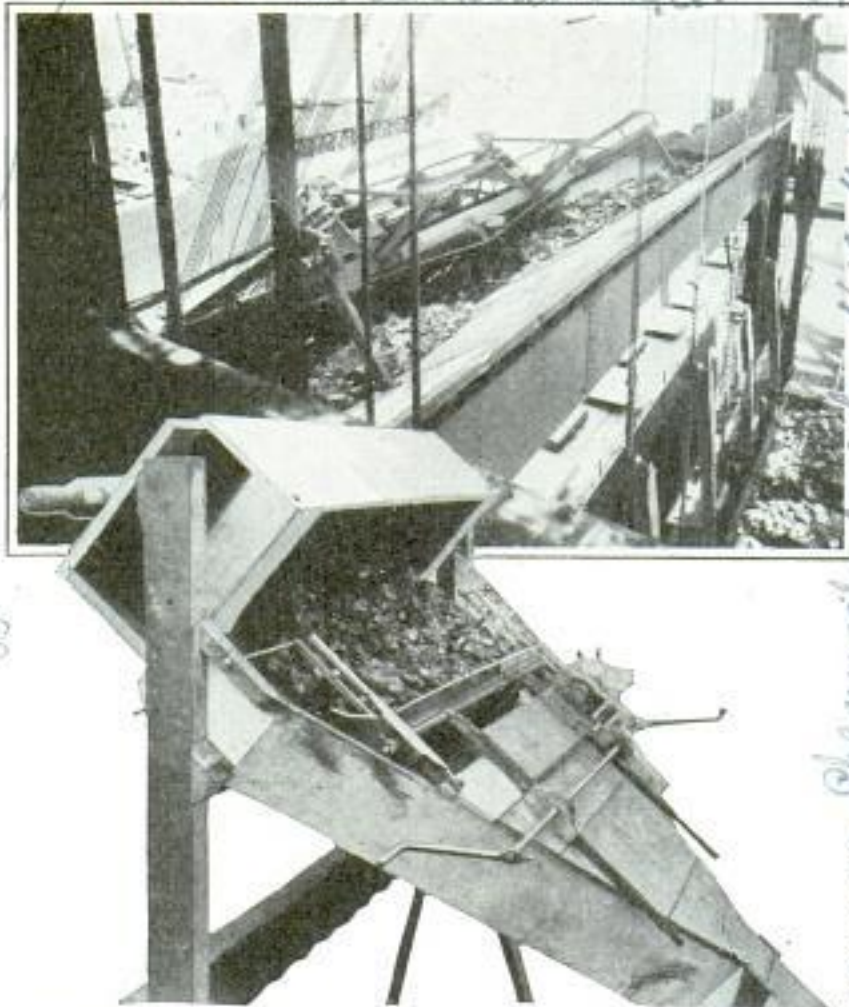


Above, Double-Deck End Table Which Adds a Finishing Touch to the Low Davenport; Center of Page, Combination Electric Toaster and Grill Which Makes Toast and Coffee at Same Time



Right, Beach Chair Which Protects Bather from the Sand, Provides a Back Rest and Possesses a Sunshade





Automatic Retarder Which Loads Coal into Hold of Ship without Breakage; It Can Handle a Full Cargo in About Twenty Minutes

**RETARDER FOR LOADING COAL REDUCES BREAKAGE COSTS**

Fifty per cent of the breakage in loading coal into ships may be eliminated by the use of a retarder that gently lowers the coal into the hold. For years, breakage of coal during the transfer to steamers has been one of the largest items of expense in coal transportation. The automatic retarder is said to save \$2,400 on each large cargo by more efficient and careful handling. Some cargoes may reach 9,000 tons. Placed in the pans of dumpers, the retarder catches the coal as it starts to leave the railroad car, moves slowly down the pan and releases the coal slowly into a telescopic spout leading into the ship's hold. A full cargo can be handled in twenty minutes, compared to twelve hours required for the job in 1893.

☐The wings of a common house fly vibrate 330 times a second.

*Science Service 7/8/33*

clerks J. M. Anderson and J. C. Seymour, 9/8

*Summary: The present practice of whaling is a summary of the present practice of whaling.*

**PLIERS WITH SCREWDRIVER IN HANDY TOOL**

Combining the pliers with the screwdriver, a new five-in-one tool has a wide variety of uses in the home and repair shop. The screwdriver is operated by turning the screw until the edged end projects beyond the jaws of the pliers. Closing the jaws firmly then provides a "handle" for the screwdriver. Reversing the process leaves the pliers free for the usual uses.



*454-54 11 11*

*4. no. liquid?*

*1000, 454-54 11 11*

**WHALE MAY SOON BE DESTROYED**

Extermination of the whale is threatened, Dr. Lewis Radcliffe, of the United States bureau of fisheries, warns in pointing out that the international treaty to save this 1,000-year-old industry has not been sanctioned by a sufficient number of countries to make it effective. More complete utilization of all parts of the whale is urged by Doctor Radcliffe, such restrictions resulting in slowing down oil production, reducing the number of whales killed and increasing the production of whale meat. At some of the Pacific coast stations in 1932, a catch of only 269 whales resulted in production of 609,663 gallons of oil, 722 tons of guano and 323 tons of bone meal, an average of 3.8 tons of dried products per whale. Doctor Radcliffe points out that, aside from the extraction of oil, not more than ten per cent of other available products of the whale fisheries of the world is now utilized.

**SURPLUS WOOL IS USED  
AS SURFACE BINDER  
FOR ROADS**

Experiments in the use of low-grade wool for binding surfaces in highway construction are being conducted in Australia to develop a possible market for wool of this grade. In this new method of road building, the low-grade greasy wool is spread over the road about three inches deep. The wool is then covered with two inches of soil to form the running surface. In some instances, another layer of wool and dirt is placed over this. A short section of highway prepared in this way lies in a black-soil region impassable in wet weather, but the wool road has proved satisfactory even during the rainy season.

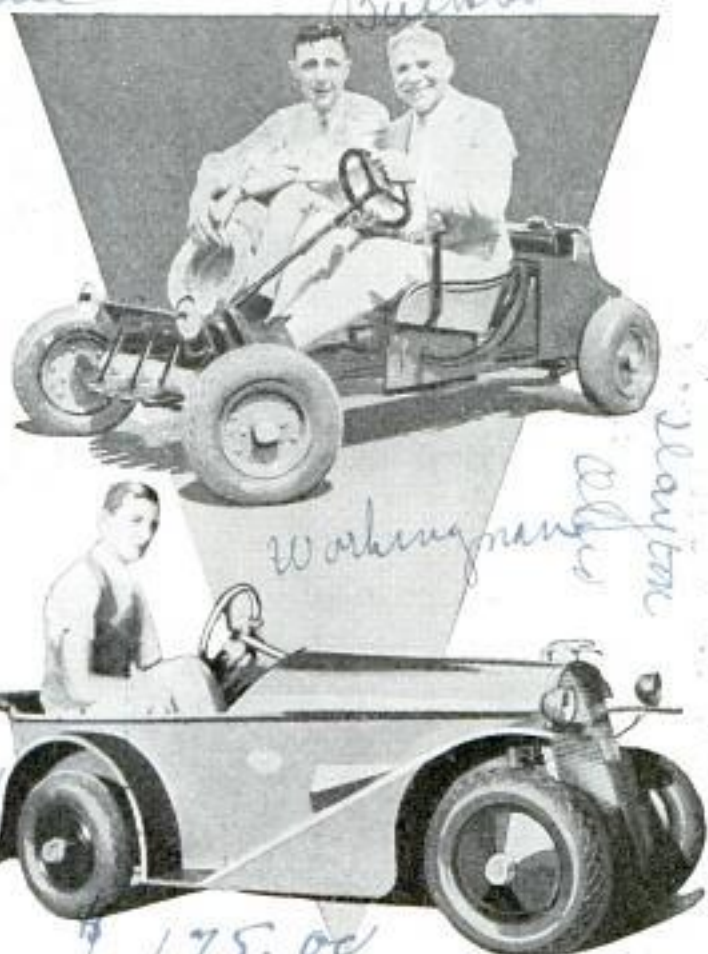
**BOAT ON ROOF OF GARAGE  
LOWERED WITH TACKLE**

Because he had no other space available, a Pennsylvania man built a thirty-three-foot cabin cruiser on the roof of his garage. A picture of the boat in a recent issue caused many readers to inquire how he got it down after the craft was built. The photo supplies the answer. The cruiser was rolled onto a platform and lowered with block and tackle onto a truck.

Lowering Cabin Cruiser to Truck from Roof Where It Was Built



*Ernest Purving  
Harborth Pa*



Here Are Two Types of American Baby Auto Introduced for Cheap Transportation; It Has a One-Cylinder Engine

**ONE-HORSEPOWER BABY AUTO  
CONTROLLED BY A LEVER**

Controlled by a single lever, a small automobile in the American market has a one-horsepower gasoline engine. The car makes twenty-five miles per hour, with a mileage of sixty to the gallon of gas. The transmission has two speeds forward and one reverse. There are no foot pedals. The weight is slightly more than 300 pounds. Two persons may ride in the car, which is offered as an economical means of transportation for the worker or for the man who wishes to leave a large auto at home.

CA Brooklyn bakery is using radio-wave heat to bake crustless bread.

*Science Service*

*Suppl. Comm. 6/26/33*

*993*

*Buckhead*

*The water is probably 1/4 inch of water in it*

*C/050*

*196*

*175.00*

*Working man*

*Leather*

# First "Sky-Train" of Plane and Gliders Tested



Artist's Idea of the "Sky Train" with Its Plane "Locomotive"; Inset, One of the Glider "Cars"

One of aviation's dreams, an aerial express train, came a step nearer realization when an airplane towed three motorless gliders in an hour's test flight on the Pacific coast. Subsequent flights have been successful. On the first test, the three gliders were lined up behind the cabin plane. A metal towing ring on the tail of the plane carried three 200-foot rope lines, each line hooked on the nose of a glider. The motorless ships were wing to wing behind the towing craft as the "train"

sped down the runway and gained flying speed through the power of the plane's single engine. Once in the air, the gliders spread out in a fan-shape formation. When the "sky train" stopped, the gliders cut loose, one at a time, and came to earth under the control of their pilots. One pilot caught an up-draft of wind and climbed to 1,200 feet to soar for fifteen minutes before landing his glider.

☐ Inquiries as to makers of articles described in Popular Mechanics, will be answered by our Bureau of Information upon receipt of return postage.

Warren

CLAY TREATMENT FOR WATER REMOVES IMPURITIES

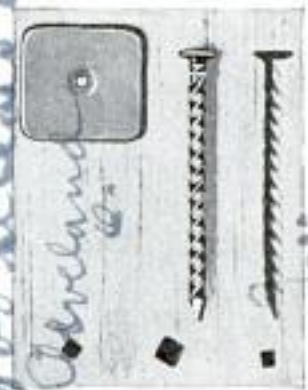
Fuller's earth, a clay mined in large quantities in Georgia and Florida, is being used to purify municipal water supplies by removing taste and odor-producing substances. When fuller's earth is added to water, it absorbs most of the protein material and bacteria, requiring less chlorine and other chemicals to complete the treatment and resulting in a large saving. Used after a chlorinating treatment of water, the capacity of this clay to take up excess chlorine accomplishes more effective sterilization and reduces bacterial formations and filters to a minimum. It imparts no chemical characteristics to the water. The clay is usually added to the water at the intake well for better mixing and a longer period of contact.

Chester Water Service Co.

SQUARE HOLE IS MADE BY NAIL WITH GROOVED SHAPE

Resembling a screw, a new grooved nail makes a square hole when driven. The nail has four separate grooves running from end to end, the result of twisting a square piece of steel into an apparently round, evenly grooved shape with a four-sided tapered tip. When the nail is driven,

it turns enough to compensate for the twist and each side sinks straight down. Since the round nail is sunk in a square hole, which has sides measuring less than the diameter of the nail, it is held in a viselike grip. The screw-



like penetration has the effect of a drill, making it easy to drive into dense materials, including some forms of concrete.

FOOTBALL STAND IS WARMED BY ELECTRIC HEATERS

Electric radiant heaters have been installed in the grandstand of an English football club to keep crowds warm. Heat emitted by these units is largely absorbed by the spectators because the air is trans-



Electric Heaters Are Shown Suspended from Roof in Novel Method of Warming Grandstand

parent to radiant rays. This method cannot entirely nullify the effects of a really cold wind blowing directly into the stands, but it is expected to increase the spectators' comfort. Chances of success in heating all sections of the stands are considered much greater than those of heating merely a small part, as has been done up to now. The electrical load required to warm 20,000 people would be heavy, but heat would be needed for only two hours in the week and then at a time when the use of current is at a low point.

FOOTREST IS SELF-ADJUSTING TO PREVENT FATIGUE

Self-adjusting so that the user may sit and work without the feet becoming numb or tired, a new footrest is being offered for home, hospital and school. A special model is made that is convenient for use in the automobile.



clay on process - Remind  
Hillwood & Co. Inc. 1117  
Cleveland Co.

From Heating and Ventilating April 1933

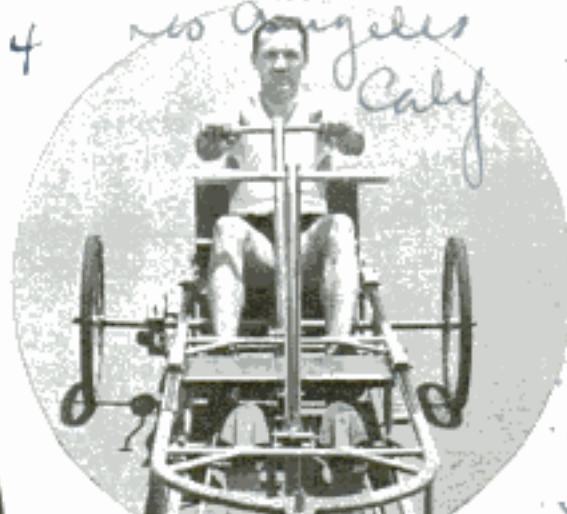
Terranti Ltd. Hollywood, Eng

Roseth & Stahl  
517-518

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*Dr. Paul A. Benedict* Not in market  
*4806 Franklin Ave. Los Angeles Calif*  
*994*



Pedaling This Vehicle About Gives the Operator Plenty of Exercise; It Has the Effect of a Racing Shell

**FOOT-DRIVEN EXERCISE CYCLE WORKS LIKE RACING SHELL**

Working something like the racing shell, a new exercise machine is mounted on four wheels. It is propelled by foot, with a cable running to the center of the rear axle. A free-wheeling arrangement permits coasting, while a brake drum is provided for emergency stopping. The machine is made of airplane tubing. Its seat moves on rollers in racing-shell style.

**THIRSTY BRICKS DRINK WATER AND PREVENT LEAKY WALLS**

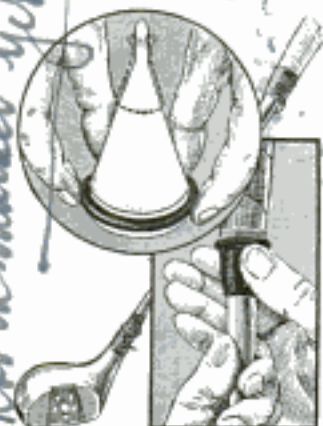
To avoid leaky walls in brick buildings, use absorbent or "soaky" brick and make the mortar joints thin. These recommendations are made by Prof. W. C. Voss of the Massachusetts Institute of Technology. The brick should be able to absorb from five to ten per cent of its weight in water in two days, and most of the absorption should take place in the first ten minutes. The ability of brick to "drink" water insures good bonding with the mortar, making the wall virtually one solid piece. There should be some lime in the mortar to insure this action.

**SAFETY GASOLINE MADE BY FIREPROOFING**

Considerable reduction in fire hazard is claimed for a new safety fuel for automobiles, motorboats and airplanes. While not entirely a "fireproof gasoline," the fuel will not ignite or explode when a lighted match is thrown into it or passed over it. Vapors given off by the fuel will not burn or explode. Fumes from ordinary gasoline burn and explode at about sixty degrees, while the fumes from the new fuel will not ignite at temperatures below 110 degrees Fahrenheit. Another feature is that engine-power output is said to be increased fifteen to eighteen per cent. Certain changes in motors will be necessary, of course, since the fuel is so high in anti-knock value that much higher compression is used. Carburetor adjustments and heating of the intake manifold to insure vaporization of the fireproof gasoline also will be required. At present, the safety fuel is higher in cost than the most expensive gasolines. Perhaps the fuel will be in greatest demand in the aviation industry, where fire hazard is comparatively high.

**GOLF-CLUB FERRULE OF RUBBER COVERS STRING WINDINGS**

String windings on the golf club can be protected or replaced with a rubber ferrule that is easy to apply. Shafts and leather grips rarely need attention, but the string windings at the bottom of the leather wrapping and where the wood club joins the shaft often require renewal on account of rotting and cutting. The rubber ferrule is a permanent and weatherproof protection for good windings or a replacement for windings in poor condition.



*Vertical handwritten notes on the left margin.*

*Not in market*

*992*  
*542*  
*54*

*Cambridge, Mass*

*Copyrighted material*  
*54*  
*Eric*  
*John A.*



# HOME MECHANICS



by  
Thomas E Stimson, Jr.

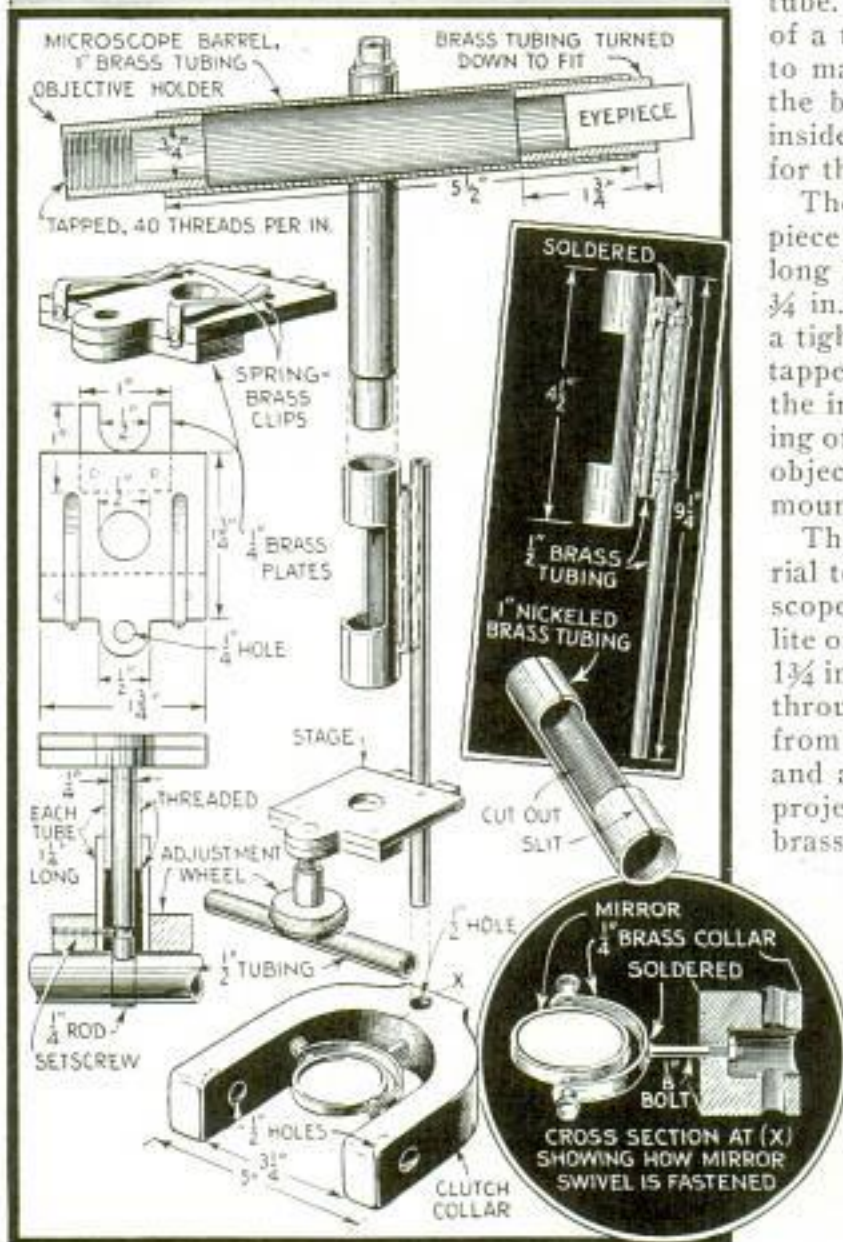
**F**EW hobbies are so interesting and instructive as the microscope, through which bacteria, yeast cells and water algae may be examined. Bacteriologists, assayers, and detectives all depend upon the microscope as one of their chief instruments. Exclusive of the lenses, a microscope frame may be built for less than a dollar if you have access to a small metal-working lathe. A few odds and ends of small pipe and an automobile clutch collar are the chief parts needed.

A heavy auto clutch collar, 5 in. across the jaws, makes an ideal base. Drill a  $\frac{1}{2}$ -in. hole vertically in the center of the collar at a point equidistant from the ends of the jaws. Drill a  $\frac{1}{8}$ -in. hole into the side of the collar, also at its center point. Get a small mirror about an inch in diameter

from a vanity case and swing it on pins from a collar made of a strip of  $\frac{1}{4}$ -in. brass. Thread one end of a  $\frac{1}{8}$ -in. nail, and solder the other end to the collar that holds the mirror. The nail fits into the small hole of the clutch collar and is fastened with a nut, allowing the mirror to swing in any direction. The mirror is used to gather and reflect light to the stage that is to be placed above it.

The upright arm that holds the microscope barrel is a  $9\frac{1}{4}$ -in. length of  $\frac{1}{2}$ -in. outside diameter brass pipe. Drill  $\frac{3}{16}$ -in. holes through it  $\frac{3}{4}$  in. and  $3\frac{1}{2}$  in. from one end. Fasten a  $3\frac{1}{2}$ -in. length of the same stock to the pipe with  $\frac{3}{16}$ -in. machine screws, soldering along the sides for solidity. Then take a  $4\frac{1}{2}$ -in. length of 1-in. nickered brass pipe and cut out a

Walle Inskel, Astoria Co. Copyrighted material  
872 Hudson, Rochester, N.Y.



trough with a hacksaw, leaving a 1-in. section of the round pipe at each end. The ends are slit with a hacksaw cut. File and smooth the edges and solder the cut-out pipe to the intermediate member of the upright arm. The cut-out pipe will make a tension-sliding adjustment for the microscope barrel that will fit inside it.

The barrel consists of a  $5\frac{1}{2}$ -in. length of the same 1-in. stock. It should be painted dull black inside. The eyepiece of the microscope, which may be the eyepiece from any good binocular or field glass, fits into one end of the barrel by means of an intermediate tube. Machine down the outside of a thick brass pipe  $1\frac{3}{4}$  in. long to make a tight, sliding fit inside the barrel, and machine out the inside to make a tight, sliding fit for the eyepiece holder.

The objective holder is another piece of heavy brass tube  $1\frac{1}{2}$  in. long having an inside diameter of  $\frac{3}{4}$  in. It is turned down to make a tight fit inside the barrel, and is tapped inside with 40 threads to the inch. This will fit the threading of any standard objective. The objective consists of three lenses mounted in a small brass cell.

The stage, on which the material to be examined by the microscope is placed, consists of a bakelite or brass plate  $2\frac{1}{4}$  in. long and  $1\frac{3}{4}$  in. wide. A  $\frac{1}{2}$  in. hole is bored through its center to allow light from the mirror to shine through, and a  $\frac{1}{4}$ -in. hole is bored in the projecting neck at one end. Two brass fittings are fastened to the

underside of the stage with No. 6-32 machine screws. One of these is a U-shaped brass collar of  $\frac{1}{4}$ -in. stock for sliding on the upright arm, and the other is a stage holder of the same stock that is to be supported by the fine-adjustment mechanism. Springs to hold the glass slides in place above the



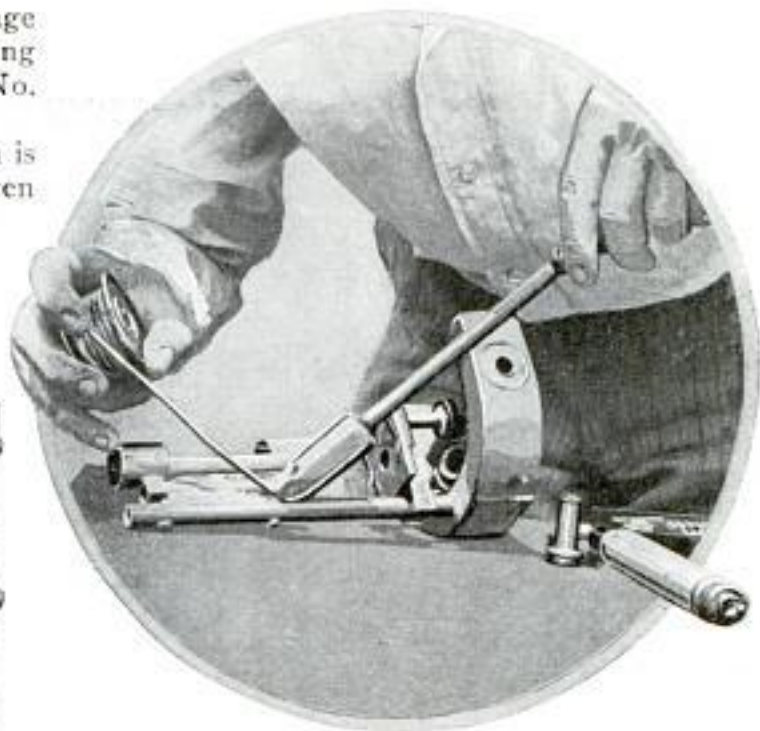
light hole in the center of the stage consist of 1-in. lengths of spring brass, fastened to the stage with No. 4-40 machine screws.

The fine-adjustment mechanism is built up on a  $\frac{1}{2}$ -in. brass tube driven through existing holes in the arms of the clutch collar. Drill a  $\frac{1}{4}$ -in. hole vertically through the center of this tube and solder into it a  $2\frac{1}{2}$ -in. length of brass rod. A small groove is cut into the rod  $\frac{1}{4}$  in. above the point where it enters the tube. The rod must be absolutely vertical. Put a fine thread, at least 36 threads to the inch, on the outside of a  $1\frac{1}{4}$ -in. brass tube having a  $\frac{1}{4}$ -in. inside



diameter. One end of this tube is soldered into the hole of the brass field holder. Now, mount a bakelite adjustment wheel on one end of another  $1\frac{1}{4}$ -in. brass tube that is tapped inside to fit the exterior threads of the other tube. The wheel and tube are pushed down on the brass-rod upright rising from the cross-tube between the arms of the clutch collar, and are prevented from rising by a setscrew running through the wheel and seating in the groove on the solid brass rod. The field assembly is put in place and is moved down to its proper position by turning the adjustment wheel. The whole success of the microscope depends upon keeping the mirror, stage, objective and eyepiece in perfect vertical alignment, and to insure this, all upright members must be absolutely vertical.

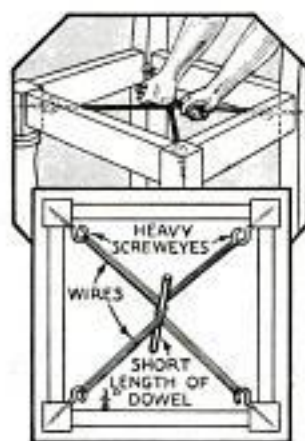
Slide glasses consist of cleaned-up photographic plates cut to  $2\frac{1}{4}$  by  $\frac{3}{4}$ -in. size. In use, the rough adjustment of the microscope barrel is obtained by twisting the barrel up and down inside its clips, and



the final adjustment is made with the adjustment wheel under the stage. The mirror should be adjusted so that it throws light through the hole in the stage to the material that is being studied. As a rule, the more light that can be placed on the material, the better will be the image that is obtained.

### Quick Method of Bracing Chairs

Dining-room chairs that have become rickety through long use can be braced in the simple manner shown. First remove the seat from the chair frame. If this was originally fitted with diagonal corner



braces, they should also be taken out. Drill holes in the legs to take heavy screweyes and run wires through them, twisting the wires together by means of a short dowel rod as shown. This tightens the joints of the frame and makes the chair rigid. The dowel rod is left in place under the seat to prevent slackening of the twisted wires and to tighten them whenever necessary.



Marking Device and Plumb Bob Used to Lay Off Holes for Installing Vertical Pipe

### Floor Holes Lined Up for Installing Vertical Pipe in Building

By using a plumb bob and this marking device, or template, it is a simple matter to lay out holes through upper floors of a building so that they will be in line to take a vertical pipe. The template is a wood disk  $\frac{1}{2}$  in. larger than the pipe to be used, with two scratch pins set in  $\frac{1}{2}$  in. from opposite edges. A third and longer pin in the center serves as a pivot. In use, the first hole is cut in the top floor, after which the plumb bob is suspended from its center to the next floor below. The template is then set on the floor with its centering pin directly under the point of the bob, and the next hole is laid out by turning the disk. By repeating this operation for the remaining floors, all the holes will be in line vertically.

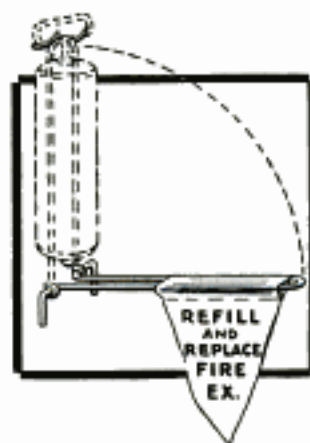
### Washing Soiled Books

Dealers in secondhand books have a method of cleaning soiled cloth bindings by using only plain water. A cloth is moistened in water and is rubbed gently over the book, care being taken not to touch the title or any other part that may be of a different color. This dissolves some of the paste pigment in the cover and spreads it out, exposing new surfaces.

Do not wipe the cover with a dry rag, but leave the wet film of pigment paste to dry undisturbed. The cut edges of the book are usually cleaned with an art-gum eraser, using a whisk broom to remove any particles that may have gotten between the leaves. A more thorough method is to use very fine pumice, and if the covers are pressed tightly together, no brushing will be necessary.—L. Bresnich, Bronx, N. Y.

### This Automatic Signal Reminds One to Refill Fire Extinguisher

In confusion usually following a fire it often happens that fire extinguishers are forgotten and not refilled and replaced in their hangers promptly. To avoid this, the signal shown will be found an effective reminder as it drops down when the extinguisher is removed from the bracket and remains projected at right angles to the wall until the extinguisher is replaced. The flag is red cloth lettered in black, and the support, iron rod.



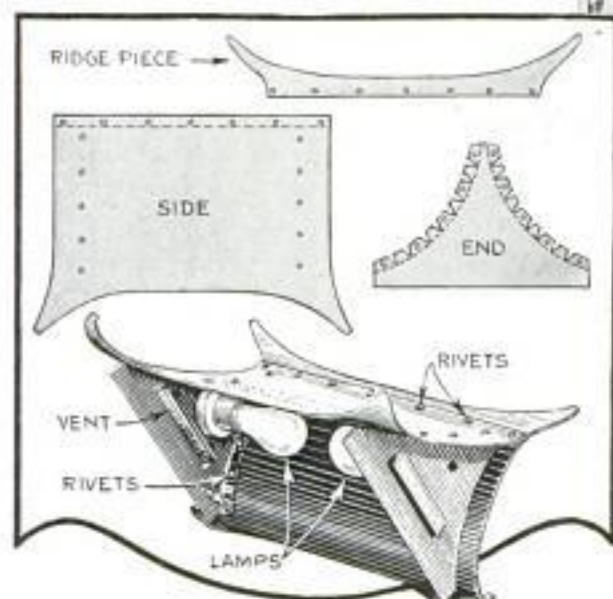
### Hot-Water Bag Used as Cold Pack

A cold pack that is not lumpy like an ice pack can be had by filling a hot-water bag with a chilled solution consisting of 1 part of glycerine and 5 parts of water. This can be cooled in an electric refrigerator and then poured into the bag as the solution will only freeze to a slushy consistency. If the mouth of the bag is not large enough to permit the slush to be poured into it, the solution can be frozen in the bag by placing it in the ice compartment of the refrigerator.—G. C. Douglas, Charlotte, N. C.



## Lamps Inside Copper Cover Heat Aquarium

This hammered-copper aquarium cover and heater is made of No. 22-gauge sheet copper or brass, and is intended for use on aquariums containing tropical fish. As these fish do not require as much air as other kinds of fish, the small vents at the ends of the top will allow sufficient air to circulate. It is a good idea to first make a cover of cardboard, the parts of which are then used as patterns. The hammered finish on the copper is done by means of a ball-peen hammer. As copper becomes brittle when hammered, it should be annealed frequently to prevent it from breaking. This can be done by heating



it to a cherry red and then plunging it into a pail of cold water. Porcelain lamp sockets mounted on the inside of the end pieces hold electric lamps, with which the



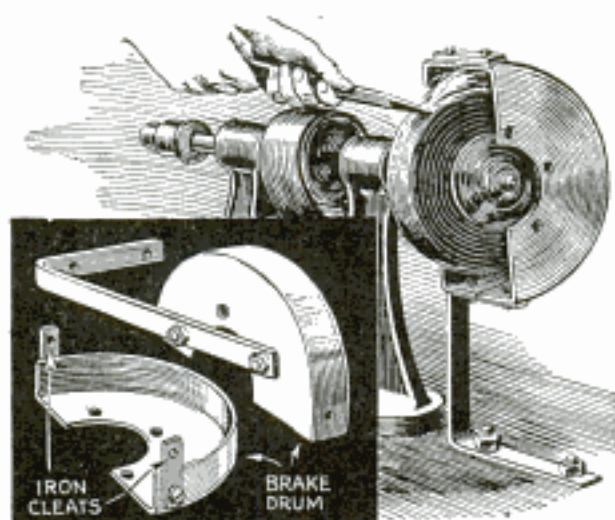
aquarium is heated. A little experimenting will be necessary to determine the size of lamps to use. After filing the edges smooth, the cover is ready for coloring. This is done by moistening a cloth, rubbing it on a piece of liver of sulphur and then rubbing it over the copper. Colors varying from a reddish brown to a black can be produced in this way. The high spots are then burnished with fine emery cloth, after which a thin coat of transparent metal lacquer is applied to keep the bright spots from tarnishing. Oxygenating plants should be kept in the aquarium to provide oxygen for the fish.

### Uses for Brick Dust

By crushing pieces of old brick into fine dust you have a material that is useful for numerous purposes, one of which is acid-proofing chemists' table tops. To do this, melt together wood tar, 6 parts, and resin, 12 parts, stir in brick dust, 8 lb., and then apply the mixture to the table with a brush. Another use for brick dust is in the preparation of a cement for holding tools such as knives, files and chisels, in their handles. To make the cement, melt

together resin, 5 parts, beeswax, 1 part, and stir in enough brick dust to make a fairly stiff plastic. Press this into the hole in the handle, and drive the tool into place. The cement, of course, should be allowed to set before using the tool.—John E. Hyler, Peoria, Ill.

☛ A small V-shaped notch cut in one jaw of a vise,  $\frac{1}{8}$  in. deep, will have many uses and will not be objectionable for other work; it gives a three-point bearing on work held vertically.



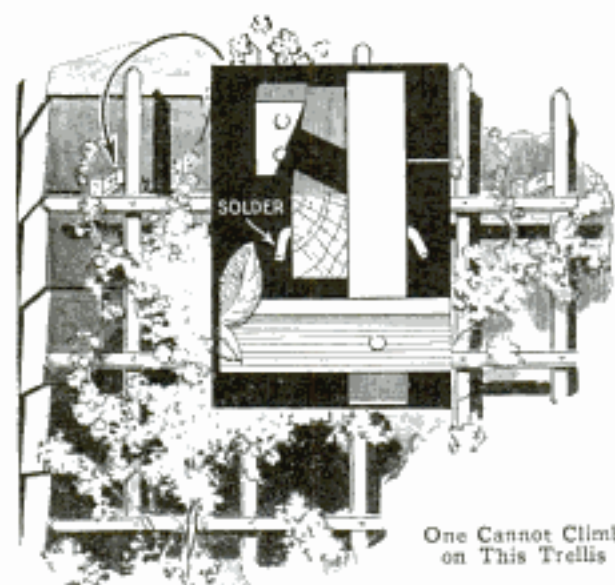
Auto Brake Drum Sawed in Two and Fastened Together Makes Guard for Grinding Wheel

### Grinding-Wheel Guard from Brake Drum

An old brake drum from a car can be used as a guard for a grinding wheel. The drum is sawed in two in the center, after which the two halves are fastened together by means of two metal cleats and cap screws. This arrangement makes it convenient to remove one side of the guard to change wheels. The assembly is then fastened to a bracket, which is in turn bolted to the grinder table.—E. H. Barton, Cicero, Ill.

### Burglars Kept from Entering House by Climbing Rose Trellis

To keep a burglar from using your rose trellis to gain access to an upstairs window or the porch roof of your home, the following method can be used: Instead of



One Cannot Climb on This Trellis

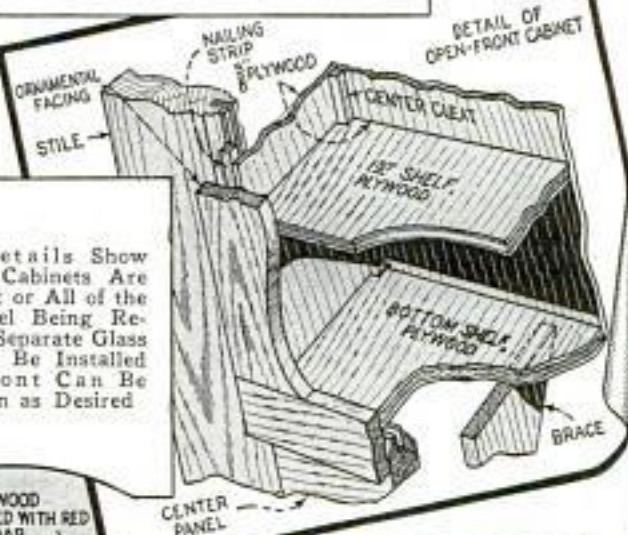
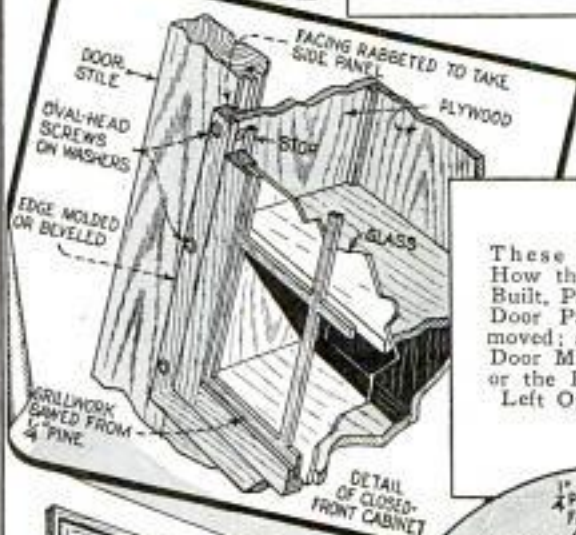
nailing the trellis to the house wall, attach it to the brackets by means of short pieces of wire solder run through holes drilled through the brackets and the trellis frame. The solder is strong enough to hold the parts of the trellis together normally, but lets loose the moment someone attempts to climb on it.

### Building Cabinets in Closet Doors

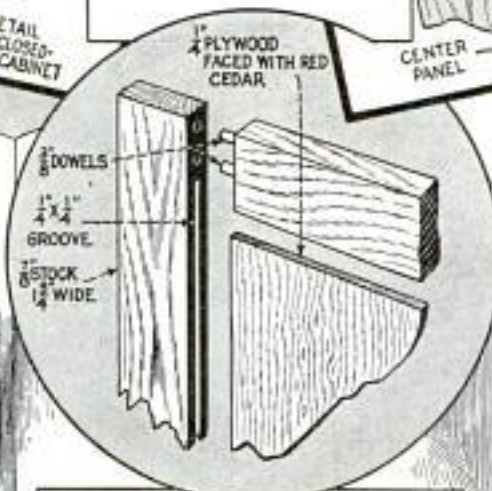
The illustrations on the opposite page show cabinets that can be built in practically any ordinary door. First saw the panel out of the door frame. The door is removed from the hinges, laid on a pair of sawhorses, and holes are bored at the corners of the panel for insertion of a keyhole saw. After the panel has been removed the stock remaining in the grooves can be cut down flush with the inner molded edges of the frame by means of a small block or nose plane. Next, facing strips are ripped from  $\frac{1}{8}$ -in. stock to a width of 2 in. with one edge molded or beveled, and the other edge rabbeted  $\frac{3}{8}$  by  $\frac{7}{16}$  in. These are mitered to length and either nailed or screwed to the door frame with the inner edge of the rabbet flush with the molded edge of the door stile and rail. This rabbet takes the edge of the panel which forms the side of the cabinet. A  $\frac{3}{4}$  by  $\frac{3}{4}$ -in. cleat is screwed to the side panel, one edge of the cleat  $\frac{3}{8}$  in. in from the back edge of the side panel. This forms a backing piece for the back panel to which it may be fastened with small screws. The cabinets should not be more than 9 in. deep or they will interfere with closing the door. A glass door for the cabinet may be fitted with a grill cut from  $\frac{1}{4}$ -in. plywood. The grill fits in the door-frame rabbets and is set in front of the glass, which is held in place by means of triangular strips fastened to the frame with brads. The door frame may be joined with either mortise-and-tenon or doweled joints. The stock for the stiles and rails should be  $1\frac{1}{8}$  in. thick and ripped  $1\frac{3}{4}$  in. wide excepting the bottom rail, which may be  $2\frac{1}{2}$  in. wide. The door is hung on butt hinges, fitted with a suitable latch, and closes against a stop as shown in the detail, Fig. 5. It will be noted that the door frame is rectangular and that the arch is cut in the grill.

# USEFUL CABINETS *built in your* CLOSET DOORS

Novel and Attractive Door Cabinets Do Not Interfere with the Use of the Door and Yet Provide Additional Storage Space for Books, China and Other Items

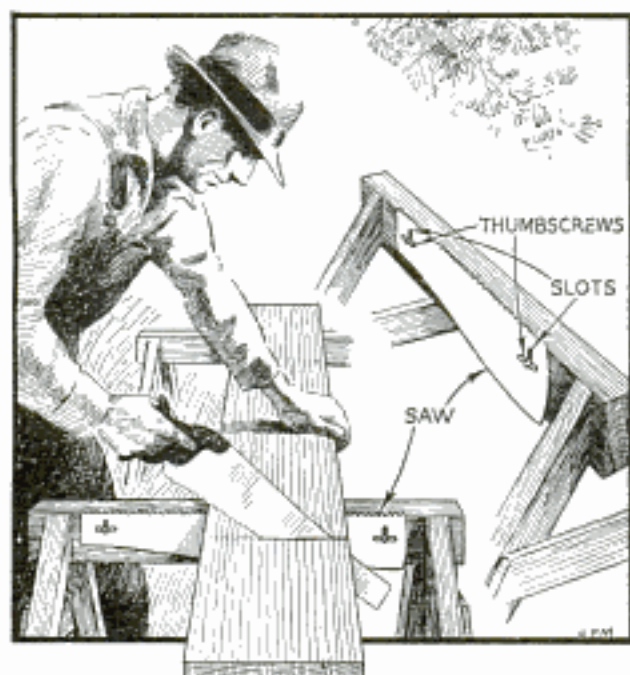


These Details Show How the Cabinets Are Built, Part or All of the Door Panel Being Removed; a Separate Glass Door May Be Installed or the Front Can Be Left Open as Desired



The Circular Detail Above Shows the Method of Making Up Cabinet-Door Frames, Dowels and Glue Being Used at the Corner Joints; for Displaying Models, a Plate-Glass Door Panel and a Light in the Cabinet Are Advised





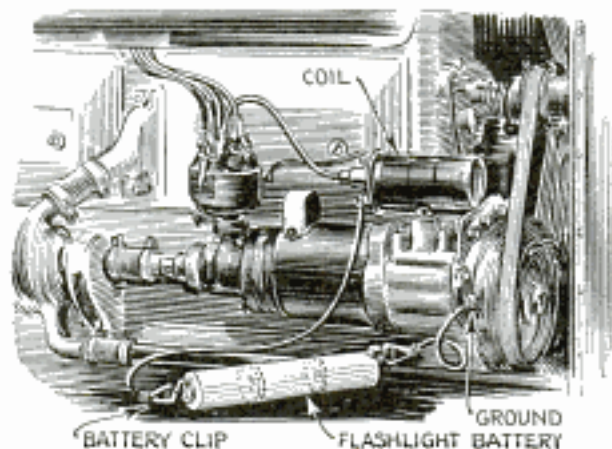
Screwed to Side of Sawhorse, Old Crosscut Saw Blade Holds Lumber While Sawing It

### Old Saw Blade Provides Lumber Grip on Sawhorse

An old saw blade, screwed to the side of a sawhorse so that the teeth project a little above the top edge of the crossmember, makes a good grip for holding boards. Thumbscrews on bolts that fit slots cut in the blade hold the saw on the horse and permit quick removal.

### Flashlight Battery Used for Ignition

On a picnic I forgot to turn off the ignition switch of my car, which resulted in leaving us stalled with a discharged battery several miles from a garage. I wired a flashlight battery to the ignition coil, connecting the center terminal to the



Wired to Ignition Coil, Flashlight Battery Operates Car Until Dead Battery Is Charged

"live" terminal of the coil and grounding the battery case. With this arrangement, the motor was started by means of the crank, and after driving a few miles, the car battery was charged enough to permit the flashlight battery to be removed.—A. H. Waychoff, Phoenix, Ariz.

### Treating Canvas for Mildew

Canvas curtains, awnings and tents, when rolled up while damp, are likely to mildew if they have not been previously treated. To treat the canvas, dissolve soap in water in the proportions of  $\frac{1}{4}$  lb. to each gallon of water, and saturate the canvas with the solution. When thoroughly wet, wring out the excess solution by hand, shake out the folds, and immediately immerse the canvas in an alum solution made by dissolving ordinary alum in water in the proportion of  $\frac{1}{2}$  lb. to each gallon of water. The canvas should be left in this solution for 10 or 12 hrs., after which it is hung up to dry.

### An Adjustable Door Hook

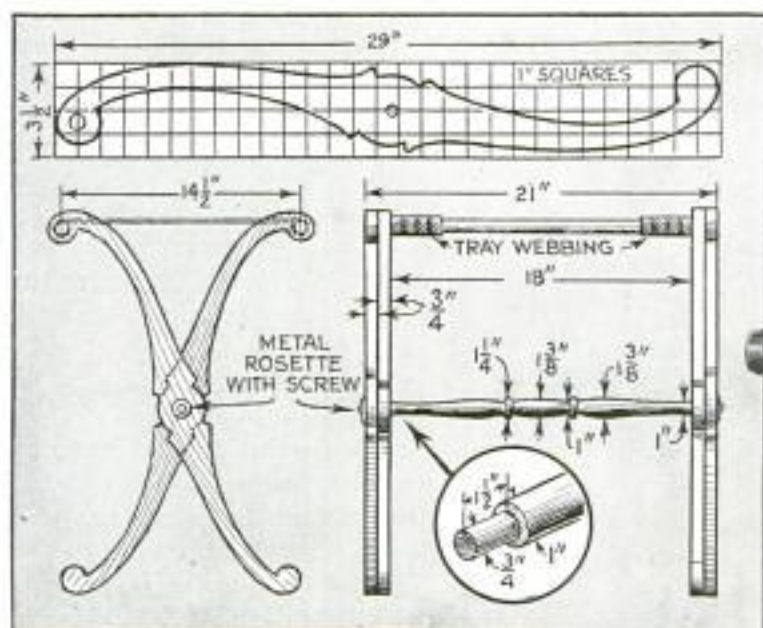
Small children will be unable to open a door or window that is fastened with a hook of the type shown. It is a regular door hook cut in two in the center, the resulting ends being threaded and screwed into the ends of a small turnbuckle. A twist of the turnbuckle tightens or loosens the hook.—Gene Stucker, Alhambra, Calif.



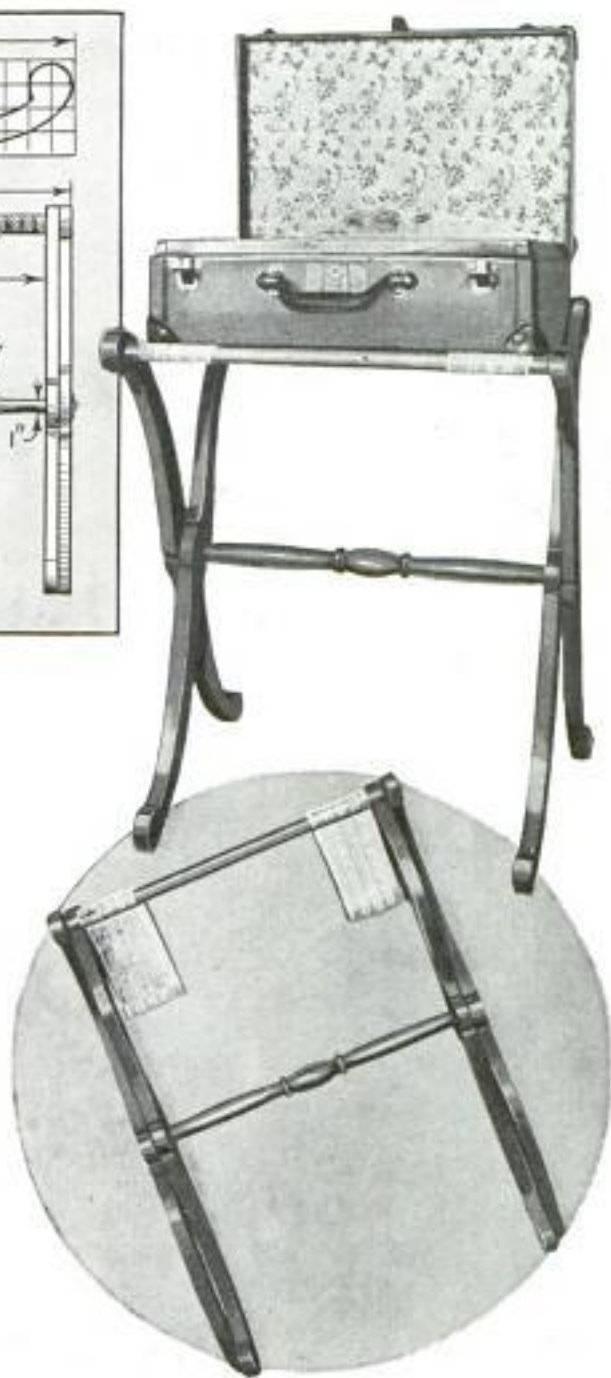
### Kindling from Old Newspapers

If you have a bunch of old newspapers on hand, they can be converted into good kindling. Just fold them up as they were when delivered and soak them in water. Then twist them into a tight roll to wring out the water and lay in the sun to dry. After the papers have dried out thoroughly, they are excellent for starting fires and cooking light meals. They burn briskly, making a hot fire which soon goes out without heating up the house, as is the case with wood or coal.

## Luggage Rack Saves Guest-Room Furniture



Marring of the guest-room furniture, occasioned by inadvertently putting luggage on the polished surfaces, can be avoided by providing a folding luggage rack which can be made for a fraction of what it costs in the stores. Hardwood, preferably maple or birch, should be used for the four formed legs, a pattern of which is shown. As the legs are identical in size and shape, they may all be sawed to shape at one time if a bandsaw is available. Pieces of dowel rod or even broom handles, which are usually maple, may be used for the two top rods. The center rod may be easily turned on a lathe although broom handle may be substituted here also. Notice that a shoulder is formed on the ends of each of these pieces to maintain the spacing between parts. The assembly consists of gluing and screwing the two upper rails and inserting the center one. The screws for the top ones are driven through the legs, at right angles to the rails. The fastening for the center rail consists of metal rosettes or washers and round-head screws driven from the ends so that the rail forms an axle or pivot on which the legs turn. Furniture webbing, 4 in. wide, is tacked around the rails, starting from the inside, then over the top and across. The pieces of webbing should be about 18 in. long so that only a yard of material will be needed for the job.—R. O. Buck, Chicago, Ill.



### Kerosene Cleans Wringer Rollers

When stains appear on the rollers of the wringer, rub them with a soft cloth dampened with kerosene. This cleans the rollers without injuring the rubber. Kerosene is also good for removing grease spots from cotton or linen cloth. Apply it freely and then rub the spot briskly until the grease is dissolved. Two tablespoonfuls of kerosene added to each bucket of warm water used for washing painted woodwork restores dulled surfaces.



This Collapsible Bookcase Takes Little Space When Folded for Storage

### Folding Bookcase Takes Little Space When Stored

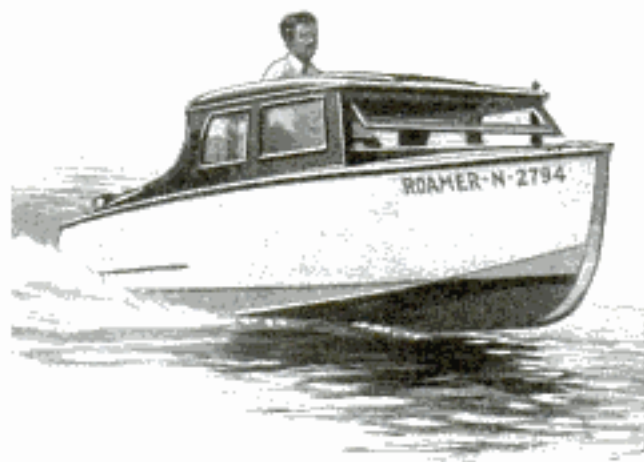
Here is an attractive bookcase which, when folded, occupies a space only 4 by 24 by 50 in. It consists of a back panel, preferably plywood; two 2-in. cleats, which are screwed along the edges; two side pieces, hinged to the cleats, and four shelves, pivoted to the cleats with dowels. The hinges are fastened to the inside so that the sides cannot be swung outward

further than at right angles to the back panel. When the side pieces are pulled out, the shelves are dropped to a horizontal position, the edges resting on short dowels driven into the sides as indicated in the detail. Weight of books on the shelves only tends to keep the bookcase in its open position rigidly as the sides cannot be pushed outward far enough to allow the shelves to drop past the dowels.

### Colored Fireproof Paint

Fireproof paint can be made by mixing powdered asbestos, 6 lb., and manganese dioxide, 6 lb., with lampblack, 1 oz., and linseed oil, 1 qt. This concentrated paint may be kept indefinitely in sealed buckets. To use the paint, thin it to the desired consistency with a mixture of linseed oil, 3 parts, and turpentine, 1 part. A less-durable fireproof paint, which is blue in color, is made by mixing powdered asbestos, 6 lb., and ultramarine, 6 lb., with linseed oil, 1 qt. This paint is thinned with the oil-and-turpentine mixture recommended for the first formula. If other colors of paint are required, brunswick green, venetian red, or yellow ocher may be substituted for the ultramarine. A white paint is made by substituting lead sulphate, 4 lb., and zinc oxide, 2 lb., for the ultramarine.

## BLUEPRINTS for Our Boat Fans

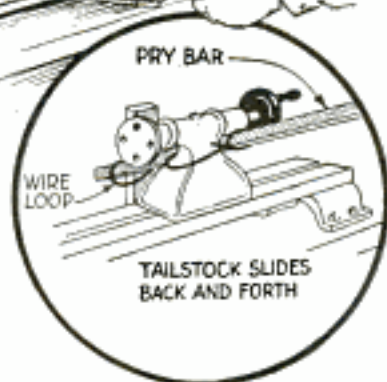
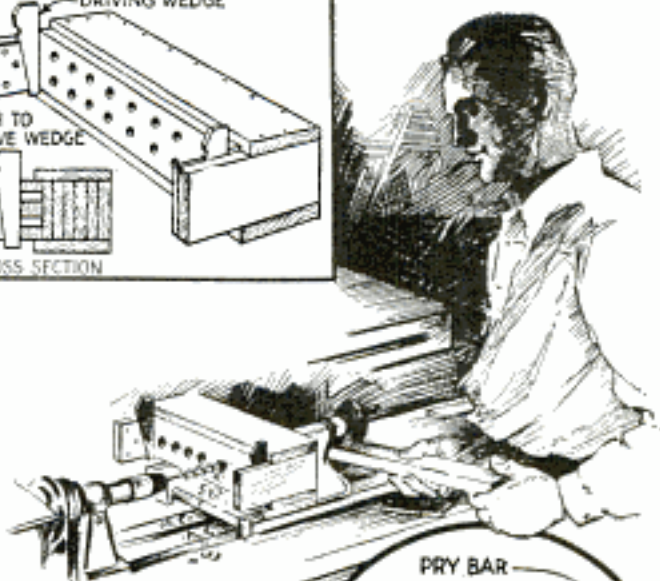
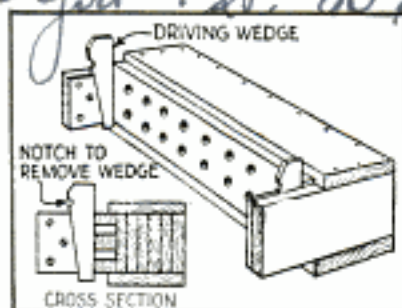


You can now obtain a complete set of blueprints on our 16-ft. outboard cruiser, "Roamer," for a dollar. Order No. 765 to 770 incl. Also, six prints, No. 840 to 845, on our 14-ft. outboard runabout, "Hi-Ho," can be had for the same price. Besides these, there are other boat prints in our total collection of 380 prints, of which a list will be sent upon receipt of 3 cents postage. A sample print (not open to choice) with forty completed projects pictured, and a list, will be sent for 10 cents. Address Blueprint Department.



### How to Retard Hardening of Plaster of Paris

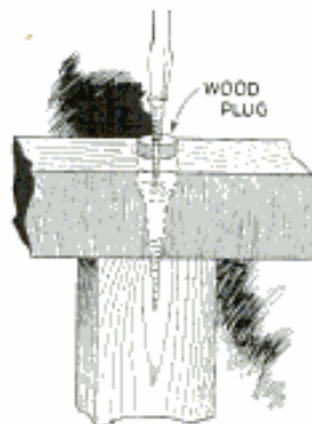
If finely pulverized althæa root, 3 parts, is mixed with plaster of paris, 97 parts, hardening of the plaster will be retarded for an hour or so. When dry, it can be cut, filed or turned, and is useful for making toys, models and moldings. If the mixture is made more than four per cent althæa root, hardening will be retarded for a longer time but the tenacity of the mass will be increased. In this state, the plaster can be rolled out on glass into thin sheets that are readily polished. This material, if incorporated with mineral or other paints, and properly kneaded, produces a fine imitation of marble that can be colored when dry. It can also be waterproofed by polishing and varnishing.



This Jig Aids in Drilling Duplicate Holes through Several Pieces of Work on a Lathe

### Removing Plug from Countersunk Screw Hole

Wooden plugs used to fill holes over countersunk screws are easily removed without damage to the plug or surrounding surface.



Simply drill a small hole through the center of the plug and drive a screw into it. When the screw comes in contact with the head of the countersunk screw, it will act as a jack and force

out the plug as shown.—F. M. Mayfield, Boise, Idaho.

### Lathe Used for Duplicate Drilling

On a job where a number of duplicate holes were to be drilled in some cabinet shelves, the work was done on a lathe by using this jig. A box was made so that the shelves could be stacked inside with a minimum amount of clearance, and a carefully drilled template of 3/4-in. hardwood was laid on top of the stack. To eliminate splintering of the undersides when the

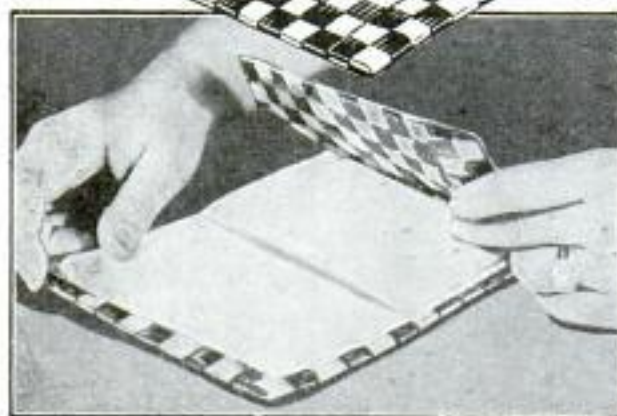
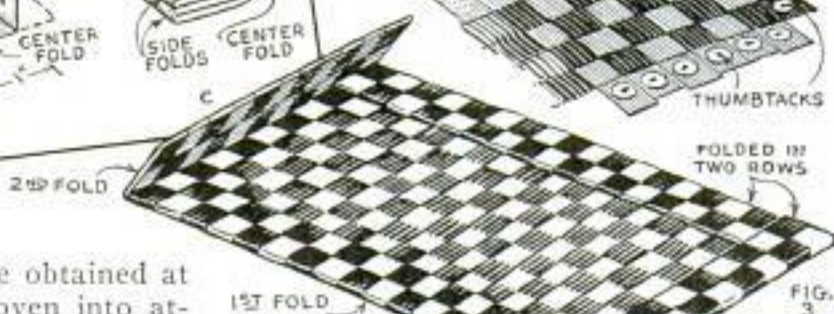
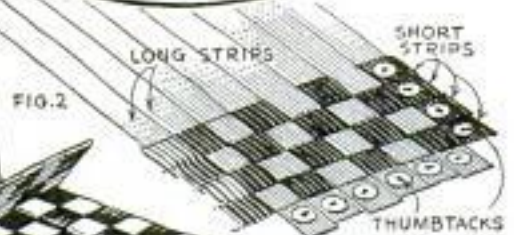
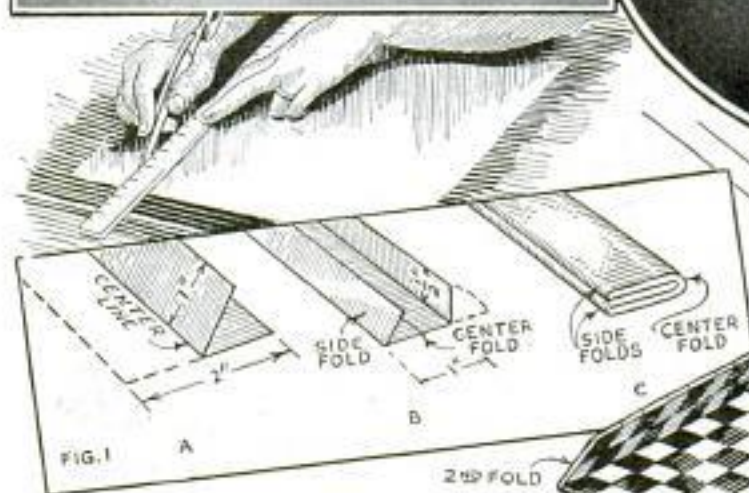
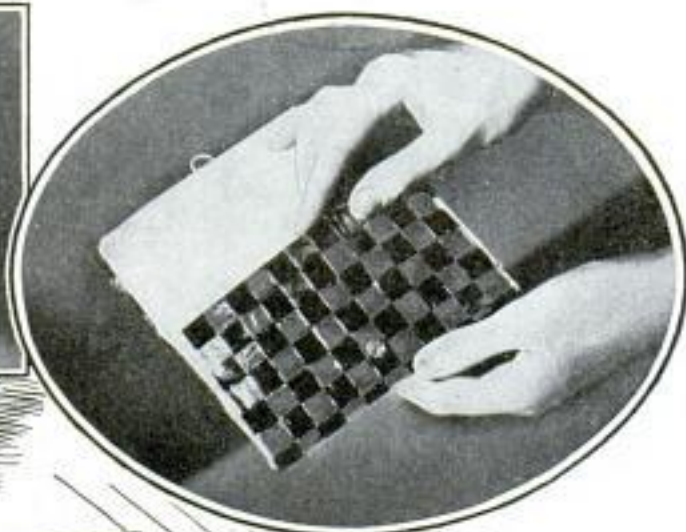
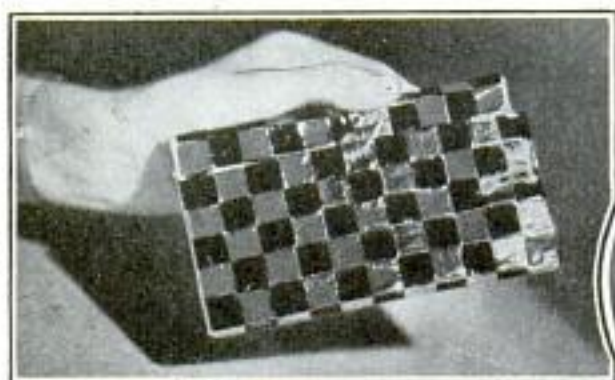
drill broke through the work, it was necessary to clamp the pieces solidly together, which was done by screwing tapered hardwood blocks to the ends of the jig so that wedges could be inserted between the blocks and the template. In use, the jig is laid on its side on a sliding table fastened to the lathe bed and is fed into the drill by means of a lever.

### Rubber Strips Keep Boat Cushion in Place

To avoid losing boat cushions or blankets, or getting them soiled if they slip off the seats, fasten them with rubber straps cut from an old inner tube. The straps are stretched diagonally across the seats and are tacked at the ends as illustrated. They will also hold garments and other articles.



# Attractive Purse Made of Colored Cellophane



Cellophane, such as can be obtained at the dime stores, is easily woven into attractive novelty purses of the envelope type. Cut the material into 2-in. strips after marking with a straightedge and the back of a scissors. Make 24 strips 10 in. long and 16 strips 15 in. long for a purse  $4\frac{1}{2}$  by 6 in. in size. Larger or smaller sizes are made by simply adding or omitting strips. The short and long strips may be of different colors to produce a checkered effect or a solid color may be used. Another attractive variation is to make half of each size of one color and the other half of another. The cellophane strips are folded as shown in Fig. 1. After making the center fold as in detail A, the piece is unfolded and the two edges are folded to this line as at B. Re-folding along the center line completes the strip as at C. The long strips are fastened edge to edge on a board by placing a thumbtack in the end of each, taking care that the folds are all on the same side. Starting at the tacked end, weave in the short strips, using thumbtacks at the starting ends as before to hold the strip in place while weaving.

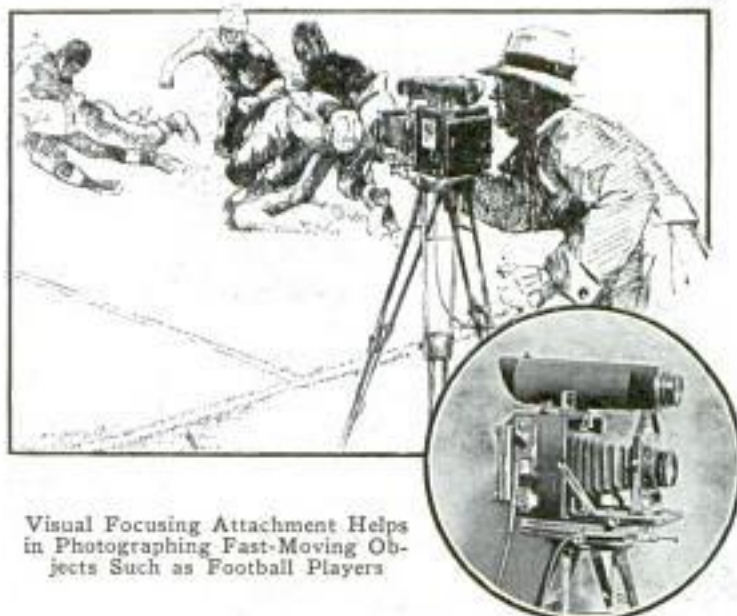
The folds of these strips should all be on the same side also. Weave by running the short strips over and under the adjacent long strips in a "May-basket" fashion. The second short strip alternates with the first, that is, where the first goes over, the second goes under the long strips and vice versa, as shown in Fig. 2. Be sure to keep the weaving close and straight across. As each strip is woven, the end is fastened down with a thumbtack; when complete

the three sides will be fastened to the board with tacks. The ends of the weave must be cemented to prevent fraying. Ordinary mucilage (not paste) is suitable for this purpose. Starting with the loose side, lift the ends of alternate long strips and apply a small quantity of mucilage with a toothpick, and then press down firmly with the fingers. Now remove the thumbtacks from one of the sides at a time and continue cementing the ends in a similar manner. When fastened all around, reverse the work and cement the loose ends on this side also. Trim the edges evenly, with a scissors, next to the edge of the first strip.

The edges are bound by folding in the width of two strips on each edge, starting with the sides and having the end folds over them as shown in Fig. 3. The woven cover is now the actual size to which the lining is to be fitted. Now fold at the center of the eighth square, counting from the folded edge, to form the pocket and at the center of the sixth square from the opposite end for the flap. The lining is buckram or tough cardboard covered on both sides with white rayon or silk. Because of the fold it should be cut about  $\frac{3}{4}$  in. shorter than the cover. A white finishing braid may be sewed around the edge of the lining if desired, to give a nicer finish. The pocket is made in the lining before fastening to the cellophane cover. When sewing the lining to the cover, run the stitches between the folds where possible, rather than through the material. Place the purse under a heavy book for an hour or two to flatten it down, then sew on a glass button and loop, or a metal clasp.

#### Visual Focusing Attachment on Camera

Here is an attachment for your camera which will take all the guesswork out of photographing fast-moving objects, such as football players and the like. It consists of a heavy paper tube, painted and varnished to withstand the weather. At one end is installed a lens that matches in characteristics and focal length the lens on the camera. A small piece of ground glass fitted in a section of tubing is in-

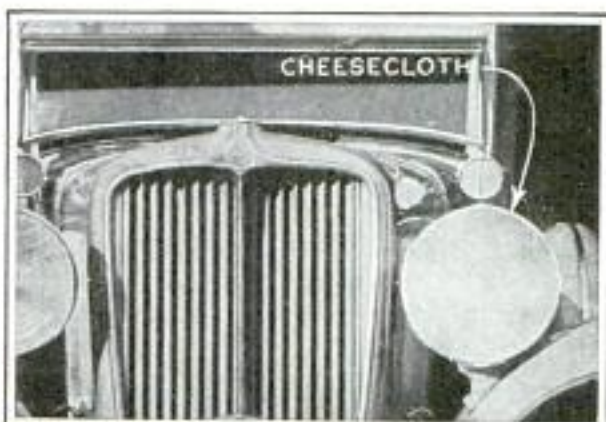


Visual Focusing Attachment Helps in Photographing Fast-Moving Objects Such as Football Players

stalled at the other end, in a position directly above the camera film or plate. The lens is mounted so that it can be slid back and forth in the tube and the mounting is then fastened directly above the lens holder of the camera so that when focusing, both lenses will be moved simultaneously. In use, a photographer keeps the object in focus on the ground glass of the tube, which automatically brings the camera lens in focus at the same time.

#### Cheesecloth Prevents Glare from Broken Auto-Headlight Lens

If you break one of the lenses of your car headlights, it is a good idea to tie a piece of cheesecloth over the lamp until a new glass can be obtained. The cloth will diffuse the light and prevent a glare from blinding other drivers.—George E. Kilpatrick, Drexel Hill, Pa.



Cloth Tied over Headlight with Broken Lens Prevents Glare and Helps Keep Out Water

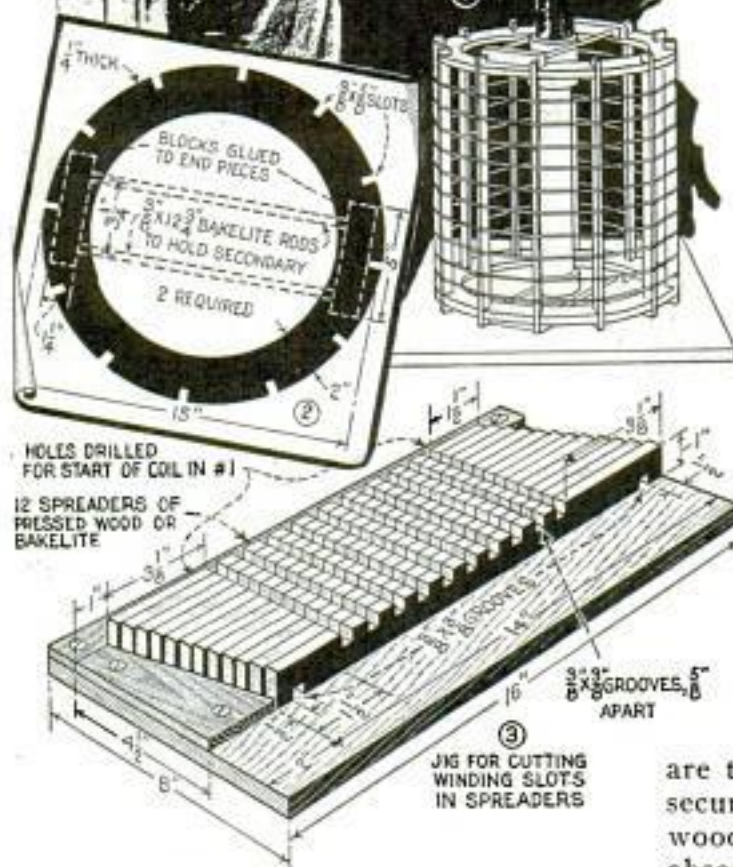


# Amazing ELECTRICAL HIGH-

brilliantly when brought near the apparatus.

The coils are made in two units so that they may be quickly separated for experiments requiring only the large coil. The larger, or primary, coil is made by winding ten turns of copper tubing or No. 8 bare copper wire into the notches of a form assembled from two rings and twelve spreaders of bakelite, fiber or pressed wood. The details and dimensions for this form are shown in Figs. 1 to 3 inclusive. The notches into which the tubing or wire is wound will have to be staggered slightly so that the coil may be wound spirally. The notches should be just wide enough for a tight fit. A jig as is shown in Fig. 3 makes it easy to saw or file the slots in the proper places. No nails or other metal fasteners should be used in the construction of the coils if the best results are to be had. If the ends of the winding

are threaded, brass nuts may be used to secure them in place. Should fiber, pressed wood or another material that is likely to absorb moisture from the air be used for the form, the assembly should be thoroughly dried in an oven and given a coat of varnish or clear lacquer while still hot. This will seal the surface and make the coil much more efficient. Four end blocks are glued to the outside of the rings in the locations shown by the dotted lines in Fig. 2. Fiber or bakelite tubes, or rods mounted in holes in these blocks, make an ideal insulating friction grip to hold the secondary rigidly in place. Fig. 6 shows



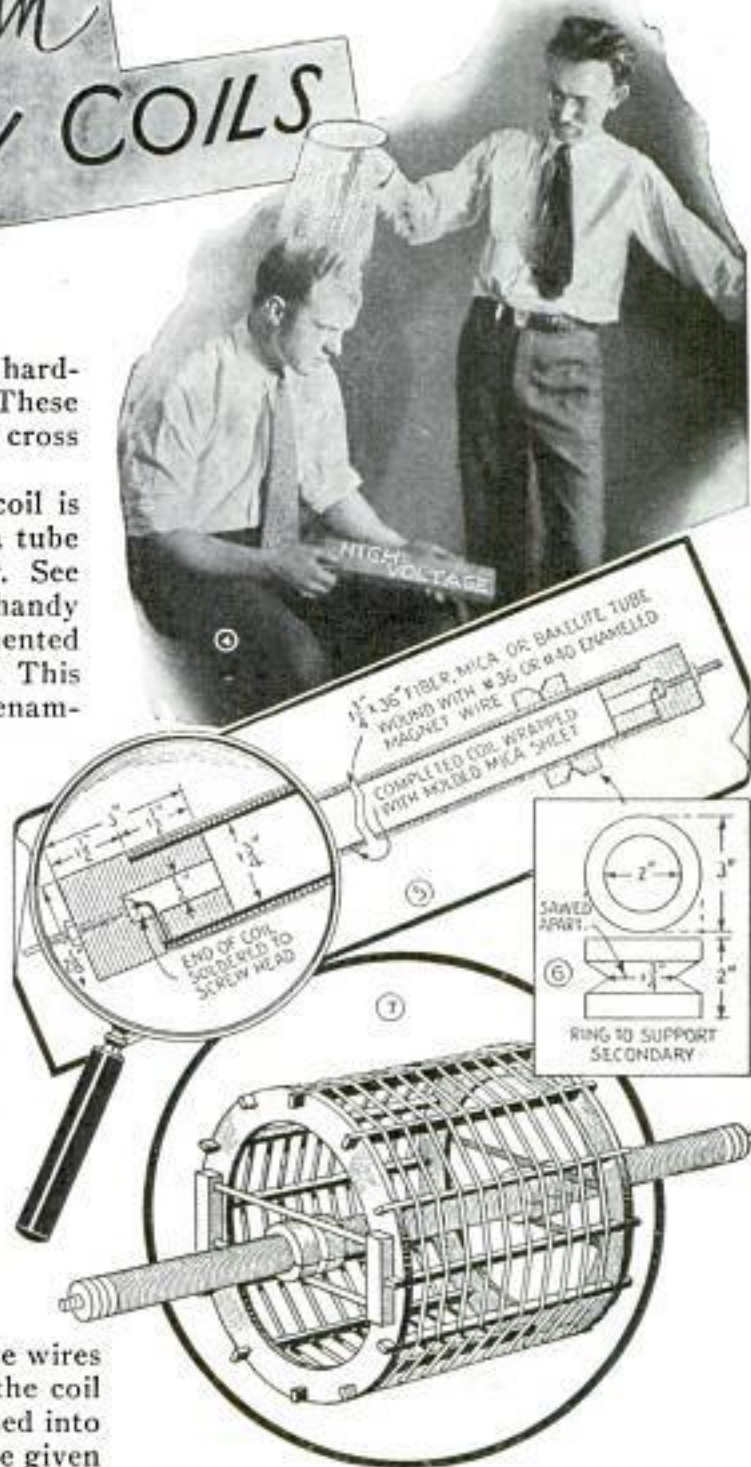
ANYONE can construct this simple but powerful high-voltage, high-frequency outfit from copper wire, scraps of bakelite, fiber or pressed wood and a few other items. With the completed outfit you can produce the same forms of electricity which physicians use to cure many diseases. High-frequency currents are also used to operate the bloodless surgical knife. Geissler tubes and small neon and other colored gaseous-tube signs light up

# DISPLAYS *with* FREQUENCY COILS

By C. A. Crowley

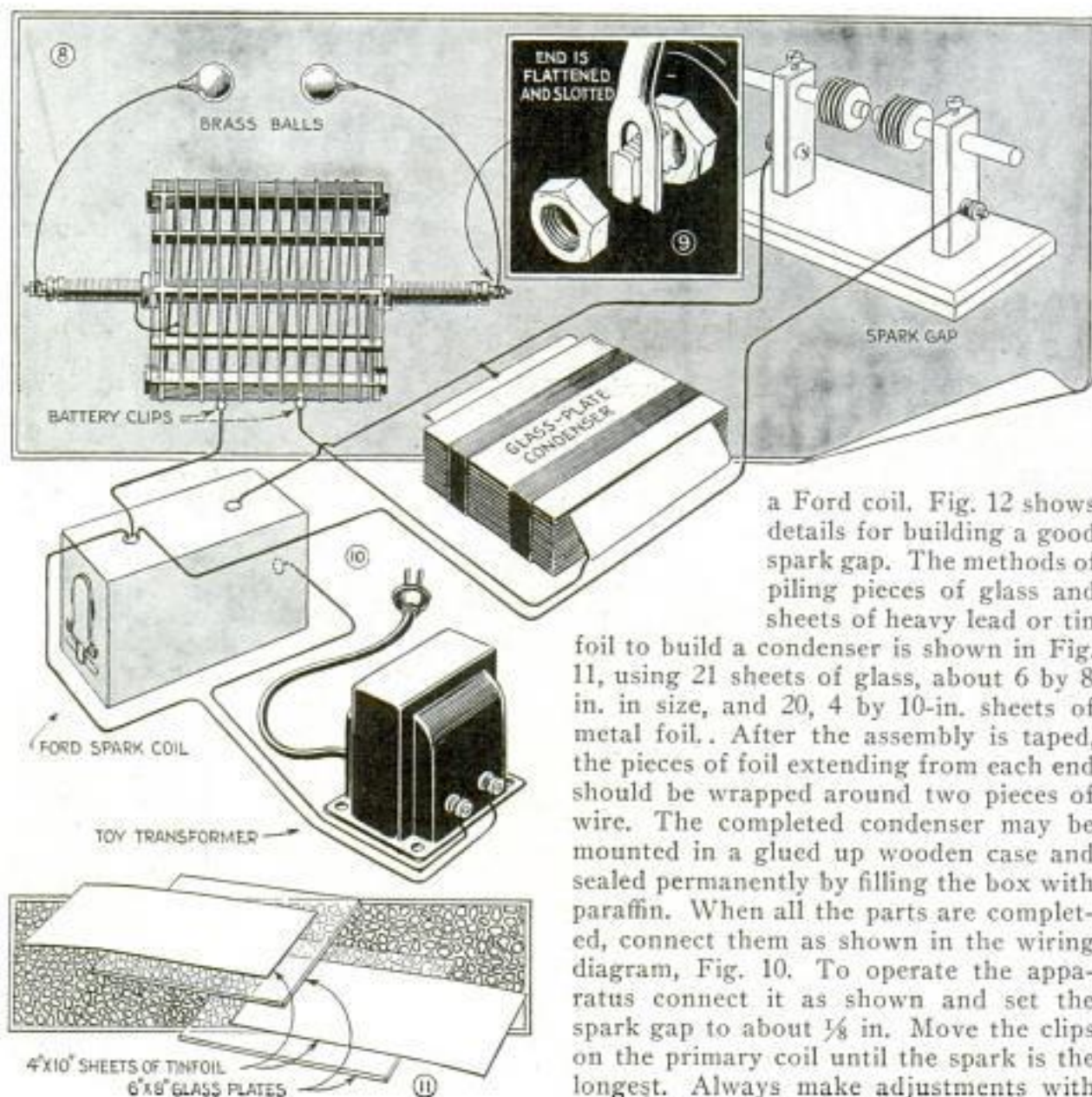
the dimensions of the two split hardwood rings used to grip the coil. These rings are held rigidly between the cross rods as illustrated in Fig. 7.

The secondary or high-voltage coil is wound on a fiber, bakelite or mica tube  $1\frac{3}{4}$  in. in diameter and 3 ft. long. See Fig. 5. If a tube of this size is not handy it may be made by rolling cemented sheet mica to the required diameter. This tube is wound full of No. 36 or 40 enameled magnet wire. If another small size of wire is handy it may be substituted. The smaller the wire the greater the number of turns and the longer the spark you will get. The fine wire from a number of old Ford spark coils may be used. When the winding has been completed, the coil may be fitted with a pair of dry hardwood end-pieces as shown in Fig. 5. These pieces should be varnished and pressed into place while the varnish is soft. Before mounting the endpieces, insert the brass screws and pull a short length of heavy copper wire through the small holes and solder to the heads of the screws. The other ends of these wires are to be soldered to the ends of the coil after the endpieces have been pressed into place. The completed coil should be given a good coat of varnish or shellac. When this is dry it is a good plan to wrap on a sheet of cemented mica over a second coat of tacky varnish, using generous quantities of varnish or shellac as a binder to hold the mica in place. Bind the mica tightly in place with tape and allow it to dry thoroughly. One or two additional coats of shellac or varnish will increase the value of the insulation. After the final coat has set, dry out the coil for several



hours by baking it in an oven at a low temperature.

The discharge balls used in the illustration were made from the ornamental knobs of an obsolete brass bed. In the event this source of supply is not at hand spherical floats may be had from a local plumbing shop. With the secondary coil mounted inside the primary coil, the outfit may be set on a table with the second-

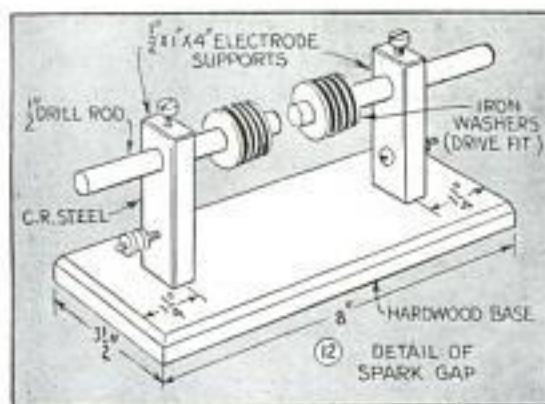


a Ford coil. Fig. 12 shows details for building a good spark gap. The methods of piling pieces of glass and sheets of heavy lead or tin

foil to build a condenser is shown in Fig. 11, using 21 sheets of glass, about 6 by 8 in. in size, and 20, 4 by 10-in. sheets of metal foil. After the assembly is taped, the pieces of foil extending from each end should be wrapped around two pieces of wire. The completed condenser may be mounted in a glued up wooden case and sealed permanently by filling the box with paraffin. When all the parts are completed, connect them as shown in the wiring diagram, Fig. 10. To operate the apparatus connect it as shown and set the spark gap to about  $\frac{1}{8}$  in. Move the clips on the primary coil until the spark is the longest. Always make adjustments with power off and be careful to keep away from the dangerous voltage of the transformer, spark gap and condenser. The long discharge from the high-frequency coil is harmless. In handling it, however, do not allow the sparks to jump around the eyes as the burn from a spark would be dangerous to these sensitive organs. Figs. 1, 4 and 13 show a few experiments. In the first, a match is first ignited by a spark, an electric lamp held near the discharge ball is made to glow, and a piece of wire held firmly between the teeth is brought within jumping distance of a spark, which looks quite spectacular, but is entirely harmless. In Fig. 4, a person standing on an insulated platform, holds a wire ring above someone's head with one hand, while holding the discharge ball

ary extending up and a discharge ball mounted on top as in Fig. 1, or, for the other experiments the unit may be suspended from the ceiling with dry cord or it may be rested on a table as in Fig. 8. The design of the apparatus is so universal that it may be used in any conceivable manner to fit the experiments you wish to perform. Fig. 9 shows how the supports of the discharge ball are attached to the ends of the secondary.

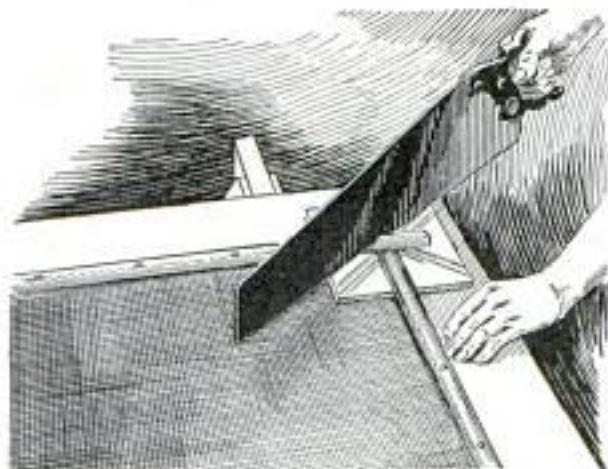
The simplest method of exciting the high-frequency coil is with a spark coil. Although small spark coils will not give the tremendous sparks of a large transformer, they are satisfactory for many very interesting and entertaining experiments. Fig. 10 shows the connections for



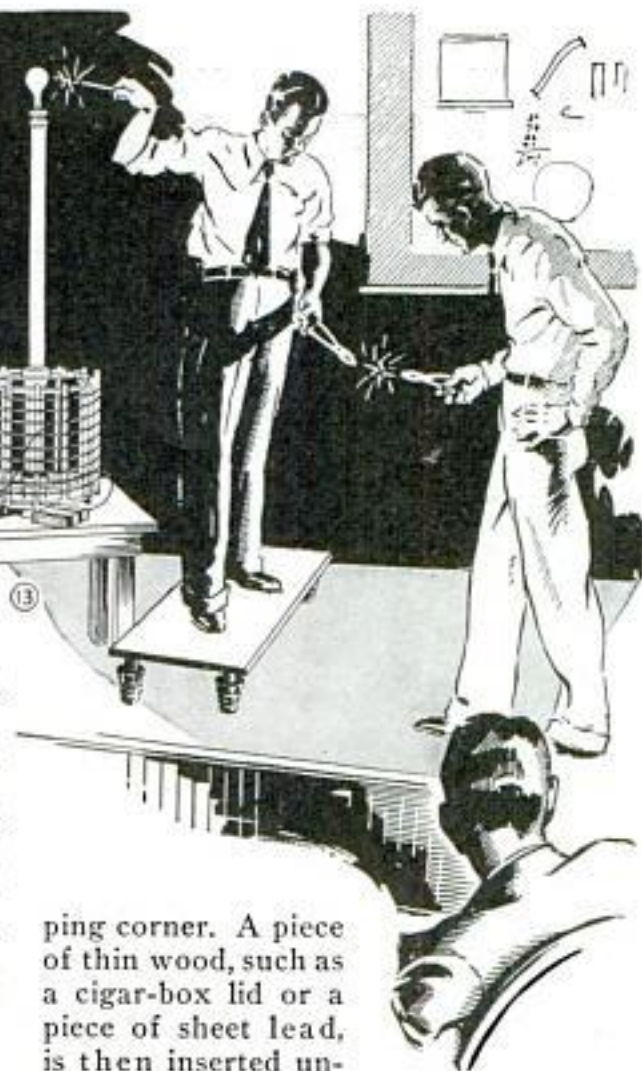
with the other hand. A corona effect will then be seen under the ring. The words "high frequency" on the board will also glow, the letters consisting of nails wired together. In Fig. 13, the performer, standing on an insulated platform draws a spark from the discharge ball to a metal rod while a helper draws a second spark from the performer, pliers being used in the latter instance as shown to avoid minor burns that would result if the sparks were drawn from the flesh. Besides these simple tricks, there are many other experiments that you can perform, and it is probably a good idea to get a book in which the subject is treated at considerable length.

### Quick Method of Mitering Corners of Screen Beading

Much time and trouble can be saved when mitering screen beading by letting the ends of two adjacent pieces overlap an inch or two, and nailing them down in the usual way, being careful not to drive the nails closer than 6 or 7 in. to the overlap-



Cutting Overlapping Ends of Screen Beading Makes a Snug Mitered Corner Joint

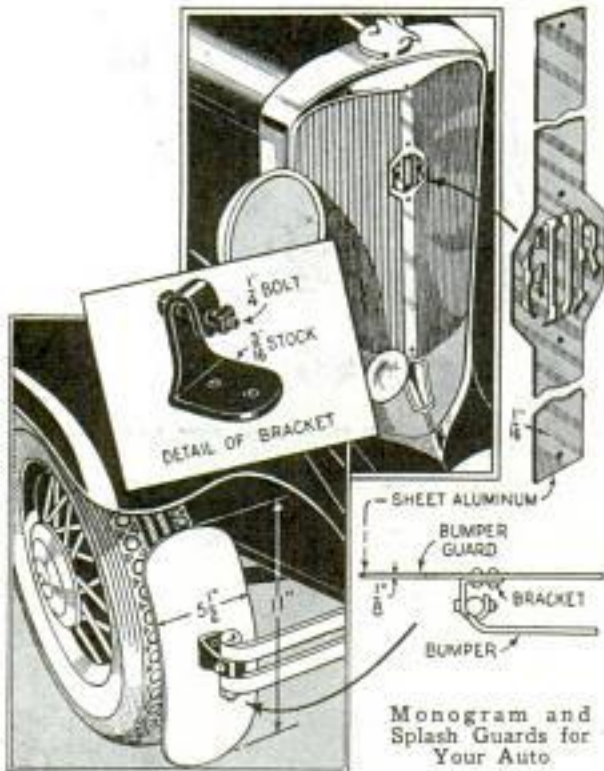


ping corner. A piece of thin wood, such as a cigar-box lid or a piece of sheet lead, is then inserted under the joint to be cut, after which you can take a miter saw and carefully cut through both pieces. When the joints are sawed in this way they will fit snugly and the rest of the nailing can then be done.

### Vinegar Used as a Cleaning Agent

A clean cloth moistened with vinegar will clean glass and enameled table tops without leaving any streaks. Vinegar also cleans woodwork and bathtubs when mixed with an equal amount of kerosene. A vinegar-and-salt solution is handy for cleaning brass or copper, and aids in removing stains from glass flower vases. A small amount of vinegar splashed over the inside of a teakettle is helpful in softening lime scale so that it can be scraped loose and washed out. It is also good for softening liquid glue that has hardened in the bottle. Soaking in hot vinegar will usually soften a hardened paintbrush without destroying the bristles.

### Auto Monograms and Splash Guards



Highly polished aluminum monograms and front splash guards for your car are easy to make with ordinary tools. The monogram, cut in a strip of the metal, is wired to the core or grill of the radiator. In cutting out the letters of the monogram, they should be so arranged that ties are provided to hold the central parts of the letters together. Heavy sheet-metal brackets are used to attach the splash guards to the ends of the front bumper, where they prevent mud and water from being thrown ahead of the car, where it is picked up by the wind and blown back against the body.

### Portable Camp Stove Improvised from Tin Can



By removing the top from a tin can and putting scallops in the edge, you can make a camp stove for light cooking. The can is filled with cotton waste to about even with the bot-

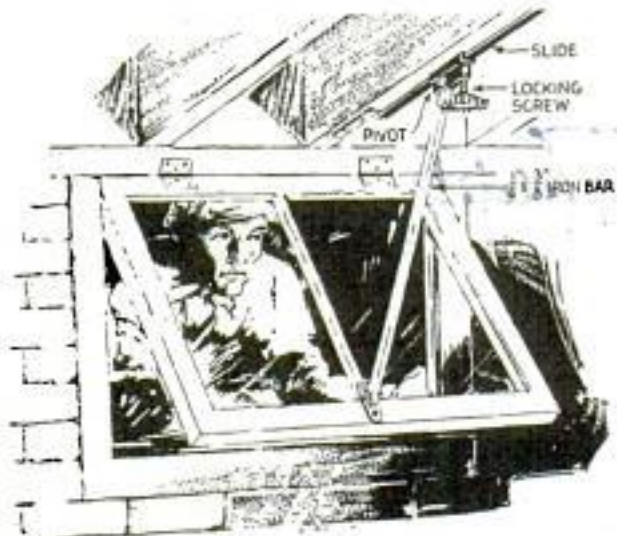
tom, after which a little alcohol is poured over it and lighted. One or two table-spoonfuls of alcohol are sufficient to fry eggs or a piece of beefsteak.

### Simple Repairs for Cracked Pipes

A temporary repair for a broken or cracked water pipe that is not under much pressure can be made by forcing stiff roofing tar into the crack and then wrapping several layers of adhesive tape around the pipe over the tar. If the pipe carries gasoline, shellac should be used instead of tar. For pipes that carry considerable pressure, brighten the metal around the crack with sandpaper, wrap a clean wire closely around the pipe over the crack and then flow solder over the wire. If properly done, this repair should last as long as the pipe.

### Open Basement Window Locked Securely

When it is desired to keep a basement window partly open and still have it



With This Simple Lock You Can Keep Your Basement Window Open without Danger from Intruders

locked so that no one can enter, the arrangement shown in the illustration will be of service. A length of bar iron is pivoted to the lower edge of the window at the center, and also to a collar. The latter slides on another bar screwed to the ceiling in the position indicated and is fitted with a locking screw. When the screw is loosened the window can be opened and closed, and it can be held open by tightening the screw, which should be located so that no one on the outside can reach it.



### Make Your Own Calcimine

Good calcimine can be made in any color by mixing powdered white glue, 1 lb., zinc white, 10 lb., and paris white, 5 lb., with sufficient water to produce a good painting consistency. To color the calcimine add, in small quantities, a paste made by rubbing dry painters' color with water to produce a suitable tint. Water-soluble aniline dyes may also be used if they are added in small quantities and thoroughly mixed by stirring. Before applying the calcimine, the wall should be cleaned and then sized by painting it with a solution made by dissolving glue,  $\frac{1}{2}$  lb., and alum,  $\frac{3}{4}$  lb., in water, 2 gal. The size is applied with a whitewash brush.

### Football Shoulder Pads Improvised from Old Shoes

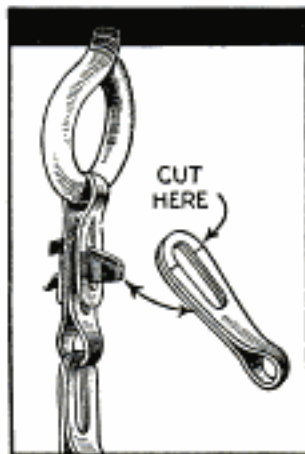
Shoulder pads for football players can be made from a pair of old shoes. The heels are removed, and the toes are cut out to fit the contour of the neck. Part of the uppers are cut away, as shown, leaving two or three



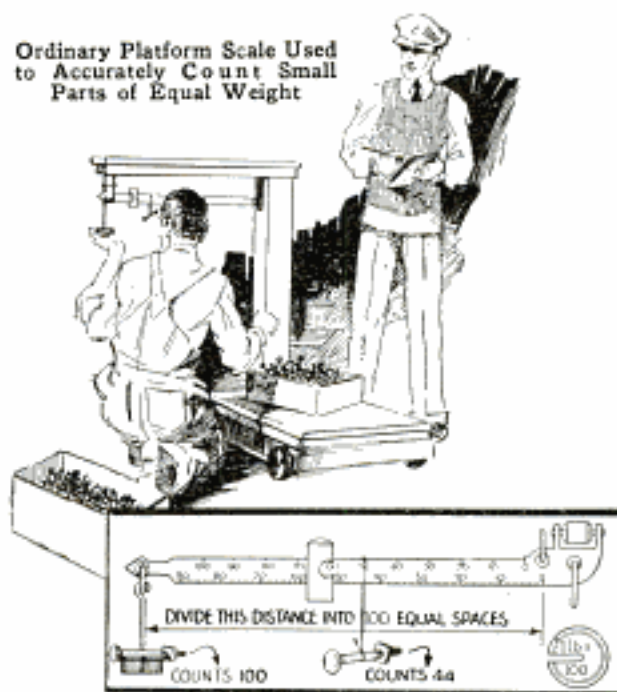
lace eyelets so that when the two sections are fitted over the shoulders they can be laced together at the front and back.—Fred W. Schneider, Towaco, New Jersey.

### Neat Splice for Furnace Chain

A neat job of splicing furnace chain or fastening the end to a screweye can be done by removing the end link, reversing it and then keying it to the flat side of the next link as shown. A good key for holding the links together is made from a link having one end cut off.—Frank W. Bentley, Jr., Missouri Valley, Ia.



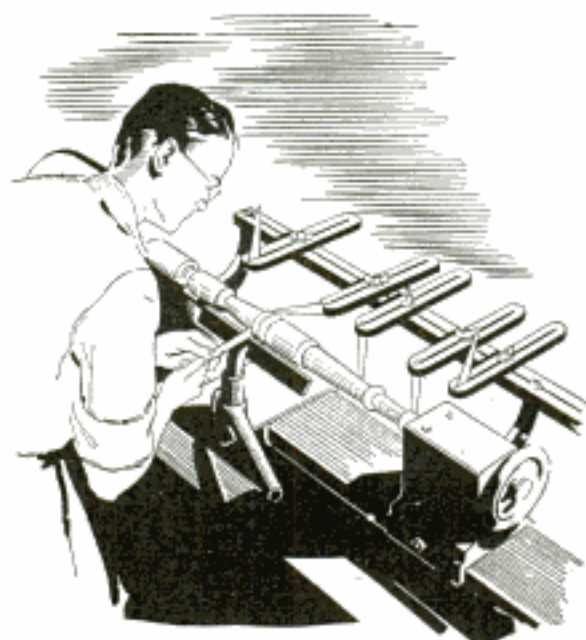
Ordinary Platform Scale Used to Accurately Count Small Parts of Equal Weight



### Scale Used as Counting Machine

A portable platform scale can be used for quickly counting small parts of equal weight. The weights at the tip of the scale beam are marked 1 lb. equals 100, which means that 1 lb. at this point balances 100 lb. on the platform, or that one of any article will balance 100 similar articles on the platform. Place a container on the platform and move the poise along on the beam until it balances. Put one sample part on the counterpoise and enough similar parts in the box to balance the scale. There will be exactly 100. To count in other ratios, as dozens or gross, remove the beam and measure the distance from the tip knife edge to the middle or fulcrum knife edge. Then divide this distance into 100 equal parts, making the graduations on the beam and place it back in position. If it is desired to count in dozens, hang one sample article by a thread looped over the beam at 12 on the new graduations and it will balance one dozen on the platform. To count by the gross, hang one sample on the counterpoise at 100 and hang another sample on the beam at 44, the total being 144. This will balance one gross of parts on the platform of the scale.—W. H. Sargent, Rutland, Vt.

☞ A sewing-machine needle can be adjusted quickly with the aid of a small mirror; place it under the shaft and you can easily see where to put the needle.



Fingers on This Calipering Device Drop When Parts of Work Are Turned to Desired Diameters

### Automatic Calipers for Wood Turning

Much time can be saved in calipering work on a lathe when turning spindles, furniture legs, etc., by using this automatic calipering device. A slotted wood bar is mounted on the rear side of the lathe by means of brackets, and carries several slotted blocks attached to it with bolts and wingnuts. Each block has a finger pivoted at one end, which rests on the work. In use, the blocks are set so that the fingers will drop when the work has been turned to the various diameters desired.—John Jansma, Grand Rapids, Mich.

### Pot Lifter Made from Table Fork

A lifter for handling hot pots and pans is easily made from a table fork. The end of the center tine is bent up at right angles, while the outside tines are bent down as shown. In use, the center tine is inserted through the hole in the rim by which the pan is hung up, and the other tines rest against the side of the pan. If there are no holes in the rims of the pans, they can be quickly punched or drilled.—A. H. Waychoff, Phoenix, Ariz.



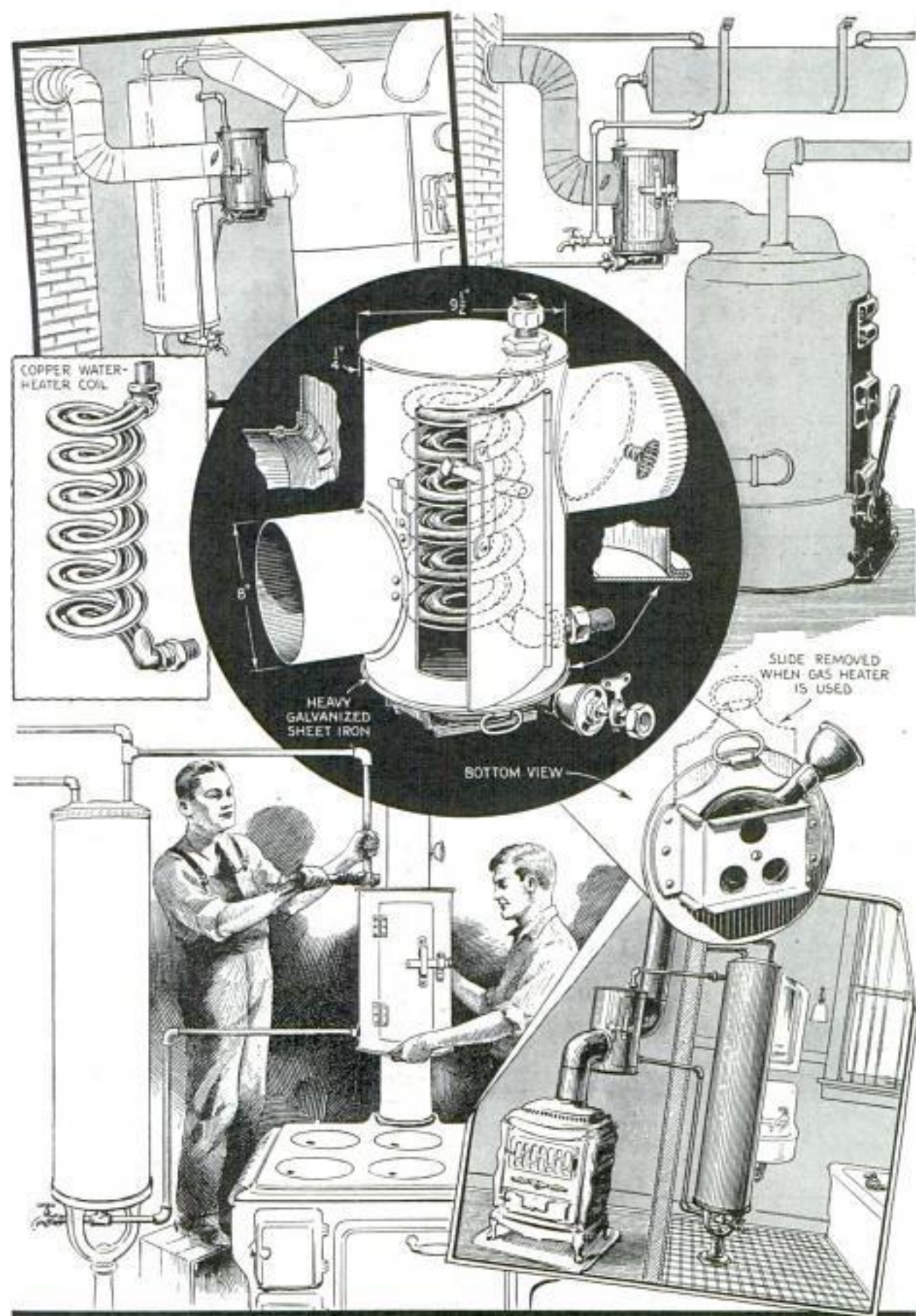
### Water-Heater Coil Installed in Flue

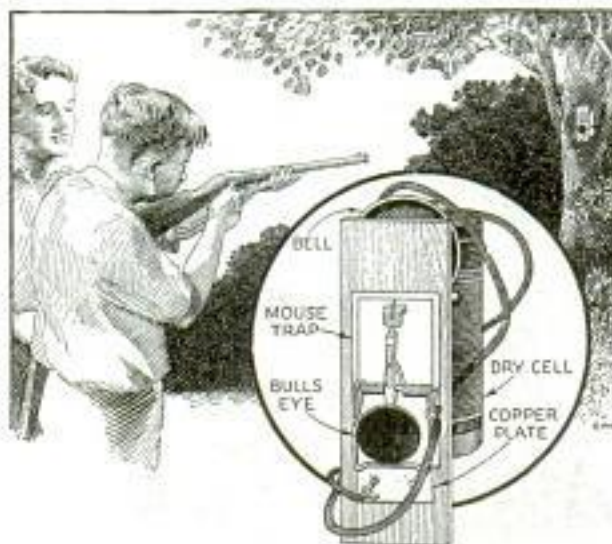
Waste heat that escapes from your furnace or stove through the smoke flue and chimney, can be utilized to provide hot water by installing a heater unit in the flue. It is important that this unit be located as close to the furnace or stove as possible in order to get the maximum heat. Several installations are shown on the opposite page so that you will undoubtedly find one that fits your particular conditions. The unit is made up of rather heavy galvanized sheet iron. In most cases the inlet and outlet are arranged horizontally although these may be set vertically as shown in the lower left-hand detail. The idea is to pass the hot smoke through the box, in the center of which a copper water-heating coil is arranged. Such a coil can be obtained at almost any hardware store. If desired, you can also install a gas burner  $1\frac{1}{4}$  in. underneath the coil for use during the summer months. In this case, a slide is provided to close the opening over the burner while the furnace is on. Methods of piping the water from the heater to a near-by hot-water tank are also shown. If there is enough space, you may hang the water tank in a horizontal position from the joists, over the furnace, so that it will not occupy any space that might be needed for other purposes. Also, this arrangement cuts piping costs and the tank, being located just above the furnace, will also be partly heated by the warm air arising from the furnace. The lower right-hand detail shows how a tank may be placed in an adjacent room, where the heater itself is installed in the smoke flue of a living-room range. This method of heating water has been found superior to a water back inside a furnace. The heater is, of course, provided with a clean-out door and you may also find it helpful to have a draft check in the unit as shown.

### Staining Window-Screen Frames

It is a good idea to stain and varnish window-screen frames that are to be covered with copper wire mesh instead of painting them. Most paints contain zinc, which acts on the copper and often causes it to deteriorate and after a time to break away from the frame.

# Waste Heat in Smoke Flue Keeps Water Hot





A Direct Hit on the Bull's-Eye Closes the Electric Circuit in This Target and Rings a Bell

### Electric Air-Rifle Target Made from Mouse Trap

Operated on a dry cell, this air-rifle target rings a bell when the bull's-eye is hit. An electric bell and a dry cell are mounted on one side of a wood block, and a mouse trap is on the other side. A metal bull's-eye is soldered to the bait holder and the front end is cut off to permit a metal plate to be screwed to the block for the trap jaw to strike. A wire is run from the plate to the bell, which is in turn wired to one dry-cell terminal. A second wire is run from the trap jaw to the other terminal of the dry cell. When the trap is set, a direct hit on the bull's-eye springs it and the jaw strikes the metal plate and closes the circuit to ring the bell.

### Flushing Auto Cooling Systems

Much radiator trouble can be prevented and better car operation assured by flushing out the cooling system twice a year. This should be done just before filling the radiator with anti-freeze solution, and again after taking it out. As the circulation of water in the cooling system carries sediment, which often clogs some of the small passages, it is evident that the most effective flushing is done with water flowing opposite to the normal flow of the water in the system. The engine water jackets should be flushed from the top, while the radiator should be flushed from the bottom. Before attempting to flush, be sure to remove any thermostats that

may be in the top tank of the radiator, in the cylinder head or hose connections. Most effective flushing is done by connecting a hose to the top of the engine, or to the bottom of the radiator and letting the water run until it comes out clear. The flushing connection should be provided with a tire valve so that compressed air can be admitted into the system in short spurts. This causes fine bubbles, which help to loosen sediment.

### An Improved Stocking Darner

Wood stocking darners can be greatly improved with this combination handle and holder. The handle is cut off and the darner is drilled to take one end of the holder. This is a length of spring wire having a loop the shape of the darner at



one end and a coil formed in the center. In use, the work is placed over the darner and the wire loop is pressed down where it is held by a wire ring slipped over the handle as shown.

### Tone Control for Doorbell

If your doorbell is too loud, you can easily soften it by means of a machine screw and a locknut. Simply drill and tap the bell near the edge to take the screw, arranging the hole so that the clapper will strike the end of the screw instead of the bell. After the desired tone has been obtained by driving the screw into the bell, turn down the locknut so that it will hold the adjustment.



☐ If the heads of clothespins are dipped in white paint, they will be easier to find in case they are dropped in the grass.

#862

# A CHEST *of* DRAWERS



## *in Colonial Design*

CHARACTERISTIC of furniture designed in the colonial period, this piece, known at that time as a "chest-on-chest of drawers," offers the utmost in storage space, in economy and ease of construction, and in appearance. It can be built almost entirely of plywood. The drawings show two types of base assembly, either of which may be used. The chest may be made of walnut or mahogany plywood, or may be finished appropriately in curly birch stained lightly and rubbed down to bring out the grain of the wood.

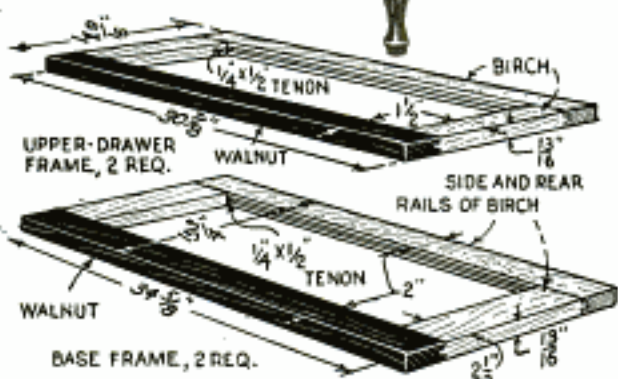
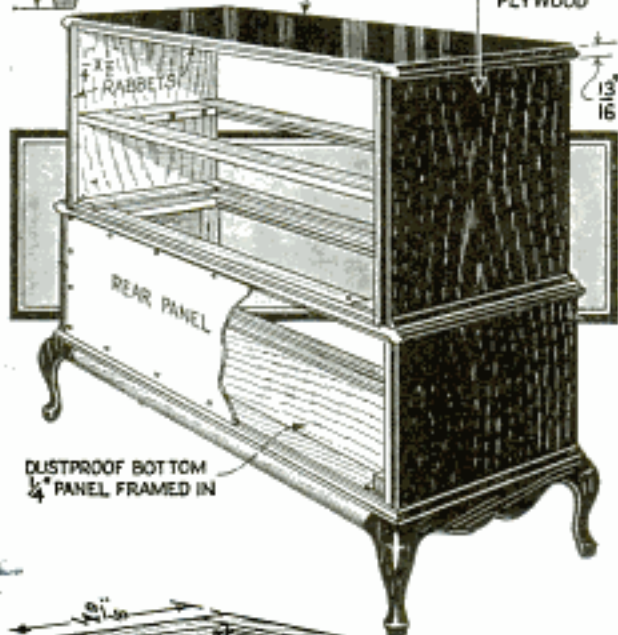
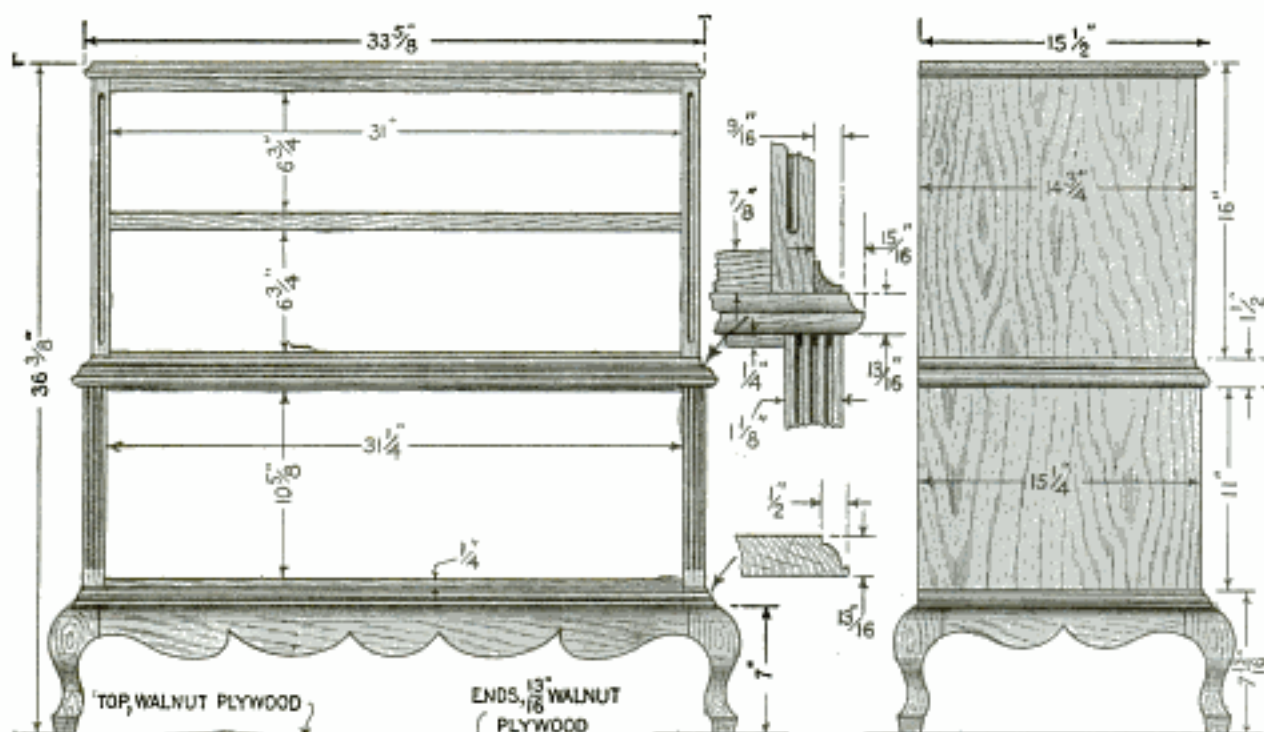
The regular base, which consists of a scrolled apron or rail and cabriole leg, should be made of hardwood, the front face of the apron being curved to fit the knee portion of the leg. First, the legs are bandsawed and finished as shown, and the aprons are formed slightly oversize. Then the parts are doweled and glued, and are drawn tight with bar clamps. When dry, the aprons are sanded to contour and flush with the leg. The back rail is simply a straight piece of 1 3/8-in. hardwood. Next, a frame of hardwood is tongued and



grooved together and is cut to fit over the first assembly. The best construction requires a panel set into the four pieces of this frame, which forms a dustproof bottom. The frame is then screwed to the base, the screws being driven up through holes drilled in the apron piece and into the leg at the corners. The three exposed edges of the frame may be molded or may

*Algamma W. Paul & Co.*

*Craftsman Wood Service*  
*7355 Vincennes Chicago*



faced with strips of solid stock, fluted as indicated and edge-glued to the panel. The top panels are made in the same way save that the facing strip is the same width as the thickness of the plywood stock. Care must be taken when gluing the strips to position that the outer edges are flush, as little sanding can be done to finish due to the thinness of the veneer. The panels are screwed to the base and care must be taken to get the inside measurement between the parts the same as given in the drawing. This done, the top edges of the side panels are joined by a second frame made in the same way as the first. All joining surfaces are glued and screws are driven through the top of the frame into the panels. The edges of the frame may be molded as shown or they may be simply rounded. The back edge must be rabbeted on both corners.

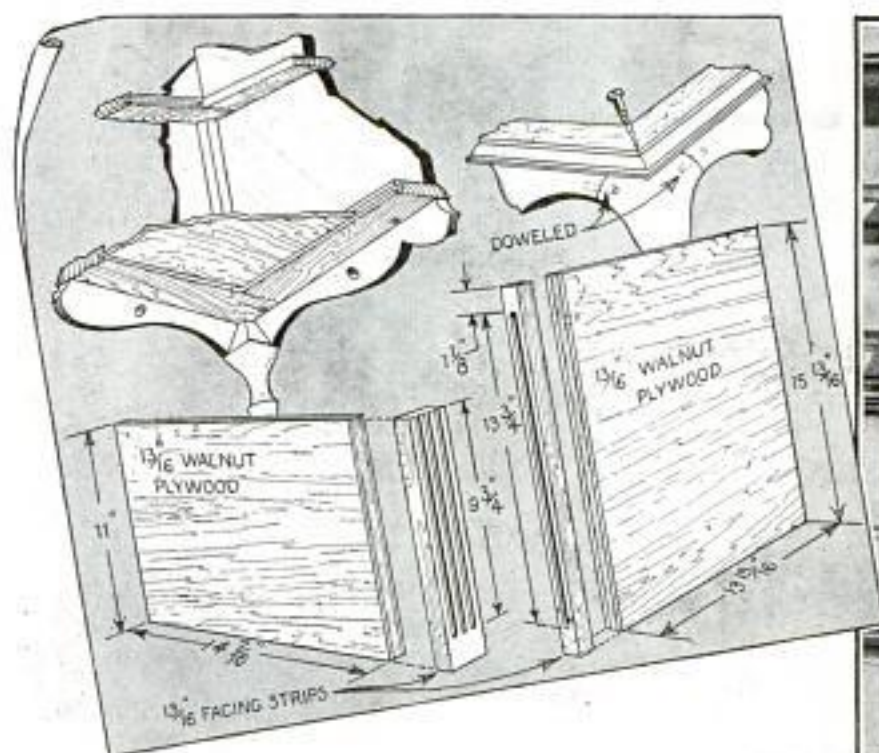
The upper side panels are rabbeted as were the lower ones, and they are glued and screwed to the frame, the offset allowing the screws to be driven in from the underside. The top is made from a single piece of  $\frac{13}{16}$ -in. plywood cut 1 in. less in length and  $\frac{1}{2}$  in. less in width than the size given. The piece is then faced on the front and ends with strips cut from the solid wood. The back edge must be rabbeted on the lower corner. Next, two frames are made from  $\frac{13}{16}$ -in. solid stock, the front piece or rail being cut from the

be simply rounded over with a hand plane and sandpaper. The back edge is rabbeted  $\frac{1}{4}$  by  $\frac{1}{2}$  in. to take a backing panel.

Next, four pieces are cut from  $\frac{13}{16}$ -in. plywood, two of which form the lower side panels. The front edges of these are

*Handwritten notes:*  
 The top panels are made in the same way save that the facing strip is the same width as the thickness of the plywood stock.  
 Care must be taken when gluing the strips to position that the outer edges are flush, as little sanding can be done to finish due to the thinness of the veneer.

*Handwritten notes:*  
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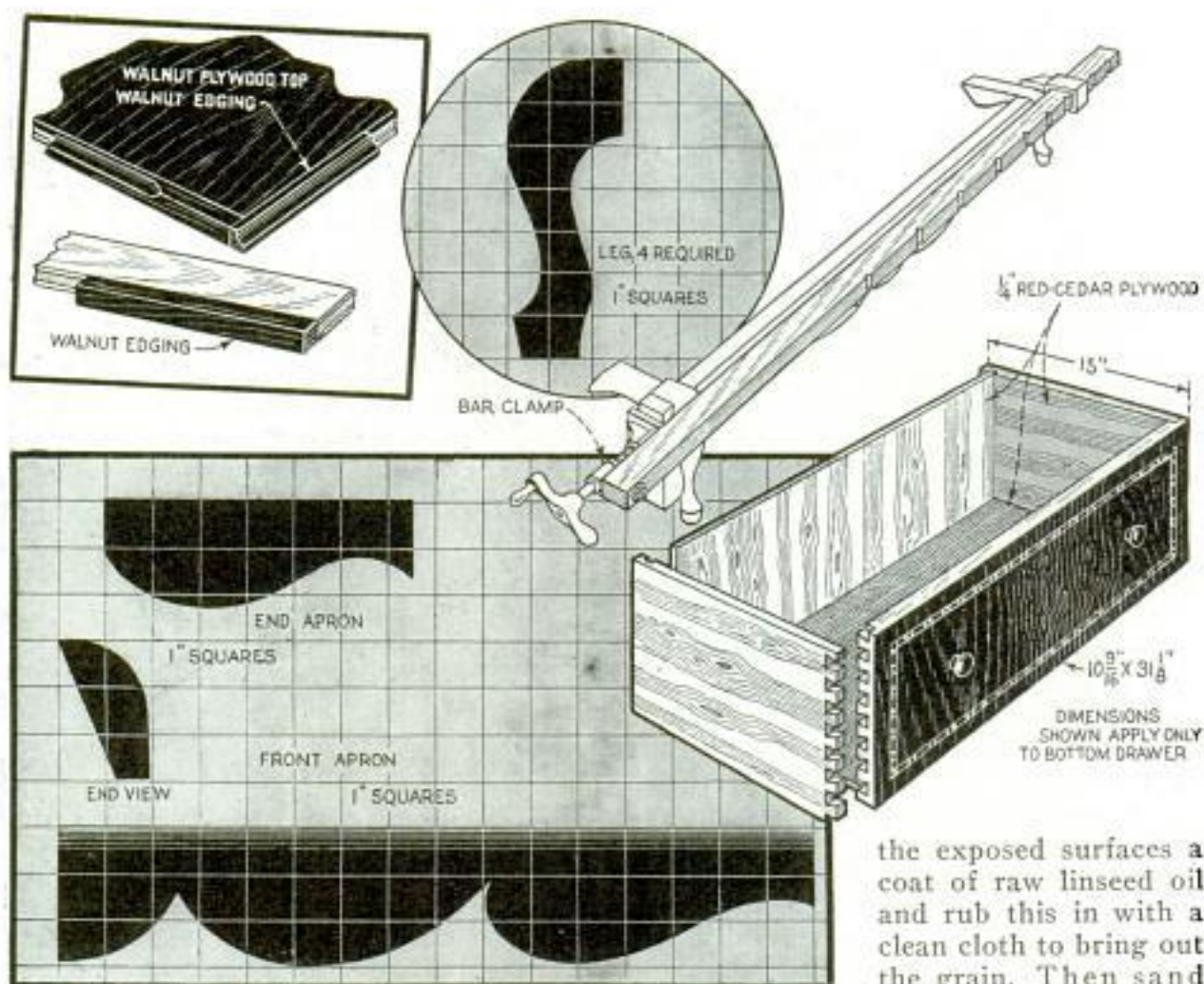


same wood as the exposed parts of the cabinet. Both frames are planed to exactly the same size, a  $\frac{1}{4}$ -in. allowance being made on both for the back panel. These are then glued and screwed to the upper side panels and the top is screwed to the top frame.

To bring the middle drawer above the edge of the molding, it is necessary to put in a riser  $\frac{3}{8}$  in. wide and  $\frac{13}{16}$  in. thick. Narrow strips ripped from  $\frac{13}{16}$ -in. stock are glued to the frames at the top and bottom of the lower-drawer compartment. Strips of the same thickness are bradded in place in the first and second-drawer compartments to form the runners. The runner strip in the lower compartment must be wide enough to support the drawer, and, due to the offset of the facing, it is necessary to fit a guide, the width of which is equal to the offset of the frame. Back panels are cut from  $\frac{1}{4}$ -in. plywood and screwed in place to finish. If desired, these panels may be purchased with one side faced with a veneer of aromatic red cedar and a backing of birch. The waist molding should be of the plain cove form as indicated, and this may be run on the machine or, not having this, it may be made by hand.

The drawer fronts are cut from  $\frac{13}{16}$ -in. plywood and the stock may be obtained faced on the back with red-cedar veneers

and on the front with figured walnut. This may be cut so that the grain runs the short way. When made in this way from this particular wood, the drawer fronts may be decorated to good effect with a narrow-band inlay not more than  $\frac{1}{4}$  in. wide, and of colors that contrast with the darker wood. Shallow grooves for the inlay strips may be cut on a circular saw as follows: Two marks are made on the ripping fence with the saw table raised so that the dado head will cut the proper depth. A rule is laid along the fence in the manner shown, the measurement being taken from the point where the cutter comes through the table at both the front and back of the table. This distance should equal the space between the center of the inlay groove and the edge of the drawer front. If the band inlay is  $\frac{1}{4}$  in. wide this distance should be  $1\frac{1}{4}$  in. In cutting, the stock is laid along the fence, the end even with the mark on the ripping fence at the rear of the dado head. With the stock raised to clear the cutters, the machine is started and the work is lowered slowly onto the cutters. The work is moved along the fence until the trailing end is brought even with the mark in the fence in front of the head. The grooves are run across the ends and back on the other edge in the same way. This stops the grooves accurately, and the remainder of the waste



in the corners can be pared out with a chisel. It is best to first run trial grooves on a piece of waste stock to get the proper setting of the dado head. If the cut is slightly lacking in width, the two outside cutters of the head may be shimmed out with thin paper disks until they cut a groove of the proper width to take the inlay band snugly. The inlay grooves may also be accurately cut on a drillpress, using ordinary router bits in the chuck and fitting a special fence to locate the cut on the work. Using the same tool and a special adjustable fence, the dovetail sockets may be cut in the ends of the drawer fronts. If the drillpress is not available, a rabbeted corner joint is a good substitute for the dovetailed corner. In cutting the stock for the drawer fronts it is well to allow  $\frac{1}{16}$  in. at the top and across the ends of each piece. This will insure that, when finished, the drawer will be an easy fit in its compartment and the allowance will compensate for any swelling of the wood.

In finishing the walnut chest, first give

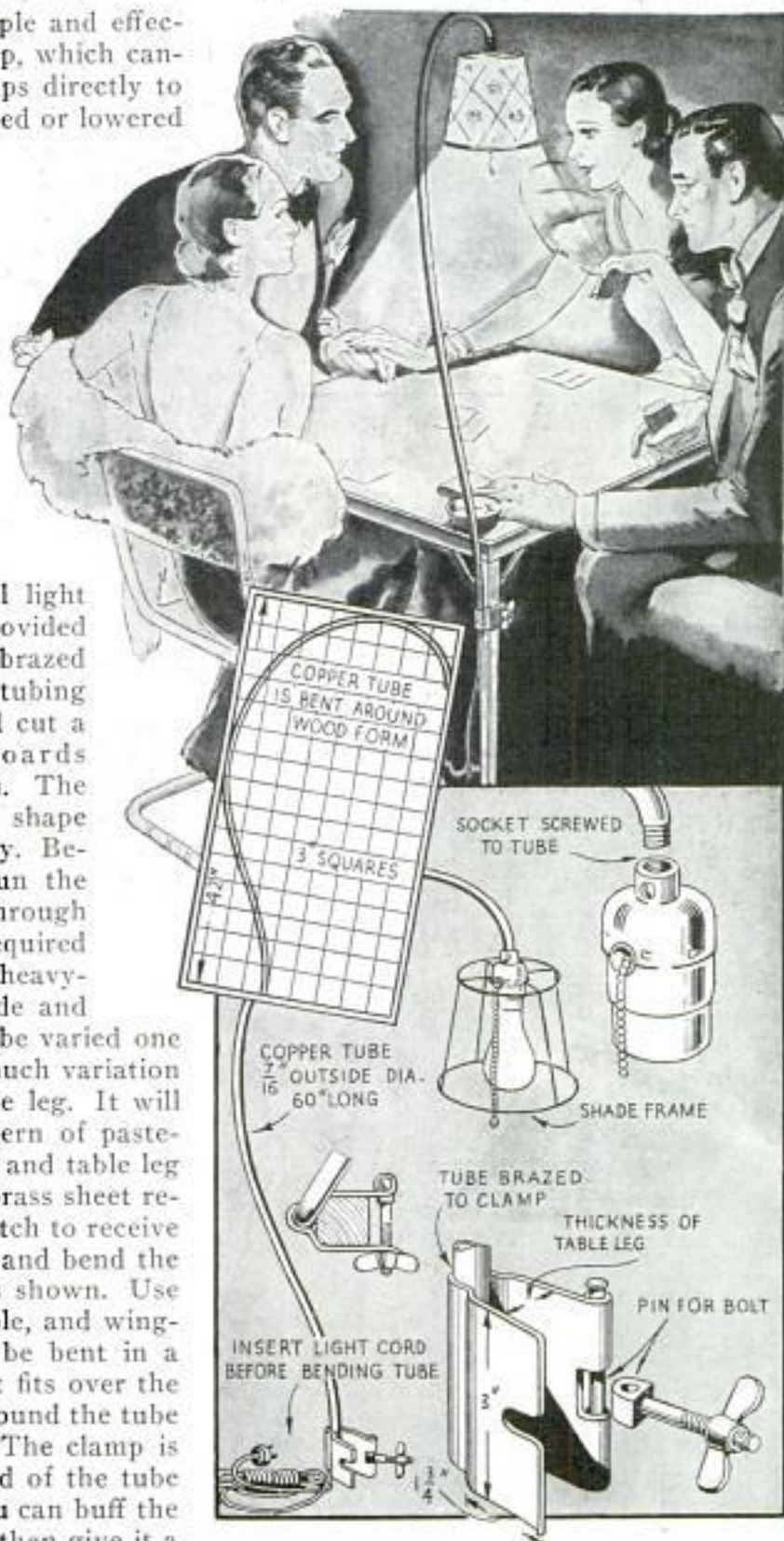
the exposed surfaces a coat of raw linseed oil and rub this in with a clean cloth to bring out the grain. Then sand lightly and coat the wood with a suitable filler, rubbing this in and wiping off any excess. When dry, sand lightly with No. 4-0 paper and dust off clean. Give all surfaces two thin coats of white shellac and rub down the last coat with No. 00 steel wool. Then finish with two coats of furniture wax rubbed down and polished with a soft dry cloth. The same procedure is used in finishing mahogany save that the linseed oil is omitted and a brown mahogany stain is used in its place. If the chest is made of curly birch the surface is stained with a golden-oak oil stain which is rubbed off quickly after applying. This brings out all the beauty of the grain and leaves a soft brown color which is most appropriate for work of this period design. Then the surfaces are shellacked and waxed in the regular way. All surfaces veneered with red cedar are left unfinished. Each drawer is fitted with two antique bronze pulls.

☛ A spool cut in two at the middle provides two useful knobs.



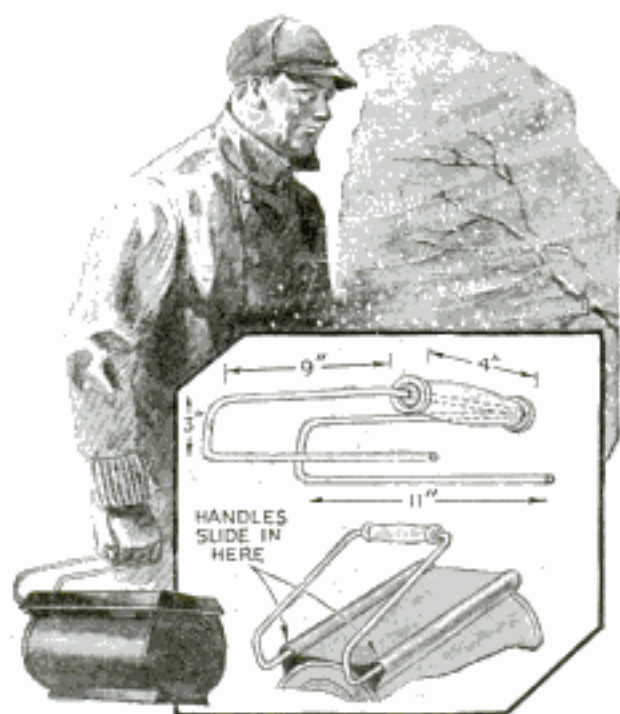
## This Bridge Lamp Clamps to the Table Leg

Here is an extremely simple and effective design for a bridge lamp, which cannot be tipped over. It clamps directly to the table leg and can be raised or lowered to suit the players simply by adjusting the clamp higher or lower on the table leg. It will fit any round or square leg and supplies illumination where it is wanted, directly over the middle of the table. As can be seen from the drawings, the entire job is done in the home workshop. Briefly, a 5-ft. length of copper tubing is bent to a graceful curve; the upper end is threaded for a chain-pull light socket, and a brass clamp, provided with a wingnut and bolt, is brazed to the other. Use copper tubing  $\frac{7}{16}$ -in. outside diameter, and cut a wooden form of  $\frac{3}{4}$ -in. boards nailed to the workbench. The squared detail gives the shape which was found satisfactory. Before bending the tubing, run the lampcord or a guide string through it, then bend slowly to the required curve. For the clamp use heavy-gauge sheet brass, 3 in. wide and about  $5\frac{1}{2}$  in. long. It may be varied one way or another if there is much variation from the standard 1-in. table leg. It will be well to first make a pattern of pasteboard and fit it around tube and table leg to get the exact size of the brass sheet required. On one end cut a notch to receive the pivoted end of the bolt, and bend the edge around a hinge pin, as shown. Use a  $\frac{1}{4}$ -in. brass bolt if available, and wingnut to fit. The clamp can be bent in a vise, except the portion that fits over the tube, and this can be bent around the tube itself or a bar of that size. The clamp is then brazed to the lower end of the tube and the job is complete. You can buff the metal to a bright finish and then give it a coat of transparent metal lacquer to prevent tarnishing, or you can apply paint to match the card table. In use, the clamp is slipped over the leg and the screw is turned around to engage the slot, after



which the thumbscrew is tightened to hold the clamp in place.

⚠ Always joint a saw to insure a straight cutting edge before filing the teeth.



Carrying a Filled Oil-Stove Tank Becomes an Easy Task with This Wire Handle

### Wire Handle Carries Oil-Stove Tank

As there were thousands of oil stoves sold having this type of tank, there are no doubt many persons who would welcome a wire handle for carrying the tank when it is to be refilled. Take a 50-in. length of  $\frac{3}{16}$ -in. wire, slip a 4-in. wooden handle over it and then bend the wire to the shape shown in the detail. In use, the two parallel ends of the wire are slid into grooves already provided at the bottom of the tank, in which position it is readily carried about.—E. L. Bray, Springfield, Massachusetts.

### Hinges Made from Sheet Metal and Brass Tubing

Decorative hinges to suit almost any requirement may be made of brass tubing and heavy sheet metal. The sides of the hinge are cut from the sheet metal to the required shape and are beveled slightly on the sides at the joint. A piece of tubing is next fitted with a metal rod long enough to serve as a hinge pin. With the rod removed, the tubing is sawed into three equal pieces, which are slipped over the pin and placed in the groove. The two outside sections of tubing are soldered to one of the side pieces and the center section is soldered to the other piece. This

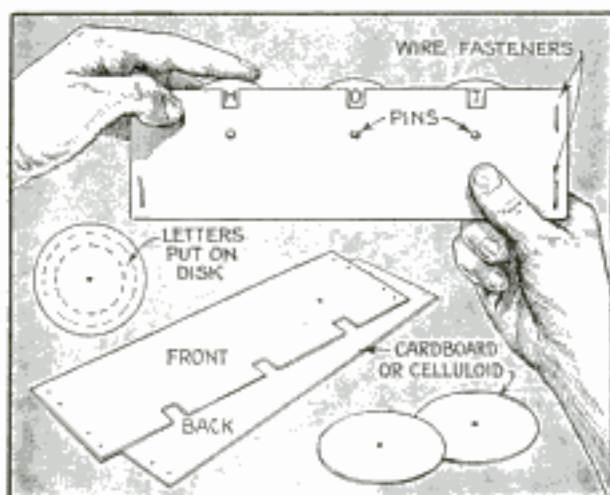
method will be found particularly handy when making ornamental strap hinges on old furniture.

### Repairing Crankcase Drain Holes

In model-A Ford cars, the crankcase oil drain is not integral with the crankcase and trouble is sometimes experienced by having the drain loosen because the plug has been turned in too tight. This usually causes no leakage, but it will be almost impossible to get the plug out when changing oil the next time. If this happens and there is no leak, the drain can be made firm by having the projecting metal electrically welded to the crankcase at two or three spots to keep the drain from turning when the plug is unscrewed. With electric welding the oil need not be removed, but care should be taken to avoid burning a hole through the relatively thin metal forming the lower half of the crankcase.—R. B. Mitchell, Mt. Vernon, N. Y.

### "Word Builder" Helps Win Contests

Here is a "word builder" that will help in making three and four-letter words from the letters in a sentence furnished by some advertisers. It consists of two pieces of cardboard stapled together at the ends between which a number of disks are pivoted, all of the letters to be used in the contest being printed on each disk. In use, one disk is turned at a time and as



Three or Four-Letter Words Are Quickly Listed for Contests with This "Word Builder"

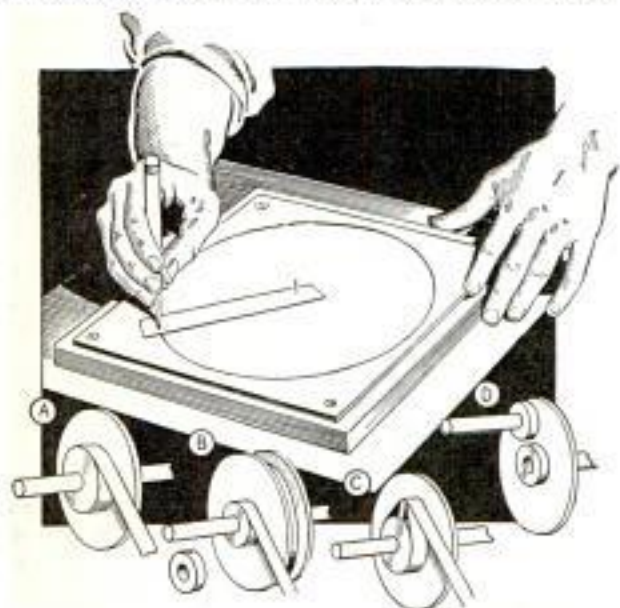
new words are brought into sight, they are listed on a sheet of paper.—Floyd Mix, Chicago, Ill.

### Improved Four-Jaw Drill Chuck

As most small drill chucks are of the three-jaw type, trouble is often experienced in trying to hold square stock with them. Being unable to purchase a four-jaw drill chuck for use in small model work, I made one from a tap wrench. To do this, either turn down the end of the shank to fit a three-jaw chuck or drill the end to take a short piece of round stock which can be clamped snugly in the drill chuck.—L. H. DeWitt, Canton, Ohio.

### Toy Pulleys and Wheels Made of Paper and Cardboard

Wheels, pulleys and small rotary parts for toys are easily made from gummed paper and cardboard. To make a flanged wheel begin as shown in detail A. Slip a cardboard disk over a dowel of the same size as the axle on which the wheel is to



Cardboard and Gummed Paper Used to Make Rotary Parts for Toys and Small Working Models

be used and wind on gummed paper to make the core of the wheel. Then another disk is added as in B, and the assembly is glued together. It is a good idea to grease the dowel to prevent the glue from sticking to it. If the pulley is to turn on its shaft, collars of rolled gummed paper should be keyed to the shaft on both sides of the pulley to hold it in place. Cams can be made by inserting a small block as shown at C, while a crank is made by rolling gummed paper on one end of a dowel, as illustrated in detail D.



Buhlwork Imitated by Pouring Colored Concrete into Molds Containing Patterns of Wood or Metal

### Buhlwork with Colored Concrete

Buhlwork is easily made with colored concrete. A wood pattern is cut out on a scrollsaw and is tacked to a back to form a mold, after which the concrete is poured into the cut-out part of the pattern. Another method is to arrange pieces of heavy cardboard in a mold and fill it with concrete. After the concrete has set for a day or two, the cardboard is removed and the resulting depressions are filled with colored concrete. If desired, the patterns may be made of colored woods or polished brass and left in the work. A third method of imitating buhlwork is to stamp the pattern. In this case, the concrete is poured into the mold, and the patterns are pressed into the soft concrete.

### Lens Cap Aids in Focusing Camera

A camera-lens cap, made by cutting out one end of a pill box to let light enter at two sides but not through the central half of the lens, will aid greatly in obtaining a sharp focus. When the camera is out of focus a line in the image appears as two lines, which rapidly merge as a sharp focus is approached. The same effect may be obtained when focusing a camera that has the lens wide open.



W. A. Maurer Company  
 6. colors kit. \$2.00  
 W. Brand are Cheery  
 3/6

# Make your own Stained



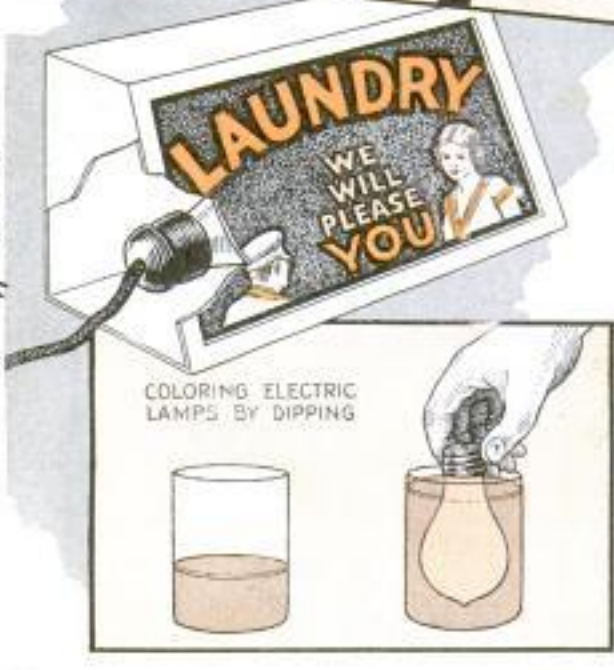
By D. M. CAMPANA

WITH a kit of specially made colors that are transparent, waterproof, and will not fade, artistic work can be done on glass, china, pottery, ivory, leather, wood or metal. There is practically no limit to the field and you can build up a substantial business in window decoration for churches, homes, hotels and restaurants.

While this kind of work does not differ greatly from other styles of painting, it does require patience and attention, the technique involved being slightly different. As the decoration is more or less transparent, depending on the amount of color applied, imperfection in the application can readily be noticed. These colors are slow drying, about twelve hours being required. It is not advisable to add any drier to them

as it will not help much, and besides, the addition of drier will affect the adhering property of the colors. It is of great importance that you clean the surface thoroughly before applying the colors. Glass should be cleaned with soap, alcohol or ammonia, and must be dry. To avoid lint or dust, use a piece of chamois skin instead of a cloth.

Paper patterns in great variety can be obtained for decorating windows. These have designs printed on them and the various parts of the design are numbered to indicate exactly what color is to be used. However, you can also draw your own designs or they may be pictures clipped from magazines. It is best to have the



# Glass Windows

also

Transparent, lasting color decoration on ornamental glass lanterns, non-burn celluloid lamp shades, household glass-ware, china, pottery, leather goods, electric signs and many other items ~ ~ ~

design on a piece of tissue paper so that you can easily judge the distribution of the color owing to the penetration of light through both the paper and glass. For this reason you should work with the glass between yourself and the illumination. The pattern is fastened to the reverse side of the glass with pieces of adhesive tape at the corners, so that you look through the glass at the design.

Now start tracing the lines of the design on the glass with black. This is done by means of a lining brush or an ordinary pen, the brush being used for the heavy outlining and the pen for the finer lines. The outline is to keep the colors separate, to accentuate the work, and to make realistic stained-glass effects. When lining on windows, it is a good idea to make use of a stick as an arm rest. As soon as the outline is thoroughly dry, the pattern can be removed, and the colors applied, being sure to dust the glass with a dry chamois first. As the colors are semi-liquid, they can be used directly from the bottle. Always stir the color well so that the pigment is thoroughly mixed in the solvent. Keep the bottles tightly corked when not in use. Do not load your brush heavily with color as it may drop off onto the





THE PATTERN IS FASTENED TO THE BACK OF THE GLASS WITH ADHESIVE TAPE

BLACK OUTLINING IS DONE WITH A STRIPING BRUSH

A PEN MAY BE USED TO OUTLINE NARROW LINES

BELOW: FLOWER DESIGN ON SUNPORCH DOOR

work where it is not wanted or it may run down over the outline after being brushed on. Generally the background or broad tints are first and the finer detailed work later. Use a large flat brush for the background and start at the upper part of the glass, gradually working down until the space is filled. Try to stretch the color with the brush rather than to apply the color in quantity. The shade may not be as deep as desired at first, but you can deepen it by giving it a second coat the next day, after the first coat has become dry. Stippling and padding can be done within two hours to smooth out uneven spots in color. The pads are made of fine silk or cotton cloth, the lint having been burned off. They are moistened with some of the color so that they will not remove too much of it from the glass. If the pad becomes loaded with color, rub it occasionally on a piece of clean paper and proceed as before. The work of stippling and padding is best done after the color has set, as when fresh, it will come off too easily. After the first color has been applied, start on another; not close to the first one, to prevent the colors from running together. In this way the entire design is carefully filled in. The next day you can repeat the coloring to get various shades and it may be necessary to apply three or four coats for the darker portions of the picture.

Removing these colors is rather difficult



as they become very hard. But if this is necessary for any reason, they should be moistened with turpentine for 24 hours. If the decoration to be removed is on a standing window or panel, you may cover it with a rag soaked in turpentine. After this period of soaking, the color will be sufficiently soft to permit scraping it off with a safety-razor blade. Of course, the color can easily be removed while fresh; a rag moistened with turpentine will clean it off thoroughly.

Practically the same methods may be followed for coloring china, pottery, metal and wood. These colors can also be sprayed with an air gun on production work in manufacturing plants. In this

case considerable air force should be used and a heavy coat should not be attempted in one spraying. For coloring electric lamps by the dipping method, put some of the color in a can which is just a little larger than the lamp, as shown in one of the details. For making lamp shades, non-burn celluloid is available. This is easy to cut to the shape required after which it may be colored in any way to suit your taste, and can then be laced to a wire frame. Another interesting and profitable application of these glass colors is the making of electric signs, which consist of wood or metal boxes with colored glass fronts and are equipped with electric lamps for illumination.

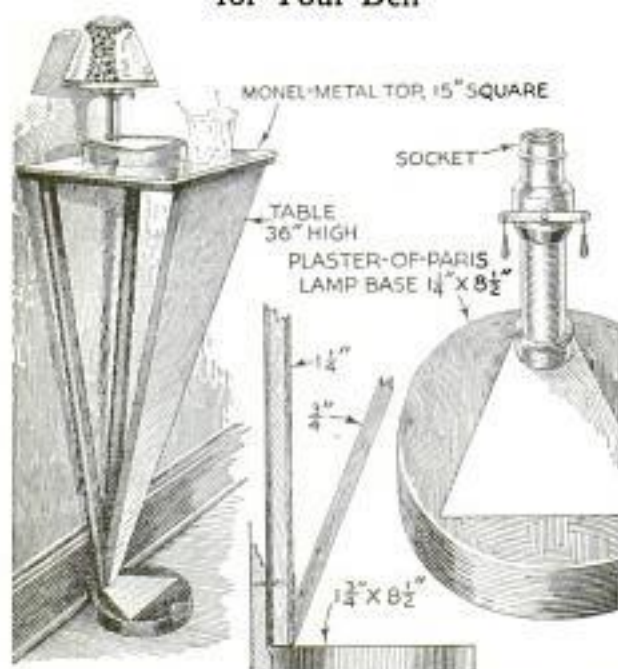
#### Dead Ducks Used as Decoys

When mallard, teal or pintail ducks are flying rather low, a few dead ducks of any of the above species placed in a life-like position about 20 yards from the shore will serve as decoys to attract the flying flocks. The decoys should be placed in shallow water where aquatic weeds grow to the surface. To set the decoys, make several piles of weeds to within about 2 in. of the surface of the water, locating the piles so that when the decoys are placed on them, they will have the appearance of feeding. Next set a dead duck on top of each pile and push a forked stick into the weeds to support the ducks' necks in a natural position. Now return to your blind and await results. If you have a

caller, use it when a flock appears, repeating the call at intervals as the ducks circle above. If a caller is not at hand, a drake's call can be imitated by closing your nose with the fingers and quacking like a duck. A little practice will enable you to imitate the calls of the various species of ducks. Many sportsmen use only this means of calling ducks. As other ducks are killed they can be added to your flock of decoys. This method will be found very effective on days when there is little wind or only a light ruffle on the surface of the water.

☛The surface of metal to be electroplated should be free from scratches or imperfections, as they will still be noticeable after the plating is finished.

### Modernistic Table and Lamp for Your Den



Monel-Metal Top Adds to the Appearance of This Modernistic Table

Monel metal is used as a covering for the top of this table, which has a lamp to match. The table is made of wood with the exception of the base, which is cast from plaster of paris. Long woodscrews driven through the rear supports into the baseboard hold the table in a vertical position. The lamp socket is supported by a length of nickel-plated brass tubing, the lower end being flared to keep it from pulling out of the base, which is also cast from plaster of paris.

### String Raises Contents of Tobacco Tin to Convenient Level

The contents of a tobacco tin may be raised to a convenient level with a string. Cut a piece about 30 in. long, double it and tie the ends together. Remove the paper package from a new tin, place the looped string over the lid hinge and drop the slack into the tin. Then replace the package,



leaving the knotted end of the string outside which is pulled in order to raise the paper container.

### Clogged Drain Scuppers on Boat Cleaned with Bilge Pump

To clean clogged drain scuppers under the deck of a cruiser, use of a bilge pump is effective. Immerse the suction end of the pump into a pail of water and insert the hose on the discharge end into the scupper to be cleared. Usually, a few good strokes of the pump will blow out the small particles of dirt and paper lodged in the pipe. In stubborn cases it may be necessary to soak the clogged scupper overnight with some drain-cleaning solution and then apply the pump.—K. F. Keith, St. Petersburg, Fla.

### Window Stop from Wood Block

Handy window stops for holding open windows can be made by pivoting a wood block to the casing. The block is sawed to the shape shown, after which a short section of the molding forming one side of the window slide is cut out to accommodate it. A twist of the stop allows the window to pass, while a turn in the opposite direction stops it.—B. Ruthenberg, Chicago.



### Making Chains from Wire

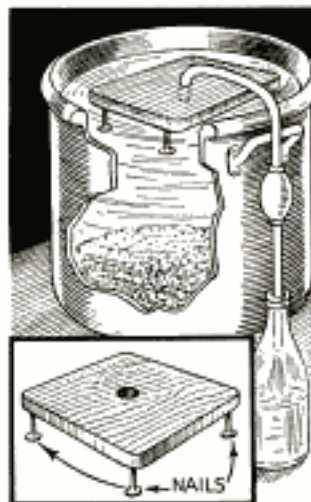
Chains of almost any length or weight can be made by wrapping copper, brass, silver or other metal wire around a hardwood form having a cross-sectional shape that corresponds to the desired shape of the links. First wrap the form with a strip of paper about 1 in. wide so that each turn overlaps one half of the preceding turn. Wrap the wire over the paper in tight even turns, making as many turns as there are to be links in the chain. Then tack the ends of the wire to the form and hold it over an open flame. The heat will anneal



the wire so that it will hold its shape, and at the same time burn away the paper so that the form can be pulled out of the wire coil. The turns of wire are now cut apart with a pair of side cutters and are soldered or brazed together to form the links of the chain. The brazing may be done with a mouth blowpipe and an alcohol burner with the links resting on a charcoal block. A spelter, having a lower melting point than the material from which the chain is made, should be used for this purpose. Brass turnings may be used as spelter if they are mixed with granulated zinc and melted in small quantities. The more zinc used, the lower will be the melting point of the spelter. Silver solder of suitable hardness may also be applied by the same method.

#### Float Aids in Siphoning Beverages into Bottles

When siphoning beverages into bottles, a float to carry the end of the siphon hose will help prevent the sediment in the bottom of the container from being disturbed. The float is a wood block drilled in the center to take the end of the hose. Nails projecting from the underside corners of the block, support the float when it gets near the bottom of the container and prevent sediment from entering the bottles.

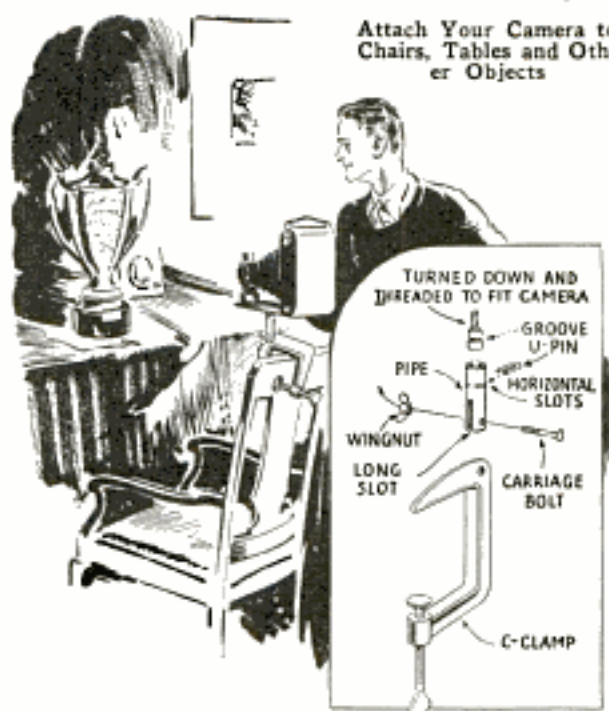


#### Hacksaw Used as Straightedge in Scribing Lines

When marking planking lines on model-boat decks, or other lay-out lines on smooth steel or iron, the trouble often experienced by having the straightedge slip as the scriber is pulled along against its edge, can be eliminated by using a straight-backed hacksaw blade for a straightedge. The set in the teeth of the saw is sufficient to grip the surface and hold the straight-edge in position.

#### Camera Holder Made from C-Clamp

Attach Your Camera to Chairs, Tables and Other Objects



For indoor photography or for long hikes, this camera holder will be found a greater convenience than a tripod, as you can support the camera on anything within the limits of the clamp jaws. The holder consists of a C-clamp and a pipe nipple. The latter is slotted lengthwise at one end to fit over the clamp, and is drilled for a bolt and thumbnut. A short piece of brass rod, turned down and threaded to screw into the bottom of the camera, is fitted into the other end of the nipple where it is held by a U-shaped pin. The angle of the camera can readily be adjusted by tilting either the C-clamp or the pipe nipple.

#### Door Locked Effectively with Chain

Effective night locks for doors from the inside may be made from a short length of chain and a large metal drawer pull. The chain is looped around the door knob and the drawer pull is run through the end links and is screwed to the door casing as shown, allowing enough slack in the chain to slip it on and off the knob when the door is closed.

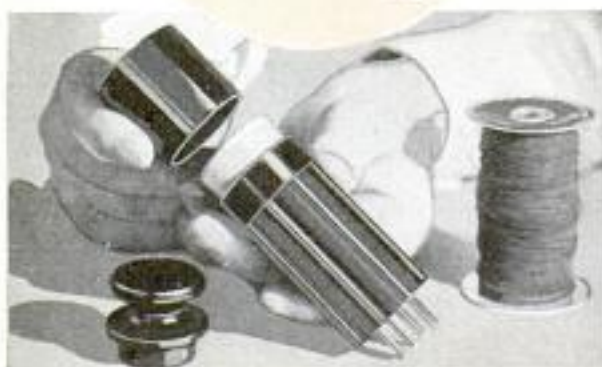
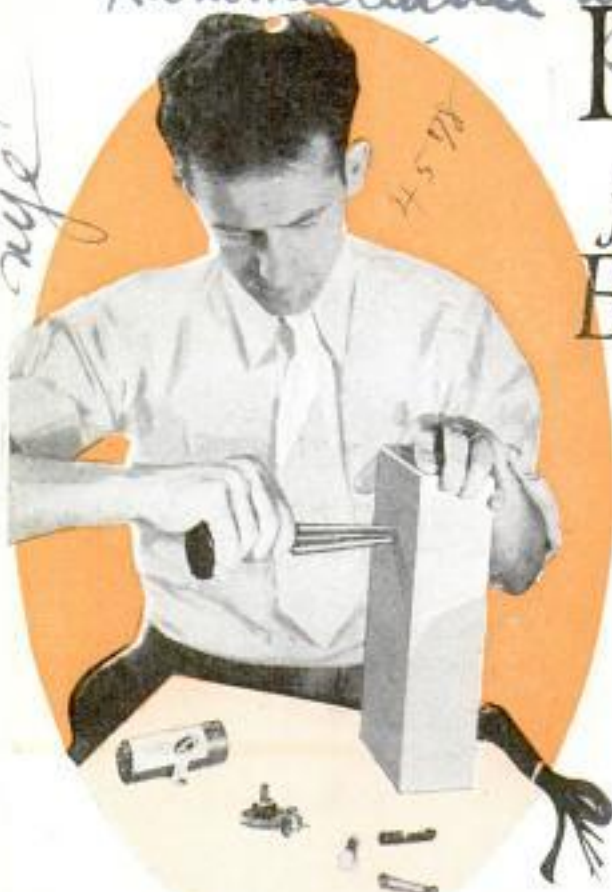


Part } Pavertone Electric Co  
 164 Washington St. N.Y.C.  
 Hammarlund mfg Co 424 W. 22nd St. N.Y.C.

# PENTODE

## for Short-Wave Battery Receiver

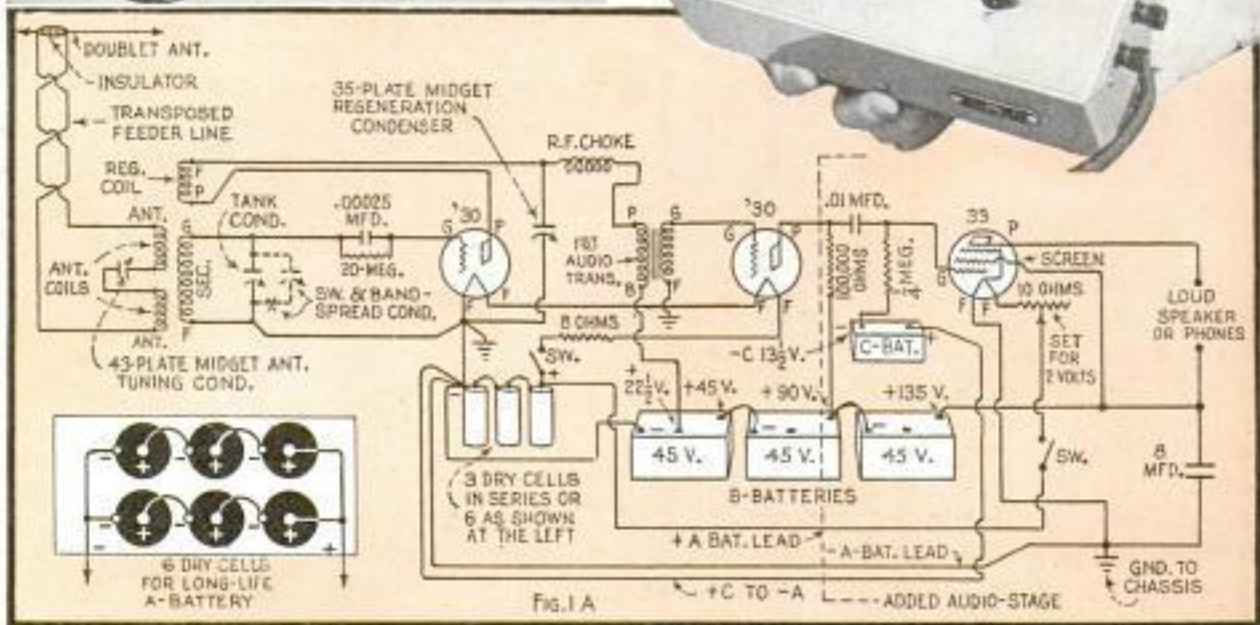
and Bruino Laboratories  
 20 W. 22nd St  
 N.Y.C.



ALTHOUGH designed for use with the two-tube short-wave set described in the September issue, this simple audio stage may be added to any small 2-volt battery-operated receiver in the same manner. Exceptional volume is obtained by the use of a type '33 pentode amplifier tube in this separate stage.

The same dry-cell A-battery may be employed. However, as this tube places a greater drain on the dry cells, it is best to use a bank of these connected in series-parallel, as shown at lower left in Fig. 1A. The builder may prefer to use a 2-volt storage cell; in this case the tubes in the set are connected in parallel, instead of series, and no filament resistors are required in either unit.

The added resistance-coupled audio stage is shown in the schematic diagram,



# AMPLIFIER

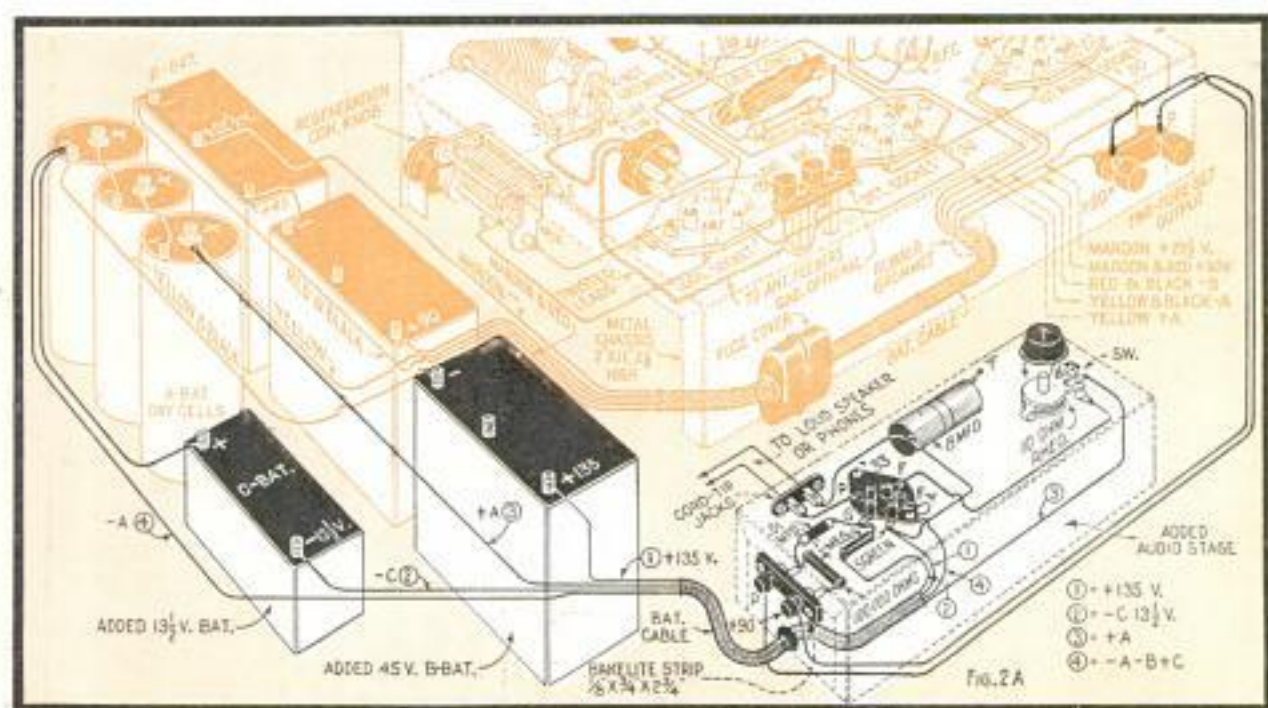


Fig. 1A, and indicated by the black-line portion of the simplified wiring diagram, Fig. 2A. The 13½-volt C-battery and the additional 45-volt B-battery are connected without disturbing any of the original battery connections. The phones, or speaker, are plugged into the cord-tip jacks mounted on the side of the amplifier unit. Two flexible leads are then run from the phone posts of the set to the input posts

on the amplifier. Posts marked P and positive 90 on each unit are connected just as shown.

The metal base for the added amplifier unit is 4 in. wide, 2½ in. high and 10 in. long. Holes for the wafer-type socket and the combination 8-ohm rheostat and filament switch are drilled 2½ in. from each end. The hole for the tube socket should

(Continued to page 116A)



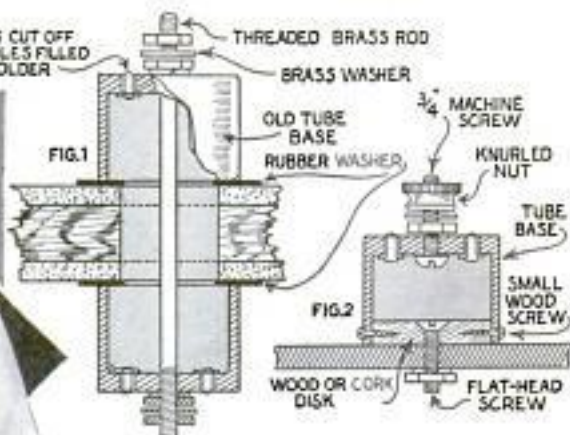
# Easy Solutions for Everyday Radio Problems

*W. Thomas Alamocone Co  
578 S. W. Overbridge  
Delaware, Mich  
C 4557*

*Hammarlund by C  
424 2033 rd*



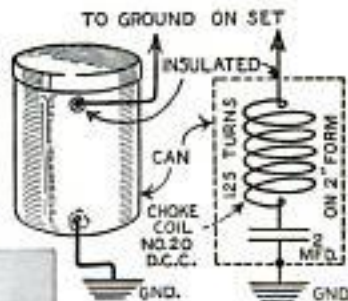
PRONGS CUT OFF AND HOLES FILLED WITH SOLDER



Useful Insulators Made from Old-Tube Bases; Fig. 1, Antenna Lead-In through Window Sash; Fig. 2, Stand-Off Type

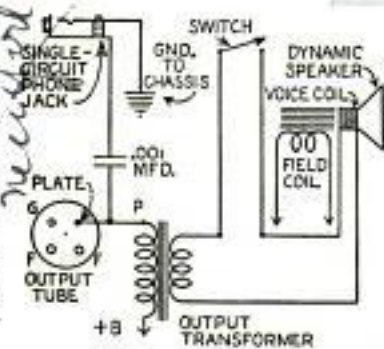


Plug-In Coil Winder from Discarded Pencil Sharpener; Cutters Are Removed and Tapered Wooden Block Is Drilled and Screwed to Shaft

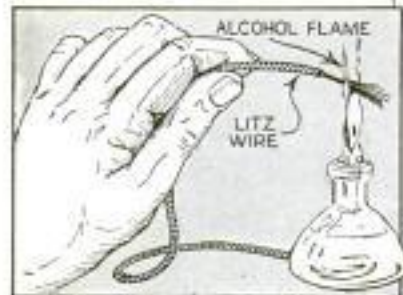


Ground Filter Reduces Interference Pick-Up from Near-By Grounded Electric and Telephone Lines; the 2-Mfd. Fixed Condenser Is Placed Inside the Choke

Above, Dry-Disk Photo-Electric Cell for Experimenters Operates without Batteries; Right, Improved I. F. Transformer, Tuned with Air-Type Variable Condensers, Retains Maximum Efficiency Regardless of Temperature or Atmospheric Conditions



Upper Left, Hook-Up for Using Phones with A.C. Receiver; .001 Mfd. Condenser Prevents Hum; Switch Cuts Out Speaker; Below, Removing Insulation from Litz Wire for Soldering



Above, Heavy-Duty R.F. Choke Coils for Amateur-Wave Bands; 235 Turns of No. 30 D.S.C. Wire Is Wound on Form 1 In. in Diameter and 4 1/4 In. Long; Left, Using Emery Cloth to Remove Scores from Condenser Shaft or for Polishing Copper Tubing

*Chicago Radio Apparatus Co  
415 Copyrighted material  
Chicago*

# Compact DX ANTENNA

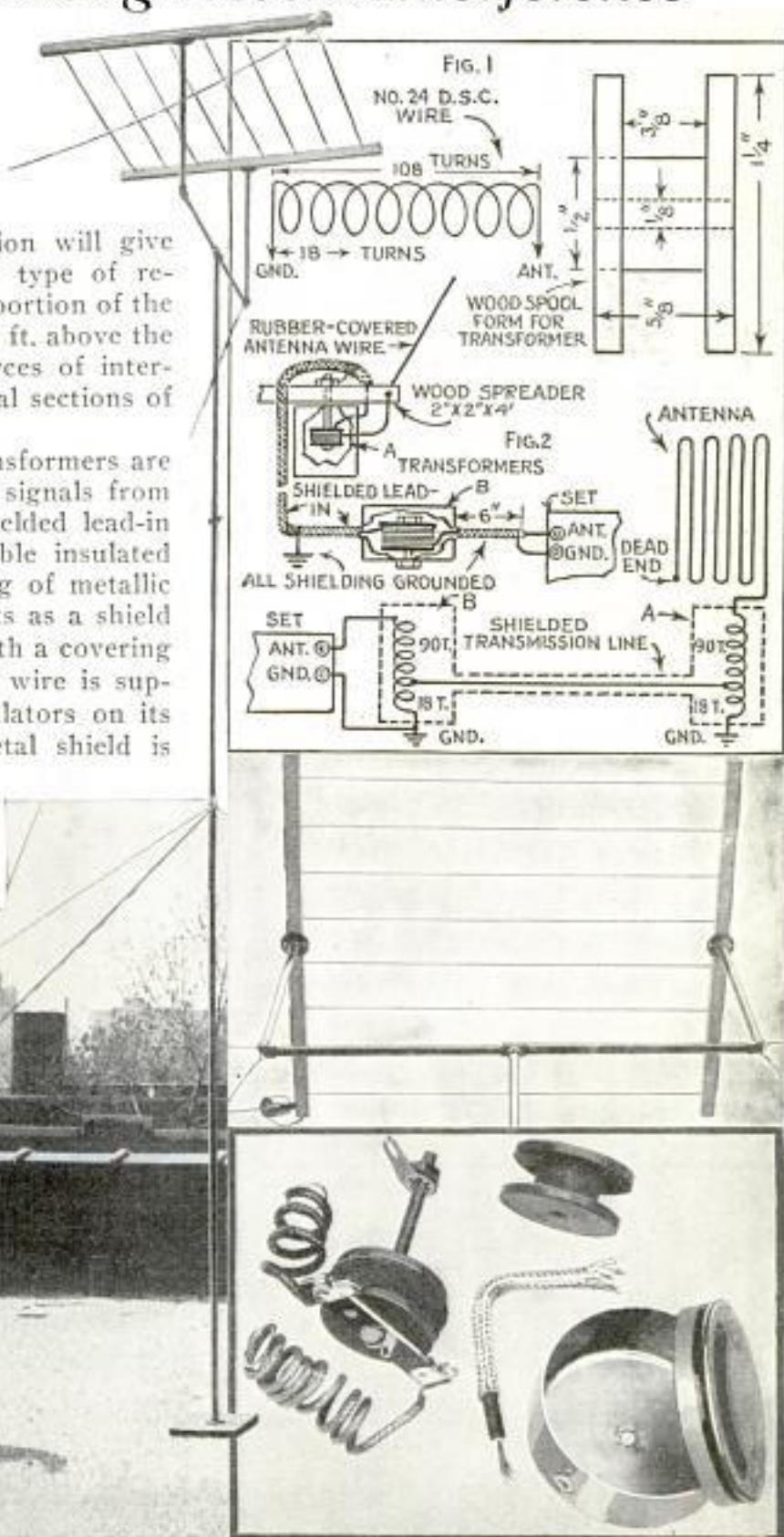
## Works Through Local Interference

**I**N crowded localities where man-made static is troublesome and limited roof space does not permit the erection of a doublet receiving antenna, this compact installation will give excellent results with any type of receiver. The signal pick-up portion of the antenna system is raised 18 ft. above the roof, well away from sources of interference, by means of several sections of galvanized-iron pipe.

A pair of homemade transformers are used to transfer the radio signals from the antenna through a shielded lead-in to the receiver. This flexible insulated lead-in wire has a covering of metallic braid. The metal braid acts as a shield and should be protected with a covering of friction tape where the wire is supported with stand-off insulators on its way to the set. This metal shield is grounded at several points as indicated.

A 4-in. floor flange is

(Continued to page 118A)

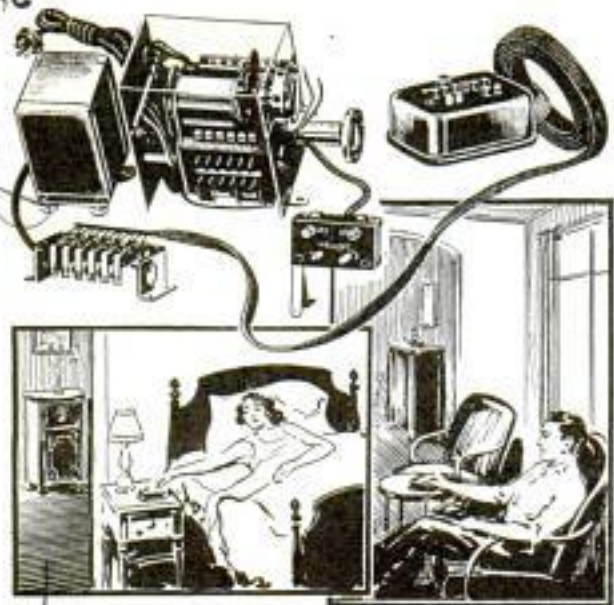


Radio Victor Corp  
Camden, N.J.

Radio Radiotron Co  
Harrison, N.J.

POPULAR MECHANICS

Seller-Wholesale Radio Corp  
 100-6th Ave New York  
 Shows



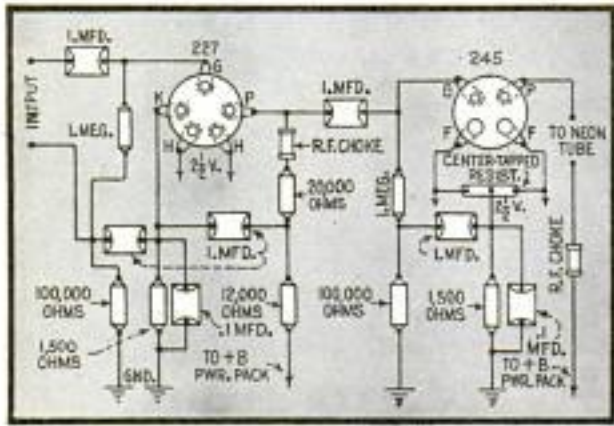
Above, Remote-Control Units for Operating Radio Receiver from Adjoining Rooms, as Shown Below

**Automatic Remote Control for Six Different Stations**

When coupled to the tuning condenser shaft of any single-dial receiver, this inexpensive full-automatic remote-control assembly turns the radio on and off, accurately selects six different stations and adjusts the volume control to suit the operator. Manual tuning other than that necessary for the original settings of the selector buttons, is entirely eliminated. The motor operates from the 110-volt a.c. house line, and the push-button control box may be placed at any point within 75 ft. of the receiver.

**Two-Tube Amplifier for Any A.C. Television Receiver**

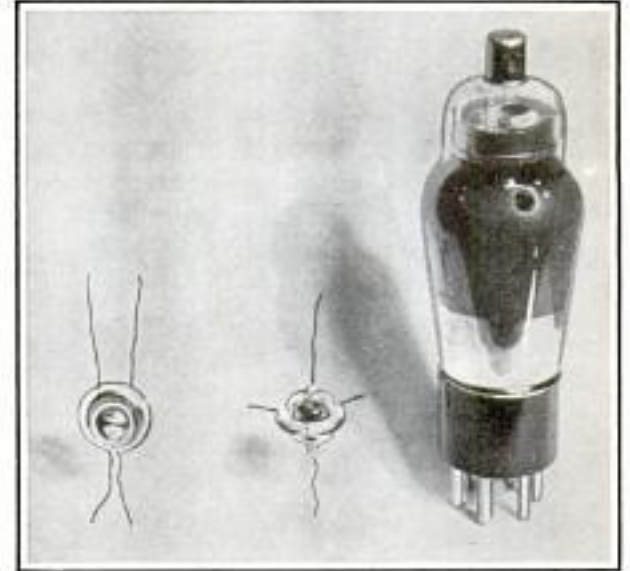
This resistance-capacity coupled amplifier, shown in the simplified wiring diagram, may be assembled in breadboard



fashion and connected to the detector output of any tuner that will cover the television band. It has been found very efficient for extending the high and low-frequency ranges.

**Miniature Tubes for Ultra-Short Waves**

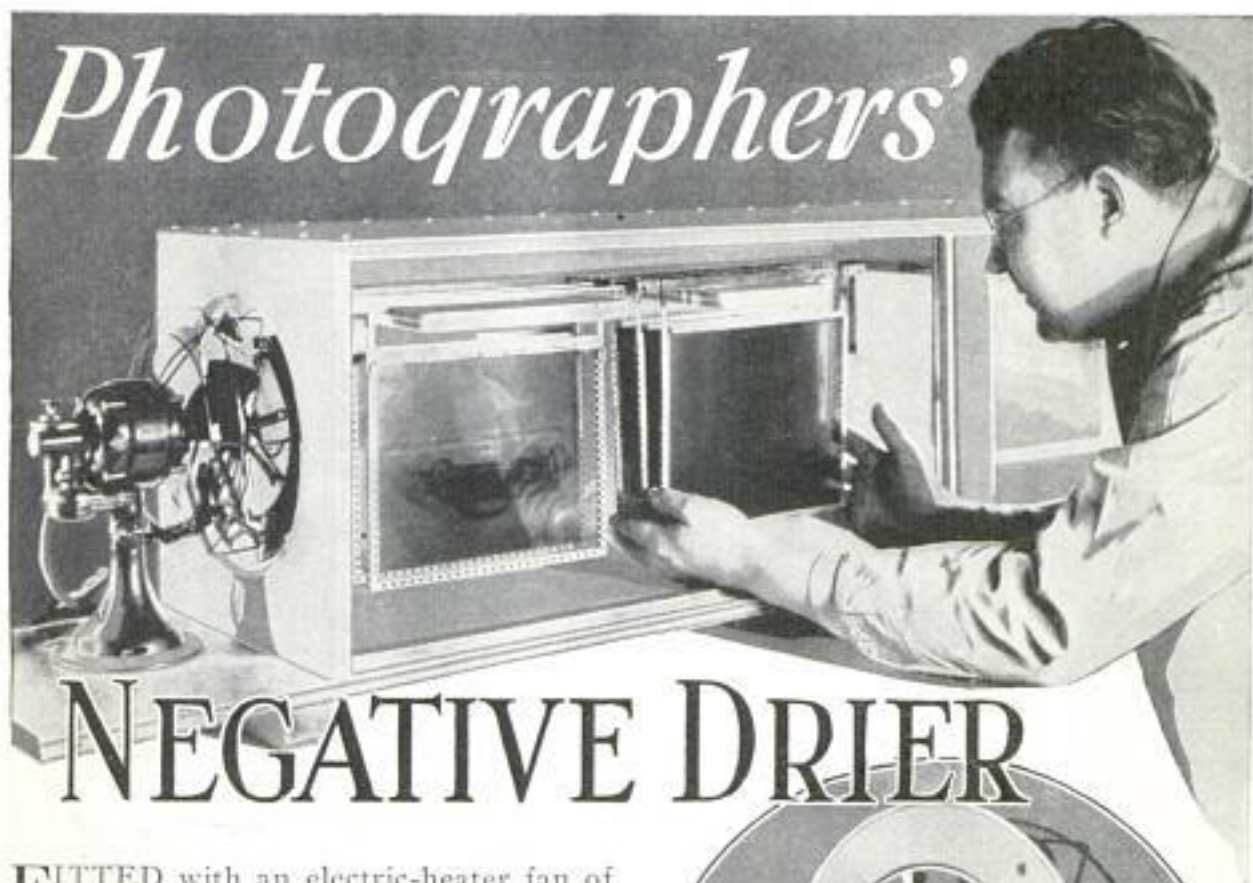
Only slightly larger than a shoe button, these little tubes, described at the recent convention of the Institute of Radio Engineers, may be used in standard ultra short-wave circuits. Compared with their big brother at the right, a modern tube of usual size, they are truly the midgets of the tube family. They have been worked successfully in tuned r.f. amplification at around 6 meters where only very special experimental tubes have been effective before. In a standard circuit, the screen-grid type, at center, provides satisfactory amplification at 60 centimeters, or a wave-



Special Short-Wave Tubes as Compared with the Usual Receiving Type

length of about 23.6 inches. The gain per stage at 100 centimeters in a tuned r.f. circuit would be around 4. At this frequency perhaps only one r.f. stage would be practical. However, at 6 meters two or more stages could be used. This tube is also employed as a detector. The triode type at the left is used as an oscillator.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

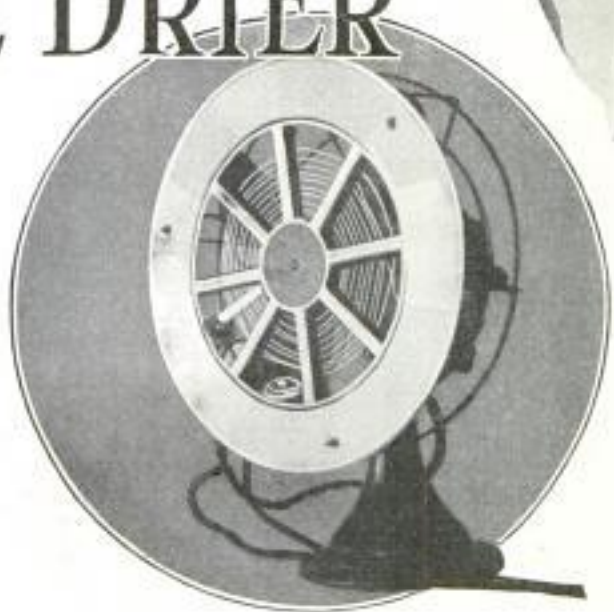


# Photographers'

## NEGATIVE DRIER

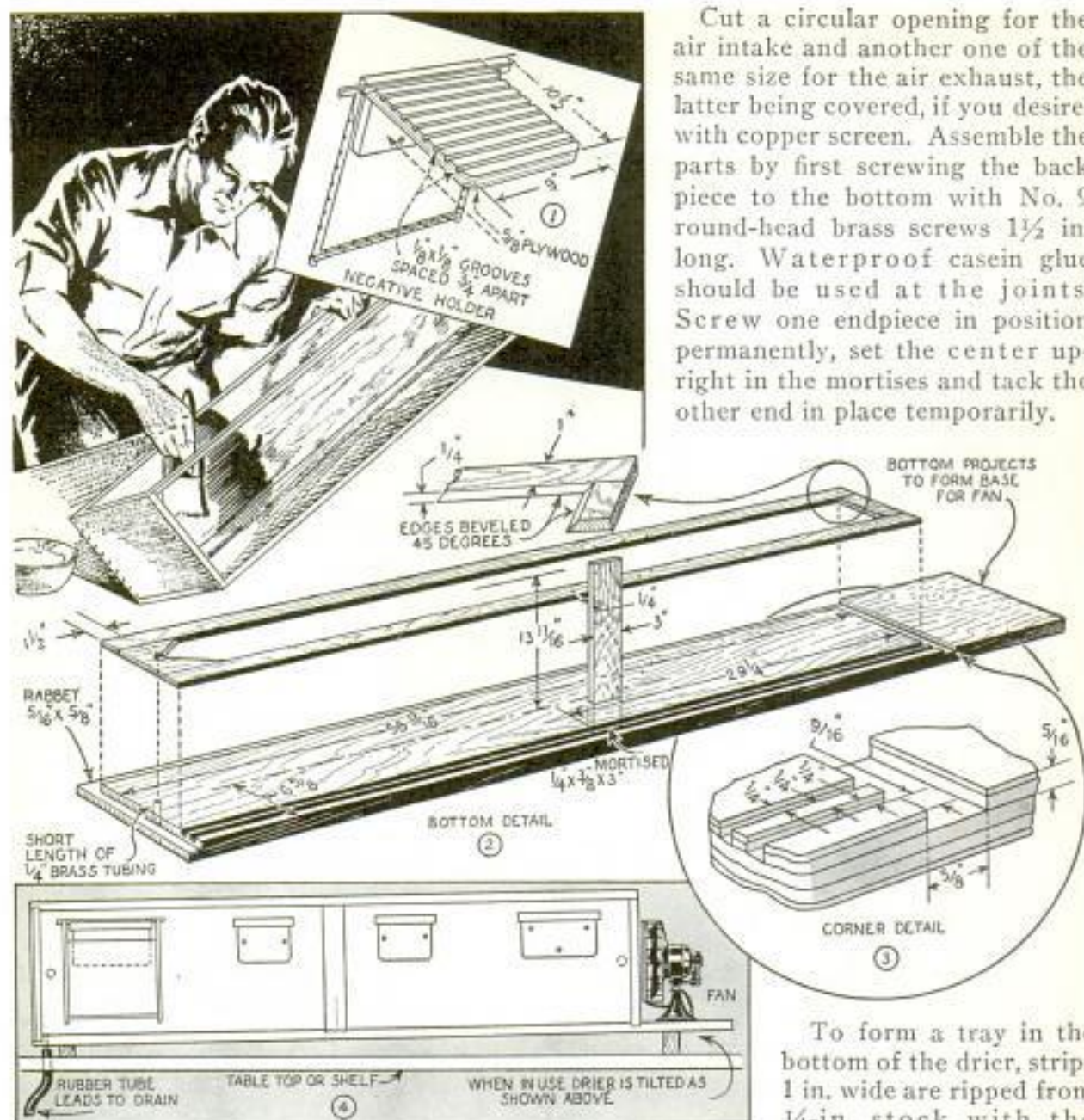
**F**ITTED with an electric-heater fan of the type shown in the circular detail, this miniature "wind tunnel" quickly dries negatives, which are suspended from crosspieces at the top. The interior is easily accessible as the front consists of two sliding plate-glass panels.

Material needed to build this drying cabinet are two 5-ply,  $\frac{5}{8}$  by 30 by 72-in., pieces of fir plywood. The panel that forms the top is ripped  $13\frac{1}{4}$  in. wide and is cut 60 in. long as in Fig. 5. The bottom piece is ripped to the same width but is cut 69 in. long, allowing a 9-in. projection for mounting the fan. The back piece is cut  $13\frac{1}{2}$  in. wide and  $59\frac{1}{4}$  in. long, and the ends each  $13\frac{1}{8}$  by  $13\frac{1}{2}$  in. These dimensions allow for cutting rabbets on the top, bottom and end pieces. If no power saw is available for cutting the rabbets, then the parts may be joined with plain butt



joints and the dimensions must be altered accordingly.

The back edge of both end pieces is rabbeted  $\frac{5}{16}$  by  $\frac{5}{8}$  in., which size rabbet is run across both ends of the top and down



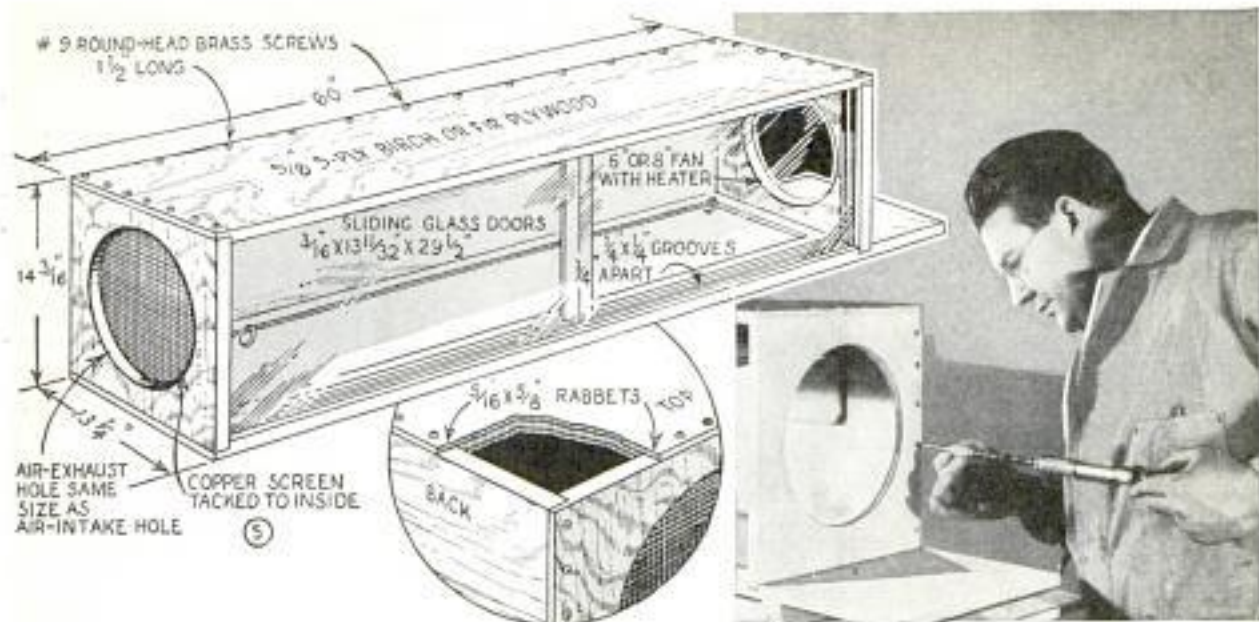
Cut a circular opening for the air intake and another one of the same size for the air exhaust, the latter being covered, if you desire, with copper screen. Assemble the parts by first screwing the back piece to the bottom with No. 9 round-head brass screws 1 1/2 in. long. Waterproof casein glue should be used at the joints. Screw one endpiece in position permanently, set the center upright in the mortises and tack the other end in place temporarily.

the back edge. The same is true of the bottom, save on the one end on which the fan is mounted. The rabbet on the back edge of the bottom piece is stopped and a 5/16 by 5/8-in. groove is run at right angles across the face as shown in Fig. 2. Fig. 3 shows the location of the 1/4 by 1/4-in. grooves which take the sliding glass doors. These grooves are run the same on the top, ends and bottom. Cut a 1/4 by 3/8 by 3-in. mortise at the center of the bottom and top pieces to take the upright. This is cut from 1/4-in. plywood and when in place supports the top and also acts as a meeting rail between the sliding glass panels.

tacked to the bottom as in Figs. 1 and 2. Crosspieces are fitted with the ends mitered to 45° as shown, and a hole is bored through the bottom to take a 1 1/2-in. length of 3/8-in. brass tubing, which is driven in until the end is flush with the surface. Fitted with a piece of rubber tubing this forms a suitable drain as shown in Fig. 4.

The racks supporting the negative hangers are made as in Fig. 1 which gives the dimensions for an 8 by 10-in. hanger. The racks may be made for any size hangers and are simply screwed to the back of the drier in a convenient position. The top face of the horizontal piece is grooved 1/8





by  $\frac{1}{8}$  in. as indicated, the grooves spaced  $\frac{3}{4}$  in. apart center to center, which will allow plenty of space for twelve holders on each rack.

This done, all surfaces of the drier, inside and out, are coated with hot paraffin melted over a bunsen burner or any other suitable source of heat. The melted paraffin is applied to the surfaces with a small brush, care being taken to work it into the corners and particularly the grooves which take the sliding doors. One coating is sufficient to waterproof the wood and any excess may be scraped off after the paraffin has hardened. Another waterproofing preparation that can be used con-

sists of paraffin dissolved in ordinary cleaners' naphtha. This is easy to apply with a brush and leaves a uniformly coated surface. When finished, clean the brush in gasoline or naphtha. The racks may be coated also on all surfaces and edges. Slide the glass doors in place in the grooves and fasten the loose end of the drier permanently with screws. Mount the box on two crosspieces ripped from  $1\frac{1}{2}$ -in. stock, one piece  $1\frac{3}{8}$  in. wide, the other  $1\frac{1}{8}$  in. Screw the narrow piece to the bottom at the end opposite the fan. Holes may be drilled through the base of the fan to take small screws or bolts to hold it permanently in position.

### Non-Slip Chock for Airplanes

This airplane-wheel chock will not slip as the greater the pressure against it, the deeper it digs into the ground. It is made of 2 by 8-in. stock. After nailing the chock together, drill small holes in a couple strips of flat iron and nail them to the sides as shown. A wood rasp is used to curve the upper part of the chock to fit the tire, after which a hole is drilled through the chock for a rope with which it is pulled

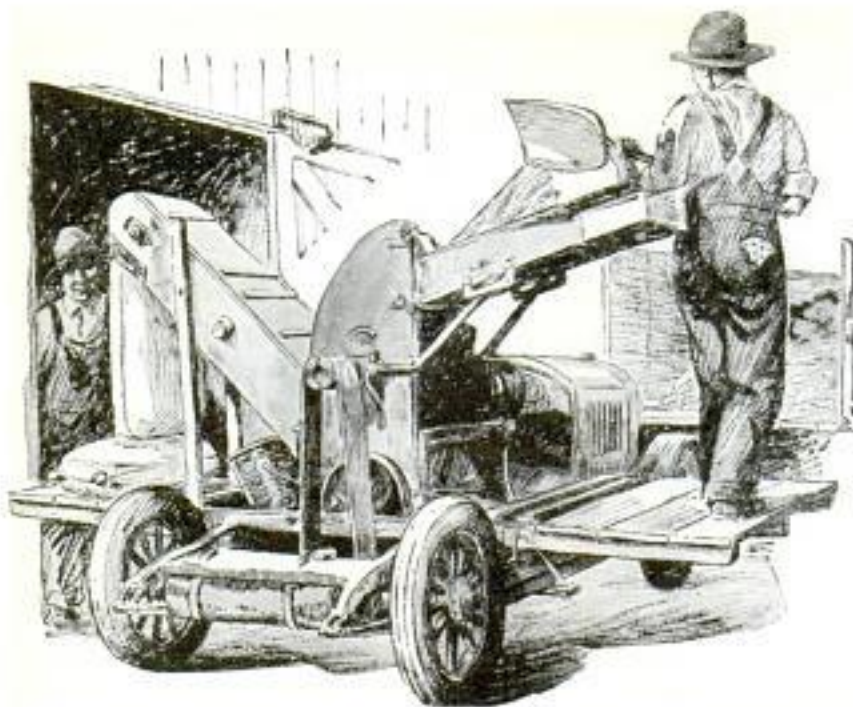


away from the wheel when the plane is started.—C. Sessions, Waynesville, Ill.

### Neat Paper Weights from Tobacco Sacks

News stand operators, drug stores selling magazines, and other vendors of newspapers and magazines should be interested in how a dealer in Tampa, Fla., solved the problem of weighting his wares. He merely secured a number of small tobacco sacks and filled them with sand. The draw string is pulled tight, tied, and the result is a neat weight, which does not tear the papers when they are jerked from the pile.

Caliper a bored hole at several points along its length, as the size at the opening may be misleading.

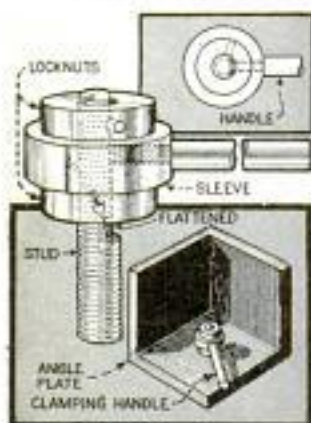


Mounted on Old Auto Chassis, This Feed Grinder Is Powered by the Auto Engine and Can Be Towed

### Portable Feed Grinder Powered with Old Auto Engine

A Texas farmer mounted a large feed grinder on an old auto chassis and towed it around to his neighbors to do their grinding work. Power for the machine is taken from the old auto engine through the transmission to a pulley on the drive-shaft, the pinion having been removed from the end of the shaft inside the differential. Folding platforms on each side afford facilities for feeding the grain and loading the ground feed, and are hinged so that they may be raised and fastened against the side of the grinder when not in use.—Gordon Holford, Garland, Tex.

### Adjustable Hand Clamping Screw for Machine and Fixture Work



Many cases occur on machine and fixture work where a hand clamping screw must have a certain amount of adjustment to make correction for the wear of constant use. Several types of adjustable

screws are in use by manufacturers but the one shown in the drawing will interest the small shop man because it can be made up from parts easily produced. The screw is a headless one with a flat cut on one side about half the length. A collar or sleeve is made with a plain hole fitting over the screw and a tapped hole in the side to take a handle. Two locknuts complete the device. In the illustration the screw is shown in use on a double angle plate. The screw turns in a tapped hole in the machine table and the angle plate is turned and tightened in

various positions to suit the work. This constant adjustment causes the handle to hit one side of the plate in time, and when this occurs the locknuts are loosened and the bottom one turned until the screw tightens up in the proper position, after which the top one is tightened to lock the setting. When the screw is in use there is no tendency to unlock the nuts as the handle bearing on the flat takes the strain of the loosening and tightening movements.

### Cutting Uniform Grooves in Wood

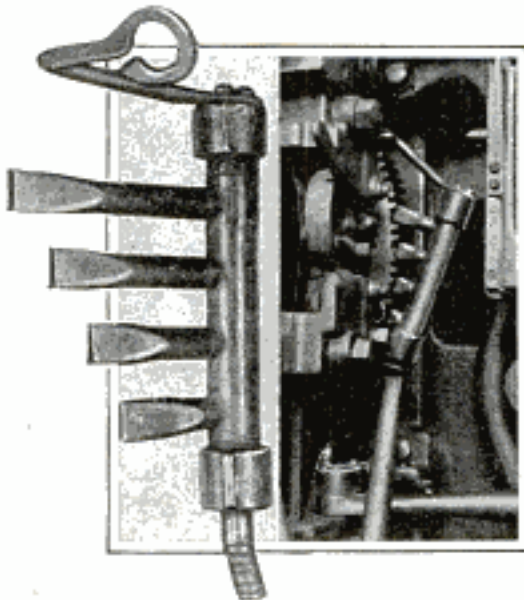
To cut uniform grooves in a wood surface without splintering the wood, brad two brass strips to the work to serve as a guide for the gouge. If the brass is thick, the inside edges should be beveled. Use an outside ground gouge a little wider than the groove.—W. H. Sargent, Rutland, Vt.



Use a fine feed on milling-machine work that is likely to be easily sprung.

### Air-Cooling Device for Linotype Machine

Linotype machines casting large slugs or locked for recasting, frequently develop trouble from overheated molds, which results in backsquirts and other metal troubles when not equipped with water-cooled molds. To eliminate this trouble and assure uniform slugs on long runs, the machinists in charge of a battery of linotype machines in a large composition plant made a compressed-air blower that proved very practical. It is made of pipe fittings and is attached to the knife-block locking studs. A pipe is run from the compressed-air line to the machine and is connected with the blower by means of a hose. A valve regulates the amount of air used on each machine and temperature can be very closely regulated for each individual machine to suit the job at hand. The photo shows the construction of the blower



Made of Pipe and Fittings, This Blower Cools Linotype Machines While Casting Large Slugs

and the method of attachment. In plants not equipped with compressed air, or for a single machine, a small air compressor, such as the type used on automobiles, hooked up to run off the motor, will give equally satisfactory results.

### Sliding Rods Hold Sheet-Metal Stock Along Wall

To eliminate lifting heavy pieces of sheet metal from bins, a tinsmith stacked his stock on edge along one wall of the building and supported it by means of 1/2-in. iron rods. Wood blocks nailed to



Stocks of Sheet Metal Stacked on Edge Along Wall and Held by Sliding Rods

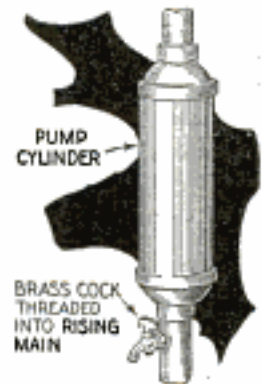
the wall were fitted with large screweyes through which the rods were dropped as indicated. To remove a piece of the metal from either end, it was only necessary to lift one rod and pull the sheets forward to select one of the desired gauge.

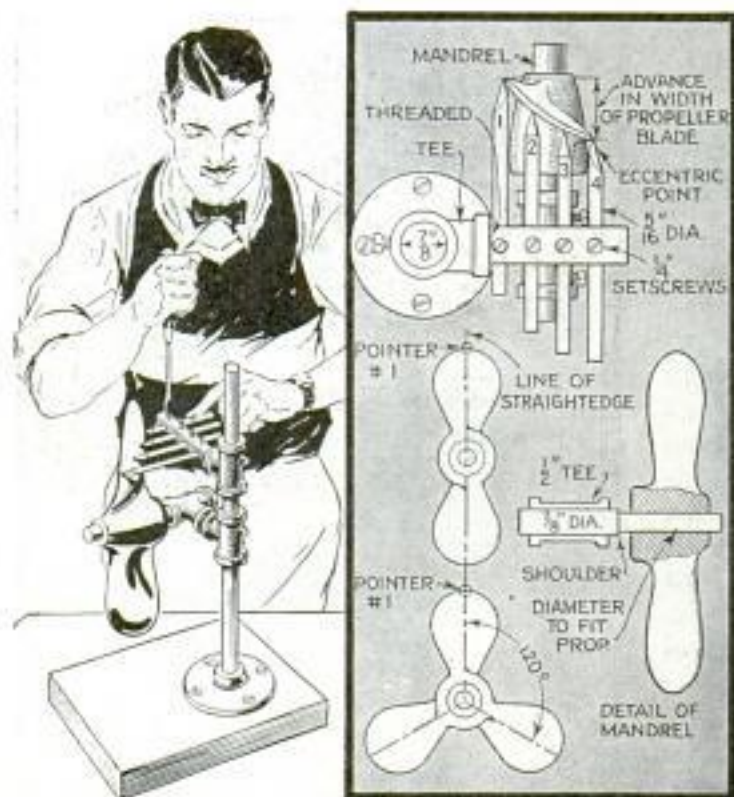
### Preventing Double Exposure of Films

After spoiling several films through double exposure because I had forgotten which plate in the holder had been used, I put little paper stickers over the holder so that they are torn in pulling out the dark slide. In this way, I can tell at a glance which plate has been exposed.—E. W. Ross, Athens, Ohio.

### Keeping Pump Cylinders from Freezing

Where a pump cylinder is so located that it may freeze, much trouble can be avoided by drilling and threading a hole in the pipe just below the cylinder, and screwing in a brass tap. When the tap is opened, air rushes in and drives the water back into the well, and a few strokes of the handle will empty the cylinder. In use, the tap is closed and the pump must be primed.—George Smith, Simcoe, Ont., Canada.





Those Who Frequently Repair Boat Propellers Will Find This Jig Useful for Checking for Uniformity of Blade Curvature

### Jig to Test Pitch and Radius of Boat Propellers

Pitch and radius of a propeller blade up to the 12-in. size, can be accurately checked by means of this simple jig which is built up of standard pipe fittings and some steel rod. The vertical piece,  $\frac{7}{8}$  by 13 in., is threaded into a pipe flange mounted on a wooden base. Two tees with setscrews are next slipped on, the lower one being fitted to hold the propeller and the upper one the pointer assembly, which can be adjusted to the correct shape of the propeller. The utility of this jig lies in the ease of determining whether all of the blades are matched. Place the best blade up and adjust the pointers against its surface; then rotate it so that the next blade comes in this position, and the difference, if any, is quickly seen. The propeller is then placed in a vise and the blade that is out of true can be brought back to shape with a lead hammer. On most propellers this need only be done at the greatest width of the blade, but large propellers may be trued at several radii. The extreme tips of the blades should all be the same distance from the center, which can be ascertained by set-

ting No. 1 pointer at the extremity and matching the other blade with it. A straightedge, laid from this point through the center of the mandrel, should cut the same point on the other blade of a two-blade propeller, while a three-blade wheel should have each center line at an angle of  $120^\circ$ . A propeller should balance when rolled on parallels with the mandrel inserted.—William B. Park, Evanston, Ill.

### Antique Green-Bronze Finish on Copper and Brass

Antique green finish may be produced on copper or brass by coating the work with an oxidizing solution, which consists of ferric chloride, 3 oz., sal ammoniac, 16 oz., verdigris powder, 8 oz., common table salt, 10 oz., and cream of tartar, 4 oz., dissolved in water, 1 gal. The work should

first be cleaned thoroughly, after which the solution can be brushed on the work, or it can be dipped into it. After the solution has been applied, it may be stippled by working the surface with a soft, round brush. Good imitations of naturally aged bronze may be produced with a little care and practice. The solution may be used at room temperature. Items made from iron or steel may be finished by this method if they are first copperplated.

### Electric-Wire Conduit from Umbrellas

Umbrella ribs make good conduit for protecting small electric wires such as are used for bells and buzzers. To install the conduit, lay the wire inside the rib, place the latter with its open edge against the wall or floor and then fasten it in

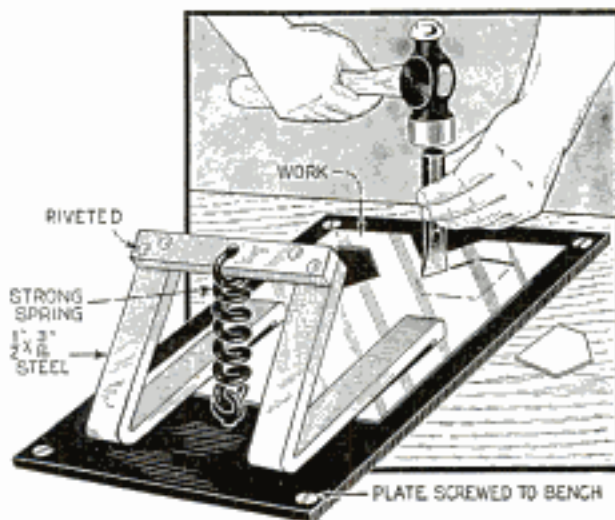


position with small staples.—Frank W. Bentley, Jr., Missouri Valley, Ia.

### Increasing Life of Bandsaw Blades

Breakage of bandsaw blades can be reduced to a minimum by taking a few precautions. When the break is in the weld there is little that can be done to eliminate it as it is caused from not being properly welded or the metal not being annealed to the proper degree of density. Care should be taken to see that the metal has been fused together before the fin is filed to the thickness of the rest of the blade. Breakage or cracks in the metal are usually due to the metal becoming hardened from the friction of the blade against the bits or guide rollers. The blade can be annealed by holding a piece of soft-grained emery stone against the side and back of the blade as it turns. This will remedy the trouble temporarily, but constant use will soon harden the blade again and the above operation will have to be repeated. Bits and rollers of hard fiber substituted for the steel ones will usually prevent many cracks in the blade and be less troublesome.—Emery F. Bull, Chicago.

### Spring Clamp Holds Sheet Metal for Pattern Work



Sheet-Metal Held in Place for Cutting by Spring Clamp Screwed to Bench Top

A spring clamp to hold sheet metal while punching out designs may be constructed from a strong coil spring and three pieces of steel, two of which are bent to a V-shape as shown, and are held together by a crosspiece. The spring is fastened to the latter and to a metal plate, which is screwed to the bench top for protection against the cutting tool.



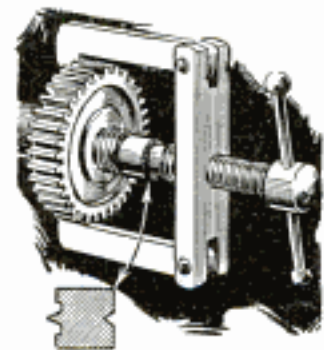
Large Charts in Shop Wound on Rod Inside Mailing Tube Protected from Being Soiled

### Chart Case from Mailing Tube

Made from a cardboard mailing tube, this case is handy for protecting a large chart or drawing in the shop against dirt and grease. The tube is slotted as shown, and the ends are plugged with wood disks, which are drilled to take a length of dowel rod having a small crank keyed to one end. The upper edge of the chart is glued to the rod and is then wound on it, after which the case is assembled so that the free end of the chart projects through the slot of the tube. If a wood strip is tacked to the lower edge of the chart, there will then be no inconvenience caused by getting the entire chart inside the case, so that it cannot be pulled out when it is to be used again.

### Protecting Ends of Armature Shafts from Gear Pullers

When an armature is removed with a gear puller, it is a good idea to protect the ends of the shaft, especially if the armature is to be placed between lathe centers. The fitting shown in the detail is handy for this purpose. It is made from a short piece of round steel stock and is placed between the ends of the armature shaft and the screw of the puller.—J. P. Kincaid, Colorado, Texas.





By  
W. CLYDE LAMMEY

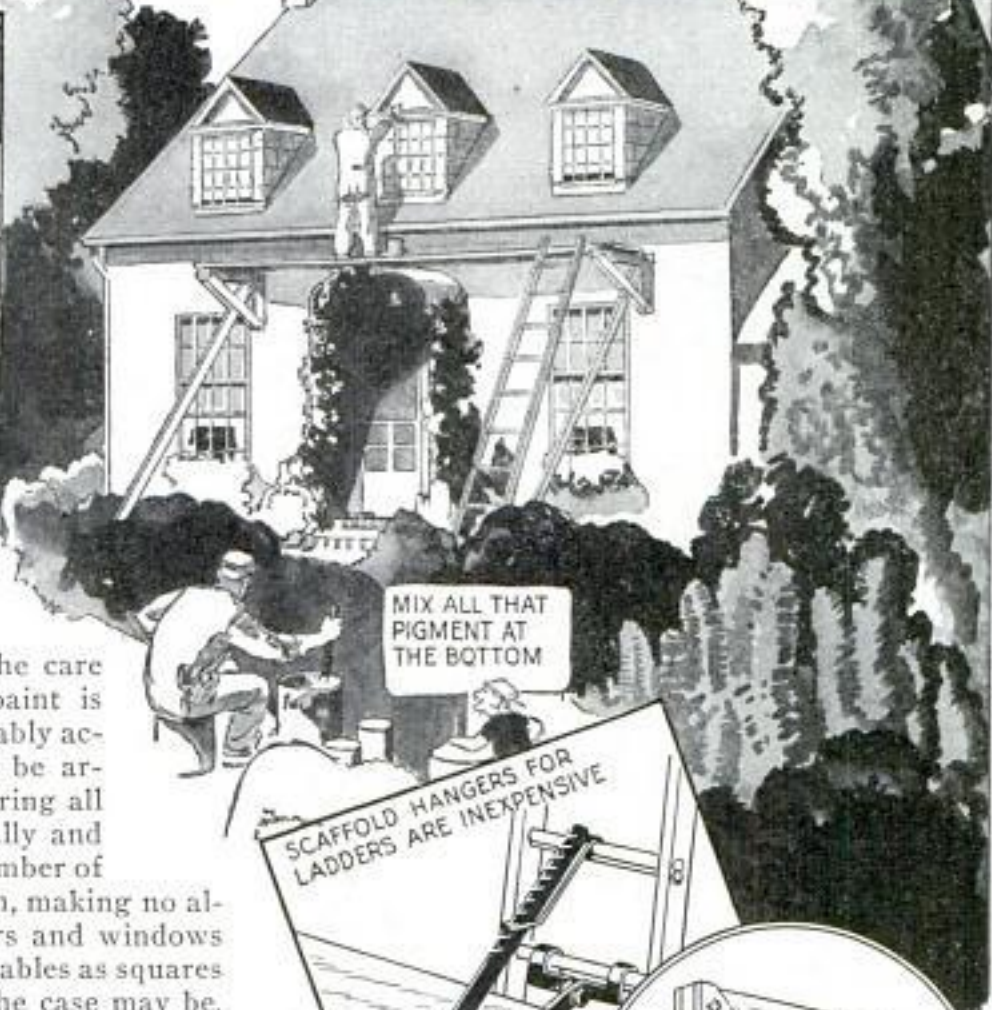
**H**OME owners who do their own exterior painting will not only effect a material saving in initial cost, but will also have opportunity to give attention to those small details which mean added permanence to the job. The late summer is the best time to paint a house. At this season the weather is more settled. Dampness in the wood when applying paint is certain to cause more or less trouble. Also, the painting should be done before frost commences.

For average work you will need a 5-in. brush for the large surfaces, a 3-in. brush for reaching those places inaccessible with a larger brush and a 1-in. brush for the

close work on window sash and doors. The split or flag ends of the bristles of a good brush catch and hold the paint, draw it out in an even film when making the stroke and prevent excessive dripping. Because of the superior work one can do with them, the most expensive brushes are really the cheapest. Quality brushes should be kept scrupulously clean, they should always be suspended in linseed oil after cleaning, and when in use, the brush should never be pressed into a corner to bend or spread the bristles. Rough handling will ruin any good brush. New brushes should be suspended with the bristles immersed in a half-and-half solution of turpentine and raw-linseed oil for some time before using. The brush should never stand on end in a paint pail with the bristles supporting its weight. In addition to the three brush sizes given you will also need a dusting brush for cleaning the siding, window and door sills, basement windows and other places which catch dust. A putty knife having a stiff blade, a flat scraper and a steel scratch brush are also necessary when painting old work.

It is impossible to give a hard-and-fast rule for determining the exact amount of paint required to cover a building with two coats as the accuracy of the calculation partly depends on the condition of

# PAINTING YOUR HOME

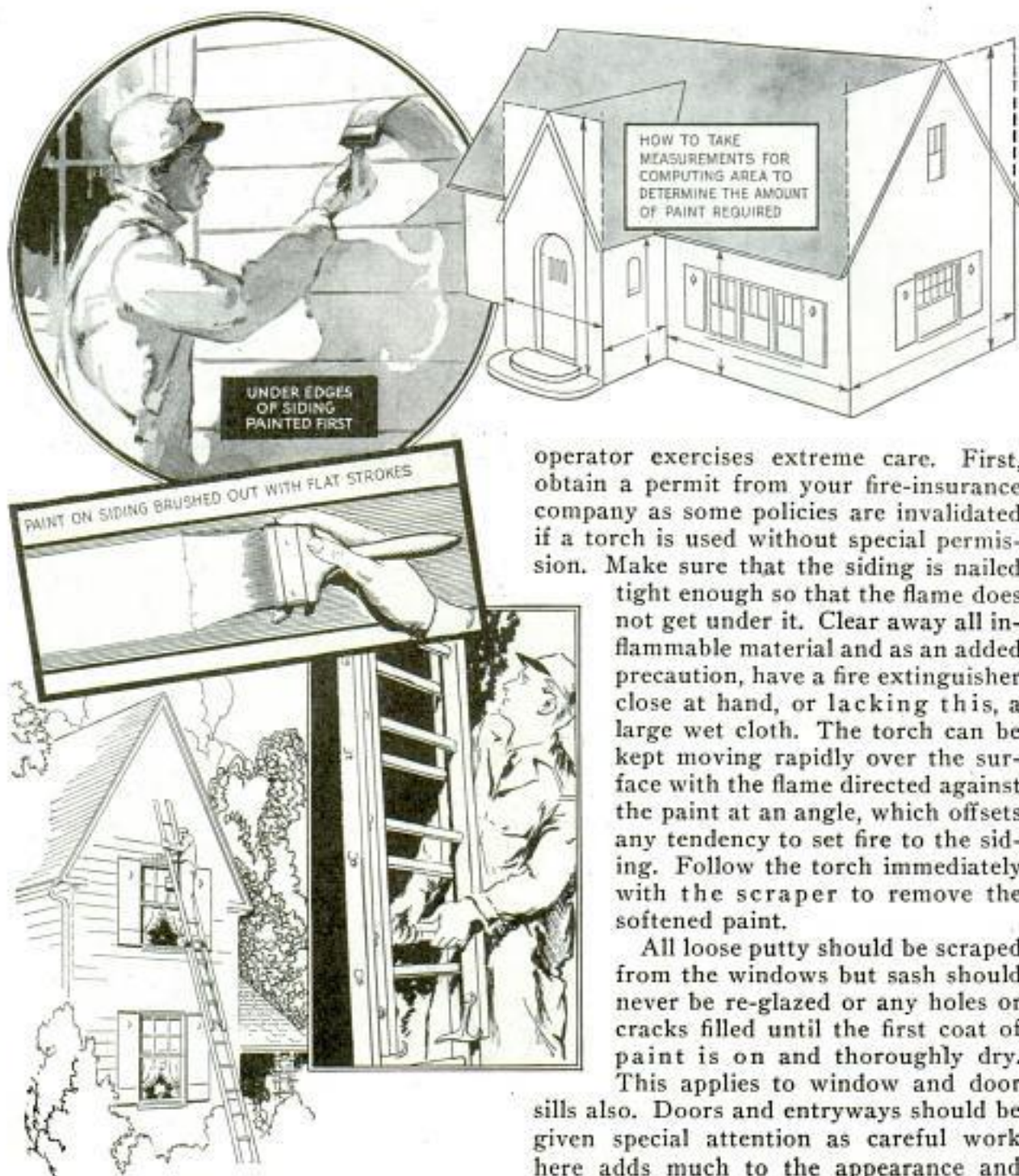


the surface and the care with which the paint is applied. A reasonably accurate figure can be arrived at by measuring all surfaces individually and calculating the number of square feet in each, making no allowances for doors and windows and counting the gables as squares or rectangles as the case may be. The total in square feet is then divided by 350, which figure is the average in square feet that a gallon of paint, properly mixed, will cover in two coats. On work in bad condition the coverage per gallon will be considerably less.

Next, the surface to be painted must be cleaned of all dust, soot and the dirt which has collected near the foundations. New work can be cleaned sufficiently with the dusting brush alone. Any knots oozing pitch should be thoroughly scraped and sealed with two coats of orange shellac. However, on new work the principal source of trouble is dampness present in the wood when the primer is applied. Old work in good condition should be given a thorough scrubbing with the steel scratch brush and a careful dusting. Care should be taken to cover every part of the sur-



face to remove all loose particles of old paint. Blisters and areas which are peeled badly can generally be cleaned off with a scraper and coarse sandpaper. Leaky downspouts and gutters sometimes cause trouble by keeping adjacent areas damp, which in time causes the paint to chalk or flake excessively even though the moisture does not get under the film or was not present at the time of application. Such conditions must be remedied. On old work



the most difficult condition of all to deal with is the "crackled-lacquer" effect caused by a much too heavy application of the original paint. The surface is either roughened by wrinkles in the film or is defaced by wide irregular cracks. Usually old paint in this condition will defy all ordinary efforts at removal. The steel scratch brush or coarse sandpaper is of little avail if the area is large, and paint remover is useless. Generally the one effective remedy is to burn off the paint with a gasoline blowtorch. This may be done with safety if the

operator exercises extreme care. First, obtain a permit from your fire-insurance company as some policies are invalidated if a torch is used without special permission. Make sure that the siding is nailed tight enough so that the flame does not get under it. Clear away all inflammable material and as an added precaution, have a fire extinguisher close at hand, or lacking this, a large wet cloth. The torch can be kept moving rapidly over the surface with the flame directed against the paint at an angle, which offsets any tendency to set fire to the siding. Follow the torch immediately with the scraper to remove the softened paint.

All loose putty should be scraped from the windows but sash should never be re-glazed or any holes or cracks filled until the first coat of paint is on and thoroughly dry. This applies to window and door sills also. Doors and entryways should be given special attention as careful work here adds much to the appearance and permanence of the job. Oak doors exposed to the weather turn dark after a time even though finished in the natural color of the wood. Take the door off the hinges and remove the varnish with a prepared remover. Clean up with a thorough sanding, then lighten the wood to its original color with an oxalic-acid bleach in the proportions of 1 oz. of acid to 12 oz. of water. Sand again to level the raised grain, apply two coats of natural paste filler and finish with two coats of spar varnish. Painted doors should be thoroughly



cleaned and sanded before re-finishing. When painting or varnishing paneled doors, finish the molded edges first, then lay the finish on the panels with a horizontal stroke using a medium-size brush. Finish with long, sweeping vertical strokes. Then lay the finish on the rails with strokes parallel to the grain and lastly, finish off the stiles. Be particular with the back edge of the stile which is exposed to view if the door opens inward, and do not forget the bottom edge of the lower rail. Either clean and finish the doors first or leave them untouched until the last. They should not be cleaned and then left while the rest of the building is painted as unprotected doors gather moisture quickly and retain it.

Considerable saving can be made by purchasing ready-mixed house paint in 5 and 10-gal. drums. Many prefer this because of uniformity of color. When purchased either in gallon pails or in drums, open the container and pour off the oil into a clean can. Then make a stout paddle of hardwood and bore several holes through the wide end. The handle should be long enough to be held in both hands. Add a very small quantity of pure turpentine to the pigment in the bottom of the pail or container and stir until the accumulation is broken up to a stiff pouring consistency. Empty this into a large clean container. Stir thoroughly, adding the oil gradually, and, if necessary, also small quantities of turpentine until the solution is brought to an easy brushing consistency. In stirring ready-mixed paint it should be remembered that all the necessary ingredients are already in the original solution, the amounts fixed by tried formulas, and that the addition of turpentine is not a matter of proportion but is only necessary to reduce the mixture so that it may be brushed properly. Priming coats on new work require a somewhat larger proportion of linseed oil and turpentine. Ready-mixed paint of reliable manufacture is always to be recommended in place of the lead-and-oil paint mixed as needed from separate materials.

When painting the average house it is best to begin at the highest points and bring the trim down as you do the siding. Before you set up the extension ladder, see that it is in good condition. One man



should not attempt to raise the ladder fully extended; rather the top section should be extended only about half way or less and the ladder raised until it stands vertically against the building, after which it may be easily placed in the desired position. When fully extended a 30-ft. ladder should not stand at an angle greater than  $25^{\circ}$  with the building. Make sure that both



legs of the lower section rest on solid ground, so that the ladder cannot slip outward or tip sideways.

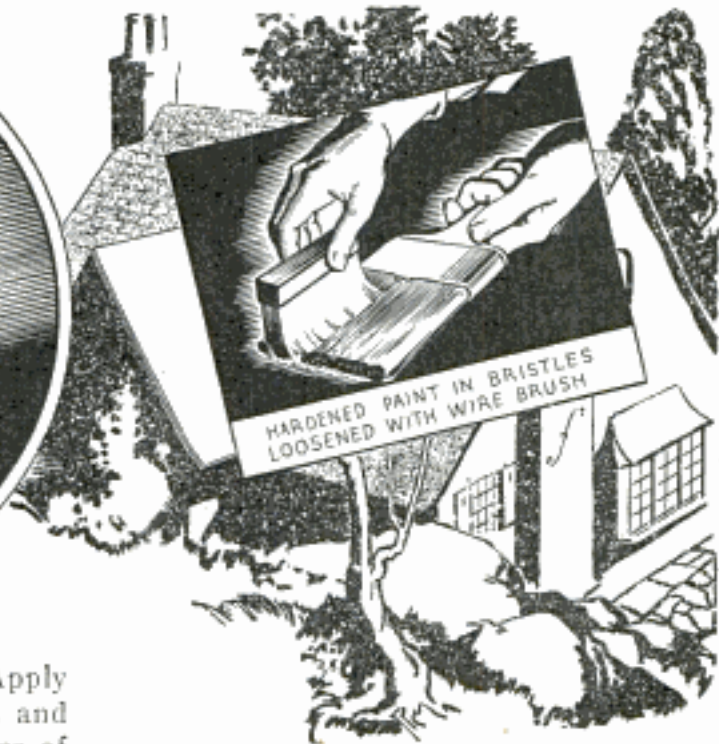
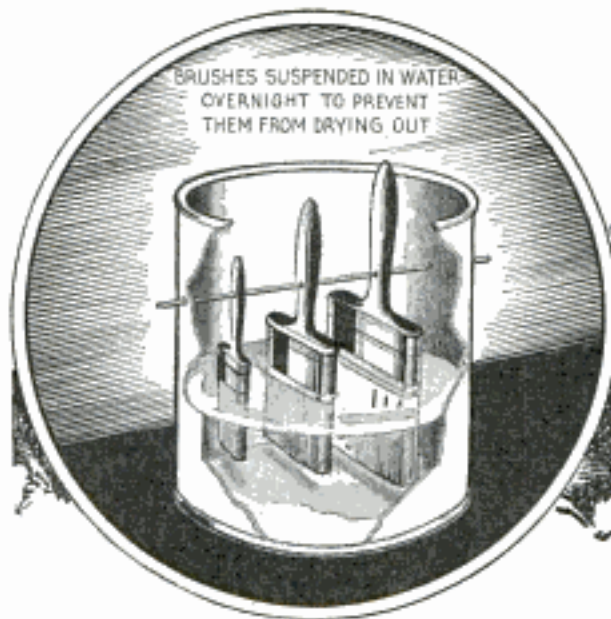
Make hooks of heavy wire to support the paint pails on the ladder, so that both trim and body color can be laid on at the same time on the high gables. Strain the paint through coarse cloth or fine screen and fill the pails only about two-thirds full. Always leave the shaded sides until mid-afternoon. Allow at least one day of

bright sunshine after a heavy rain. In painting siding, coat the lower edges first with the loaded brush held edgewise to the direction of the stroke, then lay the paint on the flat faces and draw it out to a thin film with long, regular strokes. Acquire the habit of dipping the brush half the bristle length in the paint and slapping it gently against the side of the pail each time it is dipped. This will knock off excess paint and prevent

dripping. Do a thorough job of brushing out, particularly on the first coat over either old or new work. Insufficient brushing allows paint to pile up and will then be apt to blister and peel upon drying. If the mixture works heavy under the brush cut it with a small quantity of turpentine and stir thoroughly. Lay on and brush out the body color first, taking care that it does not get on the trim. Neatness is everything in trim work.

Cut in the edges sharp and clean so that there will be no irregular streaks. Be careful not to cover so large an area at one setting of the ladder that you cannot brush back to the edge before the paint sets, which it will do in a very short time. If you brush back to this edge the fresh paint will ride over the first application forming a lap that will show even under the second coat. Take a few widths of siding at a time and run these clear across so that you can brush back to a wet edge. Always paint the siding from the corners of the building to a window casing or a door frame without stopping.

When you come to the windows, drop the upper sash all the way and raise the lower one to expose the meeting rail. This takes the same color as the stiles and cross rails. If the sash are to be painted dark green or black only one coat is necessary as heavy colors invariably cover well and dry slowly. If either of these colors are to be used, leave the sash until the last. First apply paint only to those places where old putty has been removed. Work paint well



into cracks in door or window sills. Apply the body color to the exposed ends and lower face of the sills, the outer edges of the casings which meet the ends of the siding, and the exposed ends and top face of the drip or water cap. The remainder of the window frame takes the trim color. The same is true of the door frames. The drying time between the first and second coats may be utilized in re-glazing sash, painting window blinds, if any, filling cracks or nail holes in siding, window sills and door thresholds. As soon as the putty glazing is dry the sash may be painted. If the dark color is used then the sash should be finished between the first and second trim coats. One new at the close work of tracing sash will find a tin guard of help in cutting the edges clean. Carry a cloth to wipe the straightedge of the guard and also clean up any drops of paint that may fall on the glass or sill.

At least two weeks time should be allowed between the first and second coats, more if possible. Laying on and brushing out the second coat is much the same as putting on the first, the same care must be taken to prevent forming laps on large areas, and the trim must be very carefully cut in with the body color. When painting the north side of the house and the underside of wide cornices you may add a very small quantity of Japan drier to the paint in the proportion of not more than  $\frac{1}{8}$  pt. of drier to each gallon of paint. The action of the drier tends to harden the coat and render it more impervious to

moisture. When you finish painting for the day, dip the brush in the paint the full length of the bristles, knock off the excess against the side of the pail and then suspend it in a can of water. This saves wear and tear caused by continued cleaning and keeps the brush in condition overnight. If the brush is not to be used for some time, it should be thoroughly washed in turpentine and then gasoline until all paint is removed. After a brush has been in use for some time, even though it is carefully cleaned regularly, the bristles become loaded with paint which continually works upward to the ferrule. A brush in this condition should be first washed in turpentine then laid on a flat board and the bristles brushed lightly with a steel scratch brush, which will remove the paint softened by the turpentine. After this the brush should be washed in a medium solution of washing powder.

#### Leather Washers Increase Life of Pitman Bearings on Combine Machine

In order to get longer service from the bearings where sickles connect to the pitmans on combine and mowing machines, place large leather washers on each side of the bearings. This keeps out the dirt and retains the oil with the result that the bearing is not worn out so quickly.—Elton Ely, Mason City, Ill.

### Oiling Overhead Bearings from Floor



Overhead Bearings Oiled from Shop Floor by Means of Long-Spouted Oilcan and Mirror

In a shop where there were several bearings to oil, an oilcan of the pump type was fitted with a long spout and a mirror, which was attached by means of an adjustable bracket as shown in the detail. In this way, it was possible to stand on the floor and oil the bearings, locating the oil hole in the top of the bearing by means of reflection in the mirror.—T. E. McCa-  
*lister, Anderson, S. C.*

### Smooth Surface Turned on Soft Metal with Silicon-Carbide Crystal

You can turn mirror-like surfaces on brass and other soft metals with a large silicon-carbide crystal. It is fitted and soldered into a slot cut in the end of a piece of brass stock. The tool is used in the same manner as a steel bit, except that light cuts are taken with the work turning slowly, plenty of cutting oil being applied. The drawing shows the crystal mounted in a gooseneck



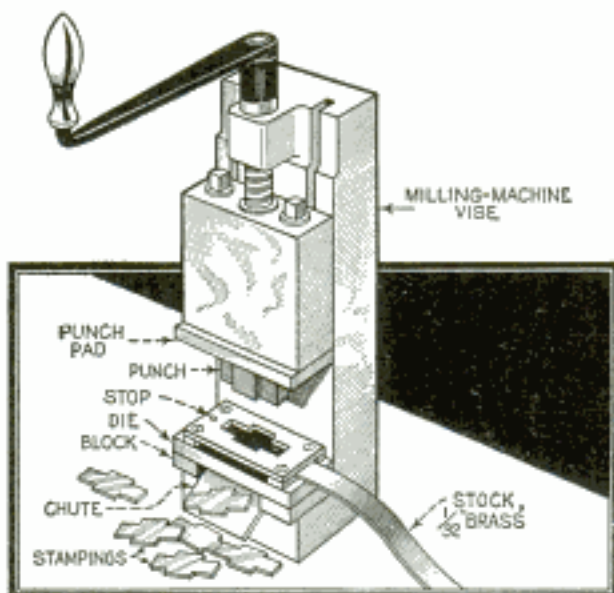
holder, the cushioning effect of which tends to prevent chattering.—W. E. Stewart, Sewaren, N. J.

### Improving Old Compression Coil Springs

Compression coil springs, such as are used on auto-engine valves, that have become shorter from long use and heat, are easily restored to their original length by holding the spring against a corner of the engine or a vise and striking moderately sharp blows on the coils. This spreads the coils apart and lengthens the spring. With a little practice you will be able to stretch the spring an inch or more and keep it perfectly straight. Do not hammer excessively as this will strain the temper of the spring.—Don C. Higbee, Cantil, Calif.

### Stamping Metal in Milling-Machine Vise

In a small shop where a punch press was not available, a number of stampings were made from  $\frac{1}{32}$ -in. brass stock with a milling-machine vise. A punch pad was



Milling-Machine Vise Altered to Punch Stampings from Thin Brass Stock

substituted for the removable jaws of the vise and two blocks for the stationary one. The punch and die is made in the same way as one used in a punch press with the exception that a chute is placed between the two blocks under the die to provide an outlet for the stampings.

Graphite and oil will arrest cutting in bronze when oil alone proves ineffective.

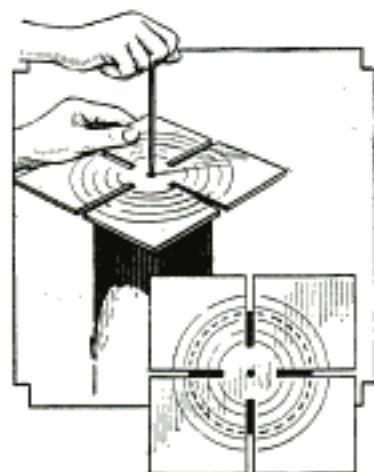
### Making Uniform Parallel Lines on Wood

Parallel lines may be made by pressing on an ordinary tap as it is slid across the work. The pitch of the threads determines the width of the spacing. A tap with eight threads per inch will space lines  $\frac{1}{8}$  in. apart. Spiral or diagonal lines on flat or round stock can be rolled into soft wood with the threaded portions of bolts and machine screws, the number of threads per inch determining the spacing of the lines. The above methods have been found satisfactory where they could be used instead of a jewelers' saw or veining tool.—L. H. DeWitt, Canton, Ohio.

### Improvised Tool Centers Round Stock

For centering round stock a tool is easily made from a square piece of sheet metal. A small hole is drilled through the center of the metal and several circles, concentric with the hole, are scribed on the surface, after which each side is slotted toward the center as shown. In use, the tool is placed on the end of the work and is moved about until an equal amount

of the stock can be seen through each slot, using the scribed circles as a guide. An awl or punch inserted through the hole in the tool is used to mark the center.—L. P. Young, Culver, Ind.



### Novel Fence-Wire Stringer and Stretcher

This fence-wire stringer and stretcher may be made from scrap material. The handle is from an old lawnmower, and has an iron rod inserted through a hole at one end, the rod being bent to engage the hub of a spool of wire so that it may be rolled along the fence row. When the wire has been strung, a hook attached to the handle is driven into the wire on the spool to prevent it from turning while the operator pulls on the device to stretch the wire.



Fence Wire Can Be Strung and Stretched for Stapling to Posts with This Homemade Device

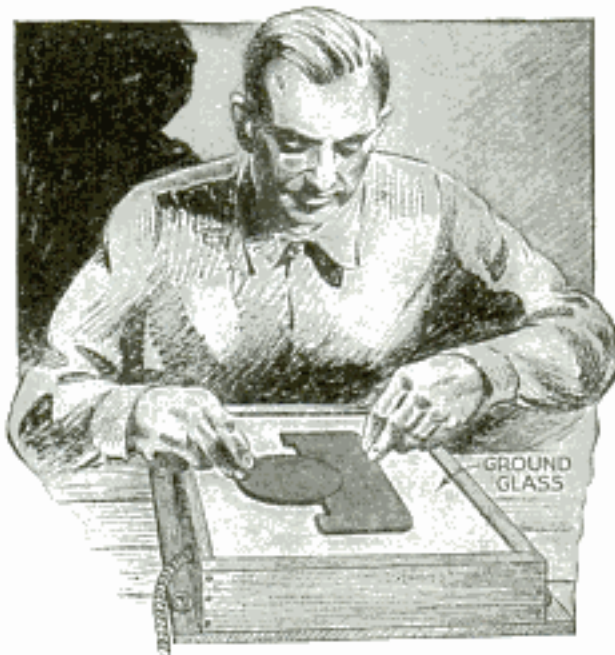
To hold the wire taut for stapling, the handle is pressed down, and an anchor hook, which is attached to the handle, is forced into the ground.—G. E. Hendrickson, Argyle, Wis.

### Floating Buoy Supports Lantern

Asked to construct a number of buoys to carry lanterns for marking floating nets, I made them in the shape of a triangle from 2 by 4-in. stock as shown. The sides of the triangle are 30 in. long and carry a deck, which supports the lantern. Two cleats nailed to the deck are beveled on the inner sides so that the sloping edge of the lantern base can be slipped under them while a wood plug driven into a hole in the deck prevents the lantern from sliding forward from under the cleats.—S. H. Cooke, Vancouver, B. C., Canada.



### Lighted Box Has Many Shop Uses

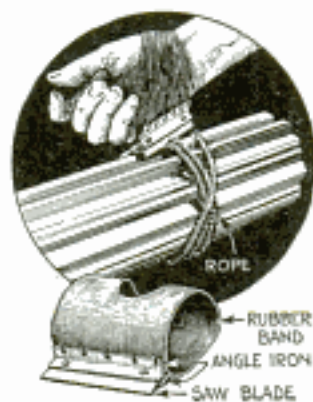


This Lighted Box Is Handy for Matching Surfaces of Machined Parts and for Tracing Drawings

Lighted by a 15-watt electric lamp, this box is handy for testing the surfaces of machined parts for high spots, making tracings from drawings and for illuminating small parts in masses to inspect them for imperfections. The box is covered with a ground glass, which rests on cleats nailed around the inside edge near the top. If a ground glass is not available, good results can be had by substituting two pieces of clear glass with a piece of white bond paper sandwiched between them. The box can be made any size, but if larger than 8-in. square, more than one lamp should be used.

### Improved Cord Cutter Worn on Hand

In a factory where cartons and raw material came in bundles tied with heavy cord, considerable time was lost in cutting the cords as the bundles were used. To eliminate this waste, the foreman made cord cutters from pieces of hacksaw blades. The blade was riveted between two pieces of light an-



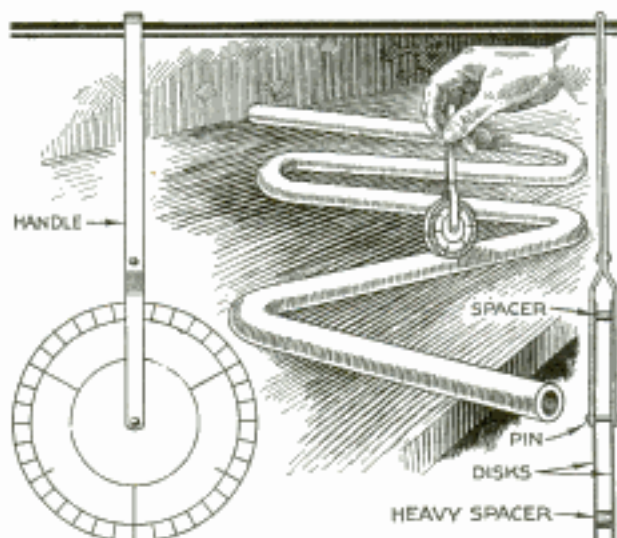
gle iron, the free edges of which were drilled and a section of inner tube laced to them. After cutting a hole in the rubber for the thumb, it was worn on the hand as shown. This permitted the cords to be cut quickly and did not interfere with the use of the hand for other work.

### How to Make Sweeping Compound

Sweeping compound for use on shop floors can be made by mixing melted paraffin, 2 oz., with yellow paraffin oil,  $\frac{1}{2}$  pt., and adding clean, dry sawdust, 10 lb., coarse salt,  $\frac{1}{2}$  lb., and fine sand, 4 lb. A pleasant odor is imparted to this compound by adding eucalyptus oil, 2 oz. If the compound is made for sale, the paraffin oil should be colored with a suitable oil-soluble aniline dye before the other ingredients are added.

### Gauge for Measuring Irregular Work

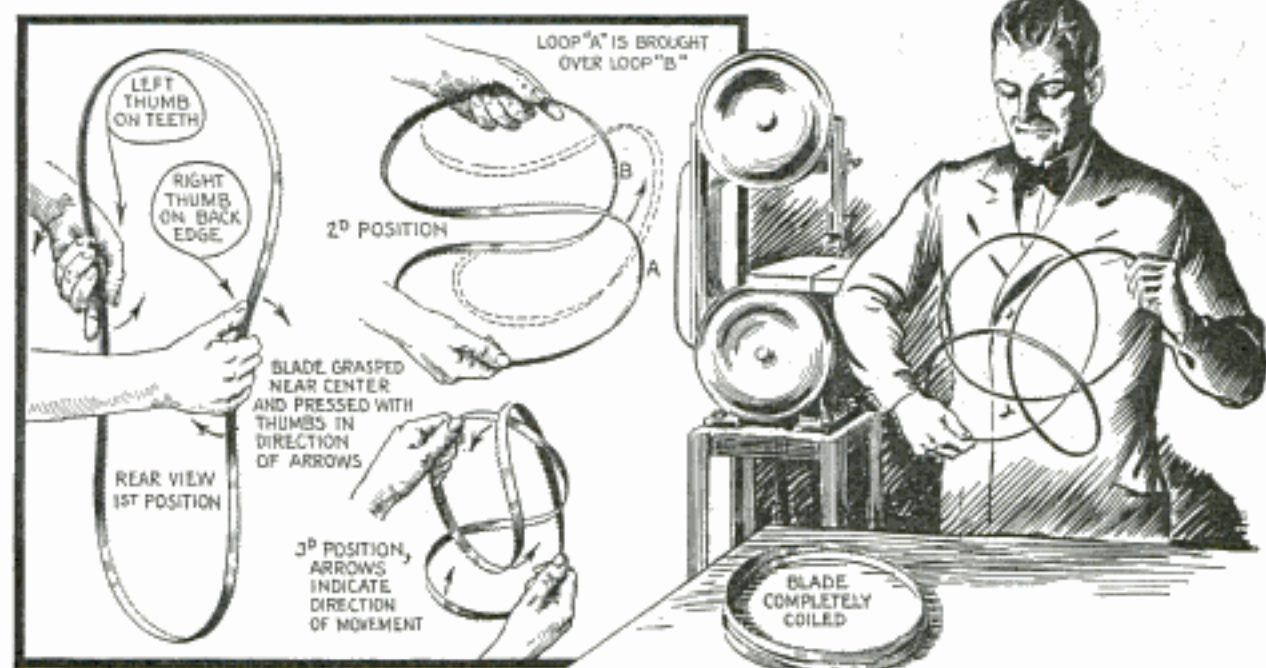
Plumbers will find this gauge useful for measuring bent pipe and tubing. It consists of two metal disks, riveted together with  $\frac{1}{2}$ -in. spacers between them, and



Length of Crooked Pipe or Tubing Is Easily Measured with This Disk Gauge

pivoted to a handle. One disk is painted white and is marked off in inches. One of the spacers is heavier than the others, and is located centrally on the zero mark. When the gauge is held free, this point swings down and will thus automatically start measuring at zero. The revolutions made by the gauge are counted and the length of the pipe is computed.

# The Trick of Coiling Your Bandsaw Blades

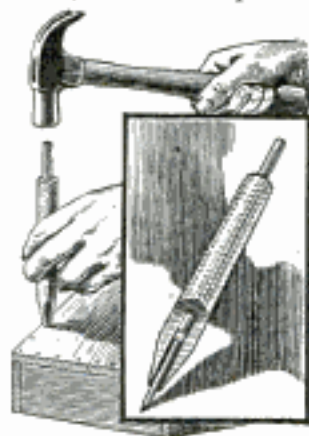


Like many knacks of doing things, it's easy to coil a bandsaw blade if you once know how. Just grasp the blade with both hands near the center of the loop. The thumb of the left hand should point down and should be placed on the edge of the blade, say on the teeth, while the thumb of the right hand, pointing upward, should be on the opposite edge of the blade, as shown in the first position, which shows the blade properly held to start coiling. It is essential that in this position the thumbs should not be placed on the flat

sides of the blade, but on opposite edges. The second move is to bring the wrist of the left hand down and the wrist of the right hand up to bend the blade to the shape indicated in the second position, forming two loops, A and B. The first loop is then carefully swung over the second as shown by the dotted lines, with the result that the blade will assume the third position, after which the movement is continued in the direction indicated by the arrows, bringing the blade in a completely coiled position.

## Tool for Driving Small Brads

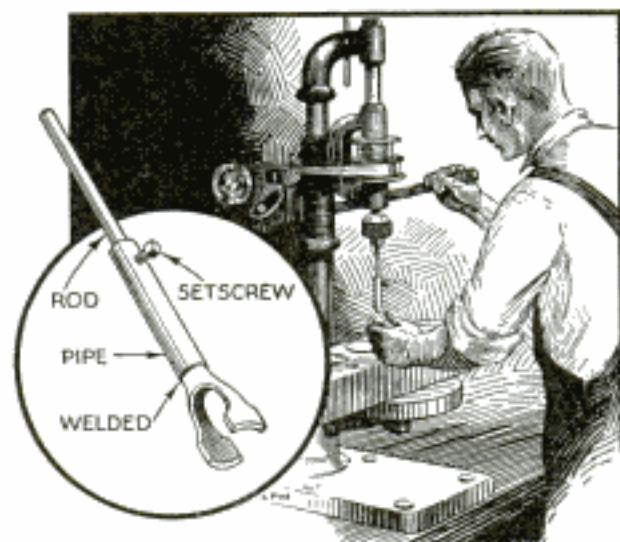
It takes only a few minutes to make this tool, which can be used to drive small brads without bending them. From an old auto, obtain a piece of steel choke wire and the tube which it runs through at the dash. One end of the tube is tapered, and the balance may be knurled if desired. The wire is cut to the length of the tube and one end magnetized by rubbing it over a strong magnet.



Brads are inserted head first into the end of the tube, after which the plunger is driven down flush with the tube. In this way the brads are supported by the sides of the tube, which keep them from bending, or angling from position.

## Screweye Improves Clothesline Prop

Instead of cutting a notch in the top end of a clothesline prop to engage the line, drive a screweye into the end. Then spread the eye and hook it over the line. This will prevent the prop from falling down and letting the clothes touch the ground when the wind blows. The screweye also provides a means of hanging the prop on a nail when not in use.



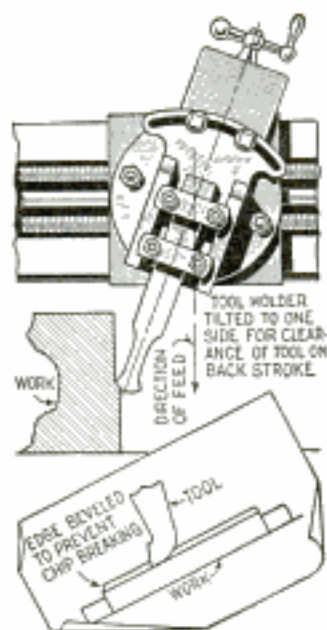
Attachment Enables Valve Springs to Be Quickly Compressed and Removed on Drillpress

### Drillpress Compresses Valve Springs

Valve springs on a valve-in-head motor can be compressed in a drillpress with the use of the illustrated tool. It consists of a pipe sleeve, which has a rod fitted in one end and a U-piece, to straddle the valve stem, welded to the other end. A setscrew in the sleeve allows adjustment of the rod for various motor heads when placed on the drillpress table.

### Improving Work Done on Shaper

When taking side cuts with a shaper, irregular or ragged work usually results unless the precaution shown in the upper detail is taken. Tilt the tool block to one side so that it swings free of the work on the back stroke.



It is, of course, necessary to tilt the tool at opposite angles for opposite sides of the work. If the front edge of the work is beveled slightly before taking a roughing cut, a chipped or broken edge will be prevented where the tool leaves the edge of the work. These precautions are highly important when it is

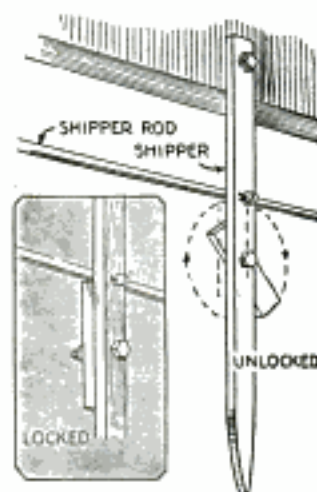
necessary to turn out a job free of gouge marks and other surface imperfections that may render it unsuitable for use.

### Safety Practices for Gauge Glasses

Gauge glasses operating under pressure should be inclosed with heavy mesh wire to prevent pieces from flying about in case the glass breaks. The wire may be fastened securely to the gauge cocks by means of galvanized wire loops. Automatic gauge cocks, while costing more than the ordinary kind, are preferable as they enable the operator to close the cocks without danger of being burned. When used on inflammable liquids, an automatic cock will shut off promptly, thus reducing the fire hazard as very little liquid escapes. When admitting steam into a gauge glass that has been allowed to cool, the cocks should be opened slowly to allow the glass to heat up gradually.—L. H. LaMontagne, Los Gatos, Calif.

### Locking a Shipper Rod

Any machine equipped with an ordinary shipper handle as a means for stopping and starting it, can be effectively



locked by the device shown, which is a valuable safeguard to a workman doing minor repairs. Fasten a piece of wood to the back of shipper handle by means of a nut and bolt, the wood being longer at one side of the bolt hole than the other, so that when the long end is turned upward and the nut tightened, it binds against the shipper rod if any attempt is made to push it one way or the other. Turned round the other way, there is ample room for the full movement of the shipper handle.

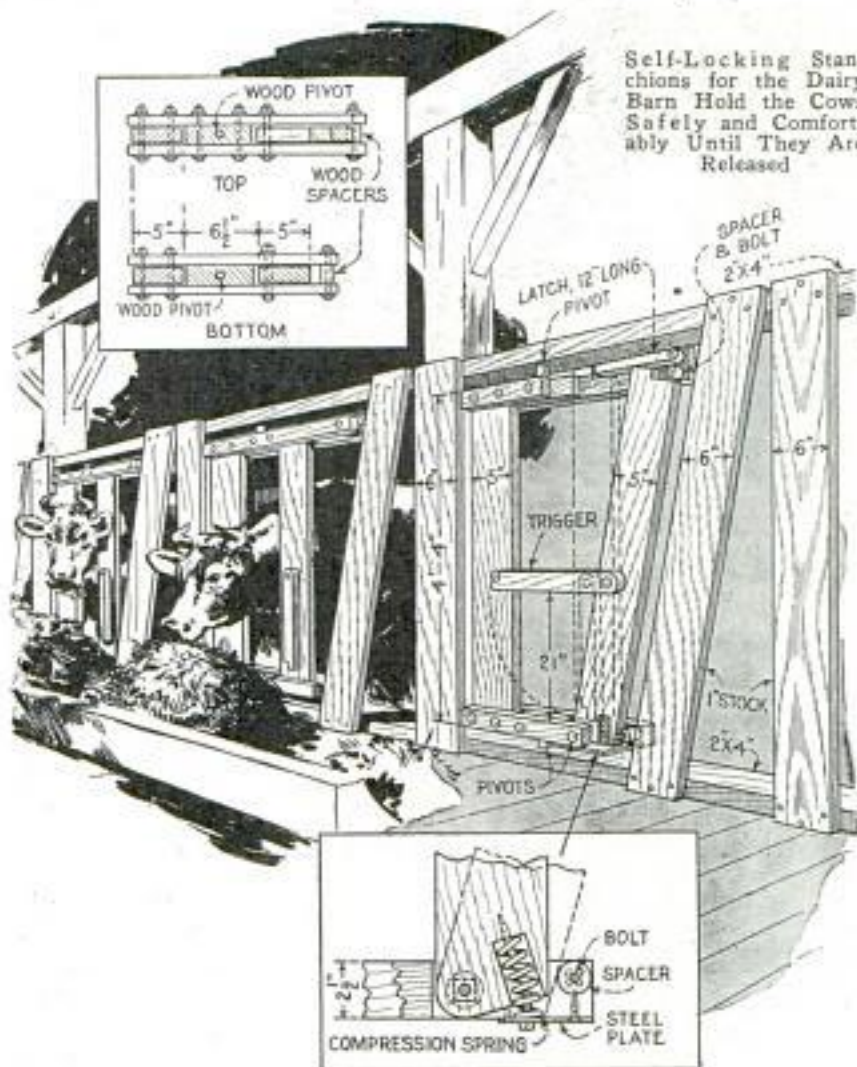
☛When figuring the number of young turkeys that a brooder house will accommodate, allow one square foot of floor space for each poul.



## Self-Locking Stanchions for the Dairy Barn

Speaking of cow stanchions and labor-saving devices, here's one that can be made at a very small cost, is simple to make and operate and nothing to get out of order. Ordinary 2 by 4-in. lumber is used, preferably maple or similar hardwood, which is not easy to splinter, and is easy to keep sanitary. Care should be taken to leave a space of at least 1 in. at the bottom of each stanchion and the foot piece, and about 2 in. at the top to enable the stanchion to turn on the wooden pivot. The spring may be any compression coil spring about 1 in. in diameter and not longer than 3 in. It should be supported at the bottom on a small bolt. The tightness of all bolts may best be governed by the action of the movable parts. All bolts should be  $\frac{1}{4}$  by 3 in. in size, except the bolt that supports the spring and the one that holds the latch. The latter may be smaller. The wooden plug that holds the trigger in place when the stanchions are set, should be about 1 in. in diameter and should project out sufficiently to fit the notch in the trigger. When made as shown in the drawing all that is necessary

is to set the stanchion open and place the feed in the manger or trough. As the cow puts her head through the stanchion and reaches down in the trough for feed, she will push down the trigger with the result that the spring will close the stanchion, and at the same time the latch will drop into place holding the cow until released.



Self-Locking Stanchions for the Dairy Barn Hold the Cows Safely and Comfortably Until They Are Released

### Compass Set Quickly with Aid of Rule



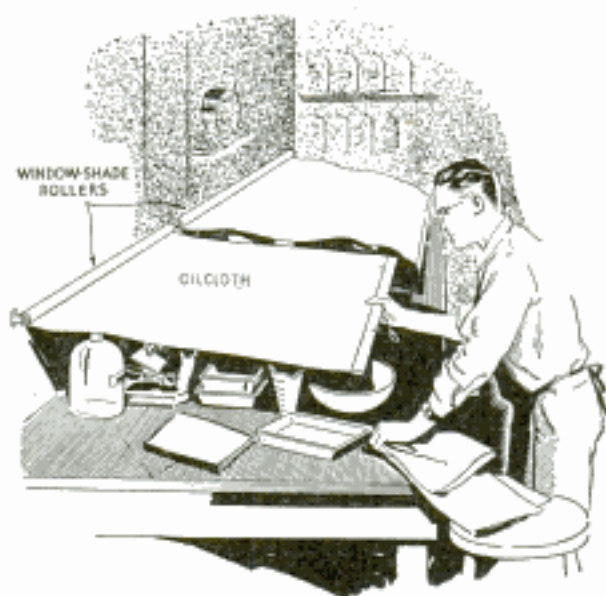
Here is a good way to adjust a compass quickly. A small square of tin and a celluloid rule are nailed to a piece of board as indicated in the photo, and a punch mark is made in

the tin at the end of the rule. One leg of the compass is placed in the hole and the other extended along the rule until it reaches the required dimension.

### Tool Bits Used for Broaching

Machinists' square tool bits make good broaches for finishing square holes in wood. With them gun ports in ship models can be made and the covers fitted very quickly. The bits can also be used for broaching out small elongated holes.

### Waterproof Cover for Workbench Made of Oilcloth



Top of Workbench Protected by Oilcloth Cover That Rolls Up When Not in Use

Chemists and shopmen can make covers for protecting articles kept on their workbenches by tacking oilcloth to window-shade rollers, and mounting them on the wall above the bench. The covers are quickly pulled over the bench, or rolled up when not in use.

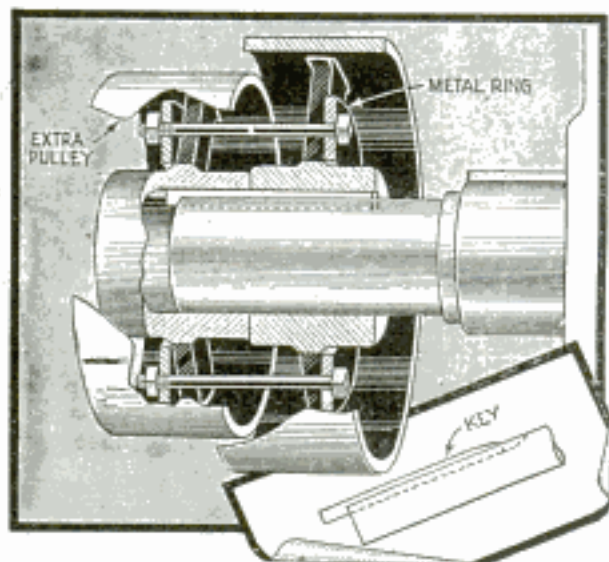
### Making Plaster-of-Paris Molds for Small Castings

Small molds for casting metal objects with lead or soft alloys are easily made from plaster of paris and powdered asbestos. Pour the plaster into an equal volume of water and stir in a teaspoonful of liquid glue to each  $\frac{1}{2}$  gal. of mixed plaster, after which powdered asbestos, equal to the amount of dry plaster, is added. The glue slows the setting and gives you time to prepare the mold. In making molds, pour the plaster around a section of the pattern so that it may be readily removed when the plaster has set. When the first section has hardened, carefully remove the pattern and paint its entire surface with shellac, melted paraffin or heavy oil. The next step is to pour on more plaster at such a position that the new section may be removed from the first section and the pattern without sticking. When hard, this section is removed and treated with shellac or wax as before, and the process is continued until the entire

pattern is covered with tightly fitting sections. After completing the casts, the mold is set in position for pouring the metal, small holes being drilled at all places where gas may collect. The holes should be arranged so the metal, which runs into them, will not break the mold when the casting is removed. A pouring hole should also be made so that the molten metal can reach all parts of the mold. The mold should be bound together and thoroughly dried in an oven, before using it. Castings may be made from pewter, lead, solder or type metal. Linotype metal is inexpensive, readily available and has the desirable quality of expanding slightly when it sets. Patterns for castings may be made from wood, modeling clay, soap or paraffin. If only one casting is wanted, a solid mold can be built around a paraffin pattern which is melted out by heating, breaking the mold away from the casting after pouring.

### Extra Pulley Attached to Short End of Shaft

If you desire to attach a second pulley to a shaft already carrying a pulley, and the end seems too short, it can be done as illustrated in the drawing. Replace the key



Two Pulleys Attached to Short End of Shaft by Bolts, Long Key, and Two Metal Rings

with a longer one to engage the second pulley. Then with two metal rings placed on the outside of the spokes of each pulley, fasten them together with bolts by drilling holes through the rings and the spokes as shown.

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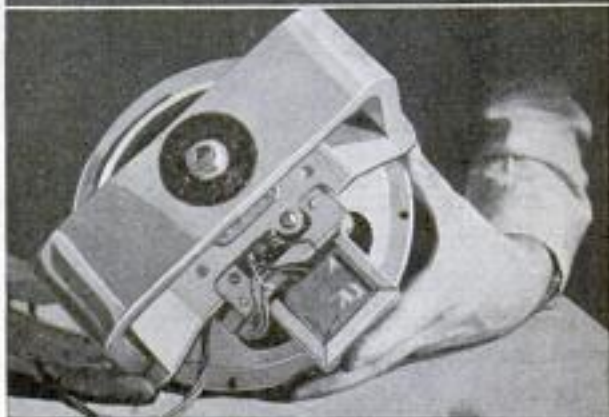
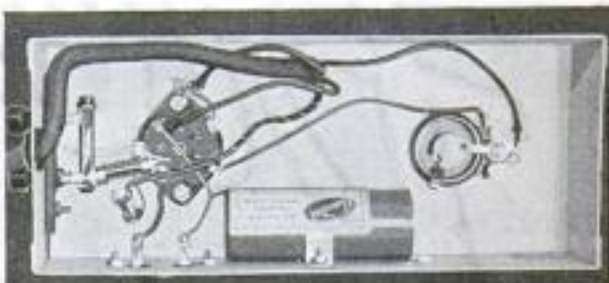
## PENTODE AMPLIFIER FOR S.-W. BATTERY RECEIVER

(Continued from page 617)

be  $1\frac{1}{8}$  in. in diameter. The cord-tip jacks and the input binding posts are insulated from the metal base.

A speaker of the permanent-magnet type shown in the photo is suitable for use with this battery-operated short-wave receiver. A large blueprint of all diagrams for the complete 3-tube set is available.

The homemade coil for the 75-meter band was detailed in the September article. The built-up plug-in coil form used is



shown in the photo on page 616. The antenna coils are 8 turns each for all bands. For the 40-meter coil use No. 22 d.c.c. wire, secondary 16 turns and regeneration 15 turns; space these coils  $1\frac{1}{4}$  in. apart. For 160-meter coil use No. 26 d.c.c. wire, secondary 70 turns and regeneration 20 turns; space these coils about  $\frac{1}{2}$  in. apart.

To operate the set, adjust regeneration control until a hiss is heard in the phones. Slowly rotate the tuning dial until a whistle indicates a station, then back off the regeneration control to bring signals in clearly. Best setting for the antenna-tuning condenser is found by trial. The doublet antenna is merely two 35-ft. antennas connected together with an insulator. The feeders or lead-in wires are crossed over Lynchite transposition insulators spaced about 2 ft. apart.

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## COMPACT DX ANTENNA

(Continued from page 619)

mounted on a weatherproofed hardwood base, 2 by 12 by 18 in., to support the mast. The upright section is made of two 8-ft. lengths of pipe threaded at the ends and joined together with a coupling. The supporting bracket at the top consists of four 2-ft. lengths of pipe, threaded at the ends and joined with a T-coupling and two elbows as shown in the photos. Two, 2 by 2-in. weatherproofed hard-maple spreaders, each 4 ft. long, are mounted on 3-in. floor flanges screwed to the ends of the bracket. Starting 2 in. from the end of each spreader, eight small holes, spaced 5½ in. apart, are drilled to take the antenna wire. About 36 ft. of flexible rubber-covered wire, of the heavy-duty type commonly used for radio power units, is suitable for the purpose. It is threaded in and out through the holes and anchored at each end. Guy wires, with insulators in series, should be fastened to the elbows and at several points on the mast.

Tin or copper containers for the transformers are easily made, or any can of suitable size may be employed. The spool and coil data are given in Fig. 1. Both transformers are identical and the tap is taken from the 18th turn. The lower photo shows how a strip of fiber is fastened to the spool for anchoring the tap and one end of the coil, the other end being grounded. The iron bolt serves for the inner connection of the coil as well as the ground contact for each container and the lead-in shield.

The containers are filled with paraffin after the transformer coils are in position. Transformer A is fastened directly to the antenna spreader by means of the bolt. Transformer B may be mounted at any convenient point in, or near the set. Similar ready-made transformers are available for those who prefer to buy them. Complete circuit details are shown in Fig. 2.

### Checking Experimental Circuits

When using a meter to check over a temporary hook-up, it is always well to make sure that the voltage or current is not too great for the range of the meter before connecting it in the circuit. A small flashlamp in series with a dry cell is best for simple continuity tests.



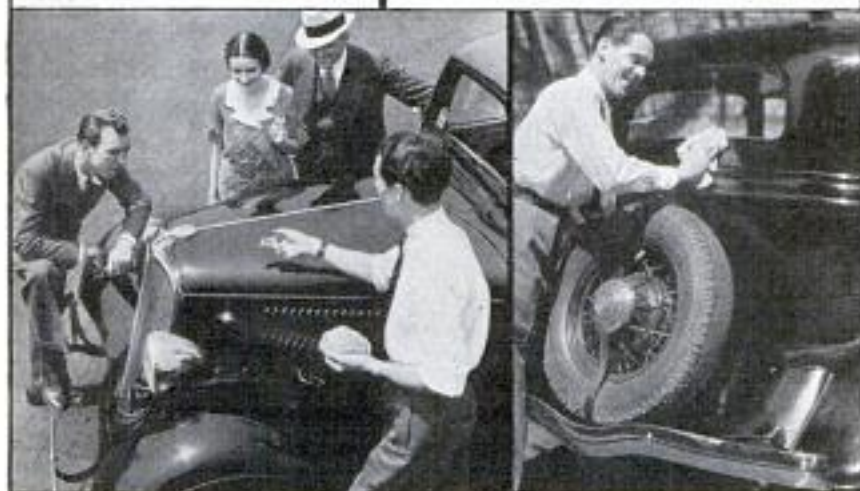
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## "TRACK-WALKERS" OF THE AIR

C 820 (Continued from page 565)

zens who disposed of the matter in their own way after failing to adjust the light so that it would not annoy them. The airways division moved the beacon at once.

In the southwest are several code beacons to mark mountain peaks. Smaller than the rotating lights, these beacons may be seen from any direction and also from above. One night, the patrol pilot was unable to sight one of these beacons and he dispatched a warning, knowing that pilots of other craft scheduled to pass along the same route that night would be watching for this light in order to keep at a safe distance from the peak. The trouble was quickly adjusted, for a delay might have resulted in a serious accident.

Failures of electric bulbs in the boundary lighting systems of intermediate fields sometimes are discovered. A message to the airways keeper such as, "Fourth light from the north on the west boundary of your field is out," sends the ground man out with a "spare."

At isolated intermediate landing fields, the periodic visits of the patrol pilot furnish the chief contact with the outside world, besides the radio or telephone. On one occasion, a patrol pilot received a message from an airways keeper saying that his assistant was seriously ill. Flying to the field, the pilot carried the sick man to a hospital in the nearest city, for an emergency operation that probably saved his life.

As a rule, a patrol flight is uneventful. The air navigation aids are expected to operate efficiently at all times, some of them are entirely automatic and as a general thing they function according to standard. The track-walker of the air endeavors to recognize difficulties in the making and to correct them before they are apparent to any other pilot flying that route. "Trouble-shooting" is a task he can handle, but his usual objective is to make certain that there will be no trouble to "shoot."

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon request, accompanied by return postage.

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## PLAYING SAFE AT 100 MILES AN HOUR

(Continued from page 571)

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## MIGHTY MYSTERIES FOR MAN

(Continued from page 557)

enable men to study another enigma, the cosmic ray, which can penetrate thick walls of lead. In the bowels of the earth we have a place where we can find out what happens when cosmic rays are not present.

Lately it has become possible for men to X-ray the earth by recording the hammer blows of earthquake shocks. The expert now translates these contortions into a language we can understand. By inducing artificial quakes, however, he has discovered a new way of locating hidden oil and ore bodies. Now we ask him to read, if he can, nature's signals which give warning of those earth-shaking movements which have cost so many lives.

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(Continued to page 124A)



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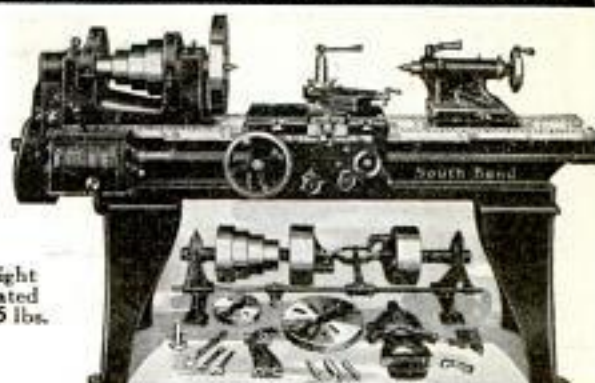
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**MIGHTY MYSTERIES FOR MAN**

(Continued from page 122A)

A pressure of a million pounds per square inch is as nothing to creatures whose tissues are largely water.

And what of the mineral wealth of the sea? Can we recover that? The sea contains a rich abundance of food for man. Fishing is a \$100,000,000 industry in America. Can we increase its productivity by fish "farming"? We have reason to believe that Africa and Europe were once joined to the western hemisphere and have since drifted apart. How did the Atlantic come between us? Our gap in knowledge is almost as wide as the ocean which separates us.

The cosmos, too, is a great theater for many dramatic events. The invisible things in the universe, such as the bending of light rays, the curvatures of space, and the nature of cosmic rays are now causing many men sleepless nights. From the great depths of the cosmos can we find some affinity between our planet and the sun? If cosmic rays are able to penetrate all things on the surface of the earth, are they absolutely essential to our lives? Do these cosmic rays represent the birth cries or the death rattles of matter? Can we tap the terrific power locked up in them?

As to the cosmos proper there are numerous other mysteries. Men are now attempting to discover fresh signs of planetary life, and also a way of communicating with that life. The most daring adventure yet conceived by man is a journey into space. Some sane-minded individuals are seriously studying the possibilities of rocket flight. We have not yet heard a satisfactory explanation of light. Is light a form of matter? All these things were formerly resolved into simple statements, but now they loom as colossal mysteries.

In considering great mysteries, we cannot completely neglect the all-absorbing subject of life. Man has hammered and dynamited the lock to this treasure, but so far has blasted only a tiny peephole. All life hangs on a frail but enduring thread of substance called protoplasm. In the simplest form of protoplasm we have about 10,000 single-celled animals. But life, considered by itself, is an immortal process. Its spark is transmitted from one generation to another. The latest research

(Continued to page 126A)

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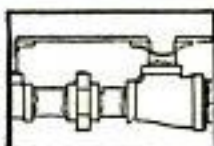


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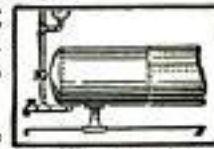
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## MIGHTY MYSTERIES FOR MAN

(Continued from page 124A)

indicates that not only life, but the cell tissues might also be immortal.

Dr. Alexis Carrel, of Rockefeller Institute, has kept alive some cells of a chicken embryo for more than twenty years, although the life of a chicken does not exceed five years. If detached cells can be made to live indefinitely, why not the human body? Dr. George Crile's studies suggest that each living cell is a miniature electric battery. The loss of electrical energy through poisons, injury, or wearing out results in death. Can we enable the body to throw off its poisons so that one life can go on like the immortal man in fairy lore?

When we remember that there are 10,000,000 square miles of unexplored area on the globe, we begin to appreciate the probable extent of man's kingdom on earth. Many strong nations have been swept off the map. Vanished peoples and civilizations are buried beneath piles of debris which no recent generation has scratched. In the most obscure corners of the globe, man finds evidence of former glorious civilizations. Who are the descendants of these people? Why are civilizations so ruthlessly exterminated?

Of all the riddles named, man himself is the outstanding riddle; and of all the mysteries about man, the greatest is the human mind. This mind is the "most marvelous and mysterious thing in the universe." No other creature has man's intelligence, his reason, his insight, his power to discover, invent, and conquer. How did this mind develop and how long did it take? Considering the power of the brain, its complexity and degree of perfection, no geological period seems long enough for its development. Just fifty ounces of brain but it controls everything we do and feel. The brain receives and records millions of sensations. Some are conscious, others unconscious. A large part of our brain concerns itself with the unconscious, where dreams, hopes, desires and ideas originate? What makes us unhappy? Why do we form habits? What makes a genius? Can we overcome fear? Countless riddles arising out of a study of man's brain and his conduct are now confronting those whose business is to find the truth by patient research and experiment.



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C1061 **YOU MAKE YOUR CAR**

(Continued from page 509)

may make a difference in the way a car functions.

Of more importance than adjustments are conditions that develop from the way a car is lubricated, fed and pampered. Not until the history of motoring is carefully recorded will posterity appreciate how much front-wheel shimmy in our day was due to the habit of over-lubricating the front springs. Fortunate is the owner who equipped his car with front-spring covers and who told every mechanic not to bother with the front springs as "they were packed in grease." That is one way of encouraging service men to help the owner avoid too limber spring action.

Probably nothing helps a car develop desirable characteristics more than mileage. One used-car man urges all customers to take out his products for a trial spin. He says it improves his stock, as every car in the establishment ought to be run a while every day. It is not unusual for new cars that have stood in storage for a few weeks to have such badly stuck valves that the head of the motor must be removed.

Of course, mileage cannot be fed to a car without a suitable amount of lubrication, inspection and tuning up to go with it, and it is because so many people overlook this fact that we have such a wide assortment of kinds of cars. There are cases where the accumulation of rust and scale in the cooling system has raised the average temperature of the motor, thereby improving its performance and increasing its efficiency.

If you "baby" the car in certain ways you can make it do some unusual stunts by way of compensation. You might swat out home runs or play holes in one provided you would go into training. Your car might be able to distinguish itself with certain compensations. But it can't be a midnight butterfly and a hill breaker at the same time.

Cars respond to special diets just as do the people who drive them. Often this is purely accidental. In certain sections of the country, for instance, there are more deposits in the water used for the cooling system. In these sections a car might easily develop a tendency toward overheat-

(Continued to page 130A)

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## e106 YOU MAKE YOUR CAR

(Continued from page 128A)

ing, other things being equal, and reveal some change in its performance characteristic as a direct result.

This, too, is largely a matter within the owner's control. Many motorists use entirely too much water. They allow the pump to leak. They go through the motions of flushing out the cooling system but never take the trouble to remove the lower water-hose connection so rust and sediment can escape. An effort to be kind to the car becomes a means of loading up the cooling system with more sediment. By not keeping the spark timing set at normal other owners invite overheating, a situation that invariably necessitates adding more water.

One owner not only found his car slow on the level but inclined to suffer motor fever on long hills. A friend's car of the same make and year revealed no such difficulties. Timing was checked and found to be correct, but the mechanic overlooked the fly-weights of the automatic spark advance. These weights were sticking. A few drops of penetrating oil would have changed the characteristics of the car so that the motorist would hardly have recognized it.

Special oils and carbon-gum solvents help to change the behavior of cars. The difference between the steering of two cars that came off the assembly line apparently alike as two peas in a pod was found to be the result of a difference in the lubricant used in the gear housing. After long periods of operation under one particular set of circumstances a car is apt to become "slanted" some unusual way. You can wear grooves in its behavior just as surely as you can slant your own actions to follow good or bad habits in your driving. In time the car has a tendency to become a reflection of your own ideas, your peculiarities and customs.

No car reaches full maturity until it has been shaped by the man and woman at its wheel. Perhaps some day we'll transfer the owner's initials from the tonneau door to the radiator nameplate. Not just a matter of giving credit where credit is due but largely to emphasize the fact that no car is really complete until it has had a chance to be owned and driven and assume its own individual characteristics.

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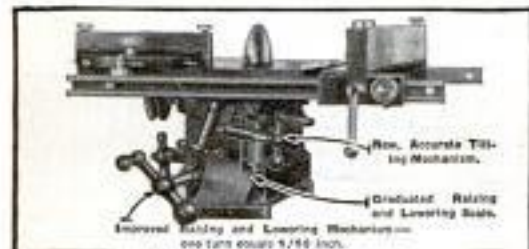
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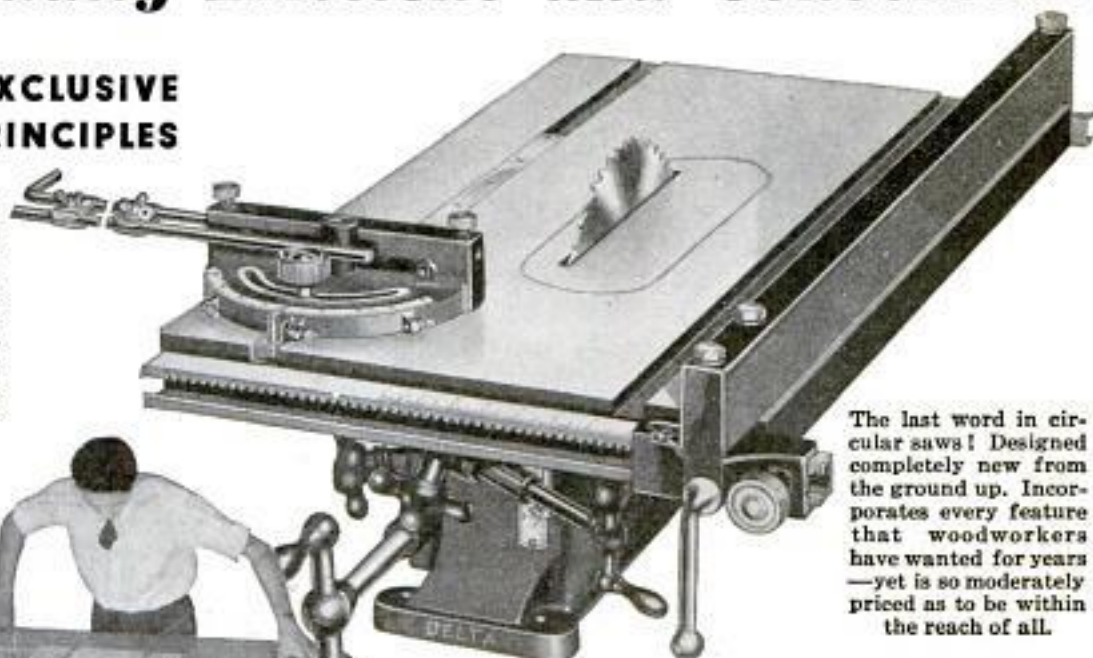
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