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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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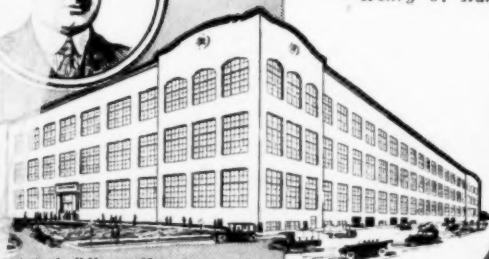
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501

Popular Mechanics Offers No Premiums - Does Not Engage in Lubbing - Clean and Honest





I have invested 2 million dollars and 13 years of my life building up my school to its present great magnitude.
—Henry J. Rahe.



Main building. Note flood daylight construction. Plenty of ventilation and floor space. Ideal working conditions.



Tractor training farm. 40 acre field for actual practice in driving and use of tractor implements.



Commercial garage and repair shop. It is the most modern and best equipped garage in the country.



Rahe apartments. Living quarters for students. Hot and cold water, bath rooms, steam heat.

Rahe

Auto School And Tractor School

**In 6 to 8 weeks will fit you to
Go in Business for Yourself**

I have employed hundreds of agents to go into every state to find out exactly what opportunities await Rahe graduates in the Auto, Truck, Tractor and Aviation Business. My reports show that every state needs five times more garages and repair shops. The cities are fairly well supplied with repair shops. But in the small towns and country districts there is a great shortage of shops. Your best chance for quick and big success is in this field. I have thousands of letters from former Rahe students who have gone back to their own towns or some place near and are making \$300 to \$500 a month running their own business. There are just as good openings for you.

You Learn Easily and Quickly

No special schooling and no previous experience required. No dull books to wade through. You are trained in modern shops under Master Mechanics. Every possible kind of tool and machine is here for you to use with your own hands. You will find every kind of equipment there is to know about. Through actual practice you will learn all there is to know about Autos, Tractors and Aviation. You will learn how to manage a garage. Before long after you have graduated, you will have a business of your own. Thousands of Rahe trained men own their own businesses today. You can do it, too. But you have got to act for yourself. Make this the turning point of your life by writing me today.

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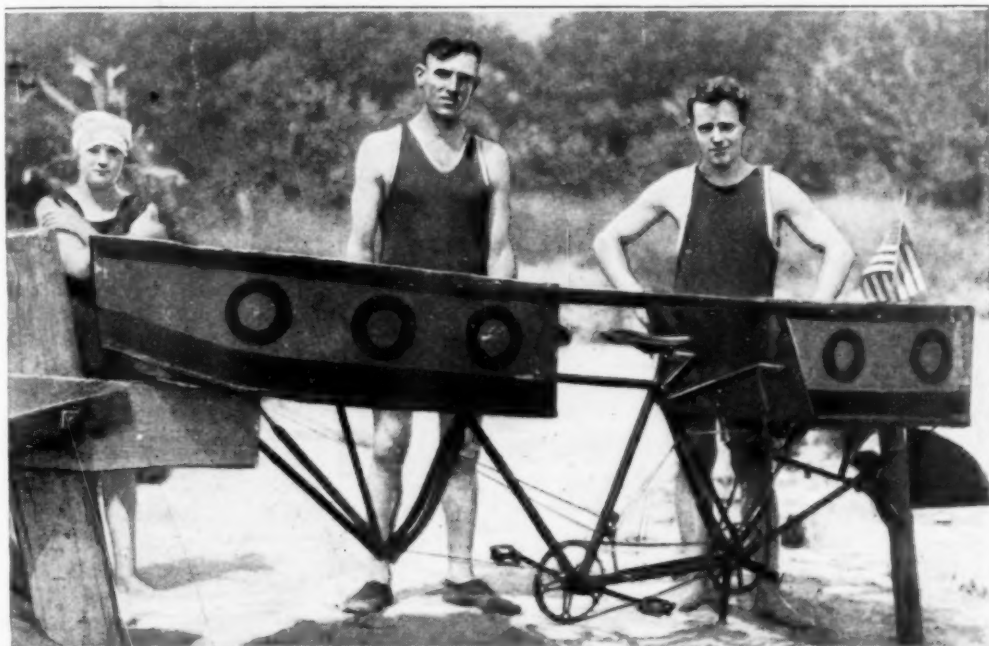
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Vol. 34

OCTOBER, 1920

No. 4

Swimming Bicycle Creates New Water Sport



THOUGH it resembles neither a boat nor a bicycle, a strange water craft designed by an ingenious pair of Illinois inventors is really a combination of the two, and its use as a bathing-beach adjunct ushers in a brand-new sport. The buoyant part of the machine consists of two air-tight metal tanks, one shaped like the bow of a boat, and the other like the stern, but with an open space between them for the operator. The bicycle frame, braced to these floats, hangs below in the water. A screw propeller at the rear is driven at high speed by the usual cranks, geared up through two sets of sprockets and chains. The handlebars are replaced by an automobile steering wheel, which, through cables from the front forks, actuates a rudder in back. With one passenger on the deck of the bow portion, and another on the stern, a speed of six miles an hour may be attained, and with only one passenger, it is not difficult to pedal through lake or stream at the respectable rate of eight miles an hour.



POLO PLAYERS MOUNT HOBBYHORSE TO PRACTICE STROKES

To make possible the most intensive practice with the polo stick, one nationally known club has recently established



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Astride the Wooden Pony the Polo Player Practices the Use of the Stick. The Balls Roll Back to Him down the Sloping Floor

at the edge of its ground a small practice cage. This might be dubbed facetiously a "corral," as in the center stands the wooden hobbyhorse, or pony, astride which the player sits. His exercise is never interrupted by the necessity for recovering balls, as each ball that he strikes hits the wire wall of the cage, and rolls back, down the sloping floor, to the little grass plot on which his pony is placed.

OYSTERS SPOILED BY INFECTION WITH PINK YEAST

Oyster growers of New England have had difficulty in shipping their oysters for long distances, on account of their being spoiled by a pink color which develops in the liquor and on the oysters themselves. A study of this matter by the Department of Agriculture shows that this trouble is produced by a yeast, which can grow at the low temperatures at which the oysters are shipped. The infection was found everywhere, in the boats, oyster houses, etc. It was also found, in some instances, in oysters carefully removed from their beds, and in samples of deep and surface water from

the oyster beds. None was found, however, in the mud at the bottom of the bay. This yeast may come from the old shells which are planted in the oyster grounds in connection with the oyster propagation. The remedial measures suggested consist in the employment of proper solutions of formaldehyde in cleaning the bins, benches, tubs, etc., used in handling the oysters.

SOUTH SLOPES OF MOUNTAINS HAVE MOST FOREST FIRES

Forest fires in mountainous country are found to be much more numerous and destructive on south slopes than on north, according to the findings of a government investigator who has made an extensive study of the subject. While the difference is not marked at the height of the fire season, the early and late fires favor the sunny side so strongly as to have a decided effect upon the average figures for a period of years. The explanation offered is that the growth of underbrush is much heavier on the south side, encouraging the spread of fire, while the north slopes hold more moisture.

LOCK STOPS THEFT OF SHOES FROM HOTEL CORRIDORS

The soaring price of leather gives timely interest to a locking apparatus of recent patent

which makes impossible the theft of shoes when, as is the custom in Europe, the hotel guest leaves them outside his door on retiring for the night. Fixed to the mop board near the door, the apparatus consists of two vertical rods which can be pushed down against the insoles of the shoes. From this position the rods can be raised, to permit the removal of the shoes, only after they have been unlocked by the master key in the hands of the "shine boy," or the room key in the possession of the guest.

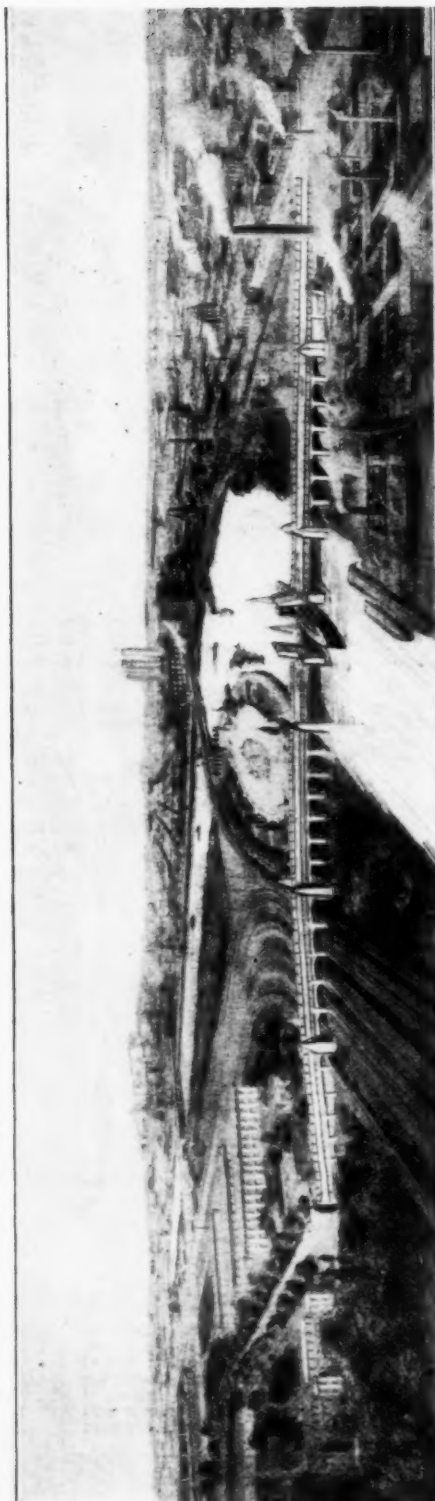


■ A cheese measuring 6½ ft. in height and 8½ ft. in diameter has been made for exhibition at the yearly fair of New York State at Syracuse. Approximately 120,000 lb. of milk were used in its manufacture.

TRACTOR TO FIGURE IN ARCTIC EXPLORATION



AN American farm tractor is to do the work of the usual Huskies during a two-years' expedition now being organized in Denmark for the exploration of Greenland. The leader is the young Danish scientist and explorer who accompanied Rasmussen on his last trip as geologist; and it is his intention to follow the uncharted northeast coast, so placing the entire island under the sovereignty of his native state. Preliminary plans call for a voyage by motor ship to Inglefield Gulf, on the northwest coast, whence the party will attempt to work eastward. The tractor will pull all the sledges, and for this purpose is being fitted with special treads. The artist's illustration conveys an idea of the equipment, although details are not yet available.



The New \$1,000,000 Bridge Planned for Philadelphia will Connect More Adequately the Western and Southern Sections of the City. This Architect's Drawing Shows How It will Span Railroad Tracks, a Riverside Park, and the Schuylkill River. The Bascule Leaves in the Middle will Not have to be Raised for Ordinary River Traffic

NEW BRIDGE OVER SCHUYLKILL PLANNED BY PHILADELPHIA

To connect more adequately the western and southern sections of Philadelphia, Pa., the city authorities are now planning the construction of a massive \$1,000,000 bridge. It is to be a structure of concrete and steel, and will consist of two long approaches in addition to the bridge proper over the Schuylkill River. The 900-ft. approach at the south will be formed, half of an incline and half of a viaduct over the freight tracks of the Baltimore and Ohio Railroad. An incline will have to be built for the 1,200-ft. approach at the north, similarly; but the viaduct will be much longer, crossing not only the tracks of the Pennsylvania Railroad, but 250 ft. of riverside park as well. The over-water spans will be laid on two shore piers and two river piers, all of monumental size and appearance. Between the river piers will be the double-leaf bascule span, which will be opened to permit passage of the largest ships. Opening of the leaves will be unnecessary for ordinary traffic, however, as there will be a clearance of about 40 ft. at mean high water.

SUGAR-FILLED TUBE TRAPS ROCK DUST IN MINE

Investigations by the Bureau of Mines having shown that inhalation of air containing sharp insoluble rock dust renders the miner susceptible to tuberculosis, many mines are now visited each year and samples of the atmosphere are obtained. This is done with a very interesting apparatus. It consists of an air meter, a small glass tube filled with granulated sugar, and a calibrated pump, all of which the investigator sets up close to the working miners. He then operates the pump for 20 or 30 minutes, and so draws a calculable volume of air into the meter, through the tube, and out of the pump exhalation valve. The tube is then shipped to the laboratory, where the sugar is dissolved out in distilled water, leaving in the bottom of the test tube a residue of the rock particles which have thus been trapped.

☐ Primarily for the use of vessels operating from San Francisco and Vancouver to Australia and New Zealand, a great fuel-oil station is now being erected on the island of Tahiti in the South Pacific Ocean.

RADIO COMPASS AND AUTOMATIC PILOT DEVELOPED FOR NAVAL FLYING BOATS

BY JENKINS BEACH KEAN

AS WARS and threats of war continue to plague a war-weary world, and to make world peace seem more than ever an idle dream, it is with considerable satisfaction that one records here two mechanical developments which are to add in the next conflict to the offensive and defensive strength of the United States. Both inventions were cradled in the American navy; and both have to do with the electrical equipment of the big flying boats used for supermarine patrol and bombing missions. The first practically solves the problem of navigating the craft to or from a distant ship or station; the second makes piloting almost automatic, and so eliminates exhaustion of personnel as one of the hazards of long-distance flight.

The initial and dramatic demonstration of the first mechanism was staged a few weeks ago off the Atlantic coast, and involved the battleship "Ohio" and a seaplane of the F-5-L type. The big flying boat, designated herein-after simply as the "F-5-L," was from the Anacostia Air Station, Washington, D. C., and like others of its class, it may be explained here, has a wing span of 108 ft., and is powered with two 12-cylinder Liberty engines. In preparation for the demonstration the "F-5-L" stationed itself in Hampton Roads, Va., while the "Ohio" steamed eastward, past Cape Henry, and dropped anchor, finally, almost 100 miles from the roads. The crew of the flying boat was kept in ignorance of the ship's position; they were not told, in fact, whether it had gone north, east, or south.

The strange game of blindman's buff began when a message was sent to the waiting airmen, ordering them to guide their craft to the battleship, to circle

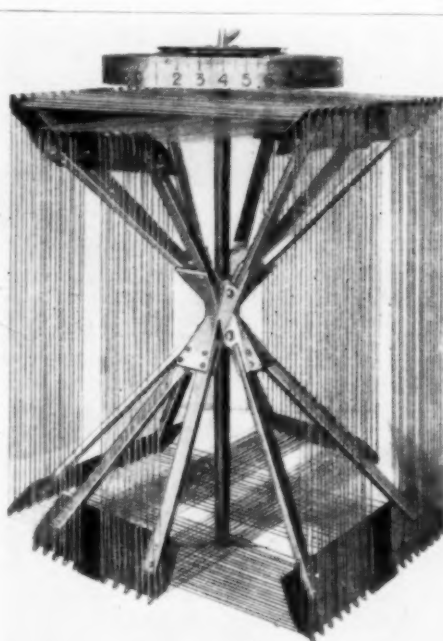
above it, and to return to the starting point at Hampton Roads. In obedience, the "F-5-L" slipped from the water and spiraled upward like a homing pigeon on release. If any at the air station had been informed of the position of the "Ohio," they must have watched the flying boat with tense but speculative interest as it neared the top of its climb and they must have been delighted when, leveling off, it struck, as though endowed with the instinct of the pigeon, straight for the hidden ship, far below the horizon and 94 miles distant.

To describe an epoch-marking flight in a few words: The craft flew to the "Ohio," circled above it as required and flew back to its starting point, traveling in all approximately 200 miles, and wasting hardly one of them in deviations to right or left.

The instrument which guided the "F-5-L" in this way, first to the battleship and then back to Hampton Roads, is the navy's new radio compass, the vital feature of which is the box-like antenna. This is placed within the hull, and con-

sists of two square, pivoted frames several feet apart, over which bare wires are wound to form the sides and ends of the "box." The frames are mounted on a vertical standard, around which the "box" can be revolved at the will of the wireless operator. Obviously, this antenna is small and cramped; but by the use of a six-stage amplifying detector the wireless impulses received are strengthened until quite audible.

It was to these impulses that the operator listened as the "F-5-L" leveled off above Hampton Roads. Listening, he revolved the boxlike antenna, and heard the signals from the "Ohio" gain and then lose in intensity. At a certain point in



The Antenna, of Two Square Frames Wound with Bare Wire, with the Dial and Pointer on Top

each revolution, he observed, the sound strength always reached its maximum. A glance at the fixed dial and the moving pointer above the antenna showed him, then, just how many degrees the goal lay to port or starboard. This information he telephoned immediately to the pilot; and the big flying boat was swung toward the distant ship. To avoid error the operation was repeated at intervals both on the outward trip and on the return, when the sending was done by the wireless station at Norfolk.

In addition to this compass outfit, the "F-5-L" was equipped, of course, with the regulation sending set, consisting of the single wire which is trailed behind the hull, and a generating set. This set is a remarkable little mechanism, being contained entirely in a small, bullet-shaped shell. This is fastened to the exterior of the hull in any spot where the wind can strike with full force the little propeller on its nose. Within the shell, and actuated by the propeller, are the generator, the transformer, the spark gap, the high-potential condenser,

and the transformer for changing and establishing wave lengths.

In this way, by the use of the boxlike antenna, the navy will be able hereafter to guide its flying boats. It remains, now, to speak of the second apparatus, which reduces for the pilots the physical strain involved in the manipulation of these heavy craft. Remembering the long and fruitless experimenting of the early days, most airmen will call the device a "stabilizer"; more properly, however, it is called

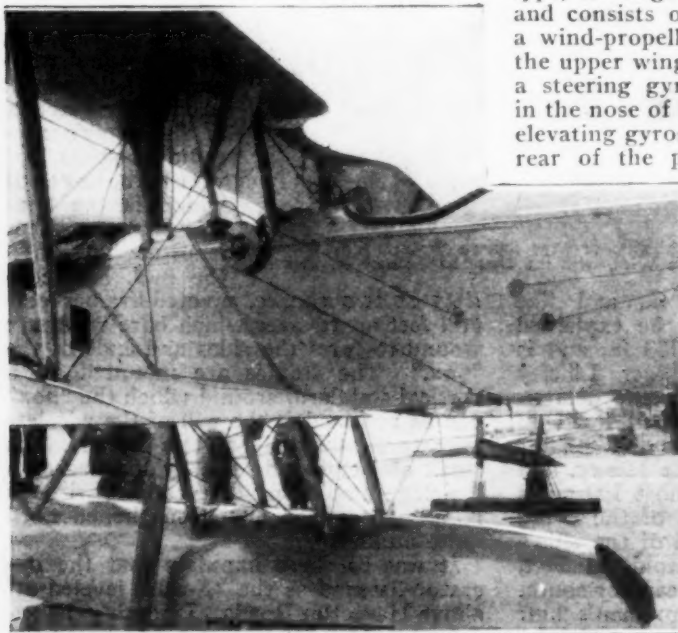
an "automatic pilot." Its development has been under way for a number of years; but only in the last few weeks have the details been disclosed by the manufacturer, famous, otherwise, for his perfection of the gyro compass and the gyro ship stabilizer.

Within the Bullet-Shaped Shell and Actuated by the Propeller Are the Generator, Transformer, Spark Gap, and Condenser

In general, the automatic pilot guides the airplane by checking firmly, though not too abruptly, any departure from the course given by the pilot prior to relinquishing the controls. As used on seaplanes of the F-5-L type, it weighs little more than 100 lb., and consists of three units. These are: a wind-propelled generator, mounted on the upper wing or on the top of the hull; a steering gyroscope and motor, placed in the nose of the hull, and a banking-and-elevating gyroscope and motor, located in rear of the pilots' seats. The motors,

driven from the generator, are powerful reversible mechanisms, geared down to sprocket wheels. Chains connect these wheels with the control cables, and so enable the motors to move the control surfaces when required.

As the power units, though mechanically somewhat different, are identical in working principle, the action of only the first need be described. On the steering gyroscope, first of all, is an arm carrying a contact brush. This brush rests upon a sector which is composed of two metal



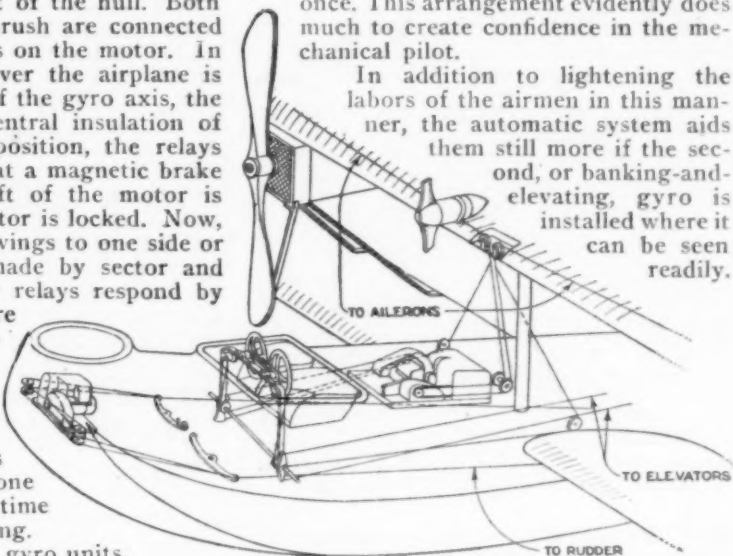
The Single Wire Which is Trailed behind the Hull is Shown Here as Carried on a Hydroairplane. It is Seen to Extend from the Hand Reel at the Edge of the Observer's Cockpit Down to an Insulated Tube

parts insulated from each other, and which can be considered for the purposes of explanation as part of the hull. Both two-part sector and brush are connected electrically with relays on the motor. In operation, and whenever the airplane is holding the heading of the gyro axis, the brush rests on the central insulation of the sector. In this position, the relays make such contact that a magnetic brake on the armature shaft of the motor is energized, and the motor is locked. Now, in case the airplane swings to one side or another, contact is made by sector and brush, and the motor relays respond by releasing the armature brake. The same action closes a circuit and starts the motor in the direction which will bring the plane back to its course. All this is done in a fraction of the time required for the telling.

Before reaching the gyro units, the low-voltage current from the generator passes through a double-pole switch, located where most convenient for the pilots. Three single knife switches are provided, too, for the selective use of any part, or all parts, of the system. One of the chief

ure of the current, whether accidental or intentional, will free the controls at once. This arrangement evidently does much to create confidence in the mechanical pilot.

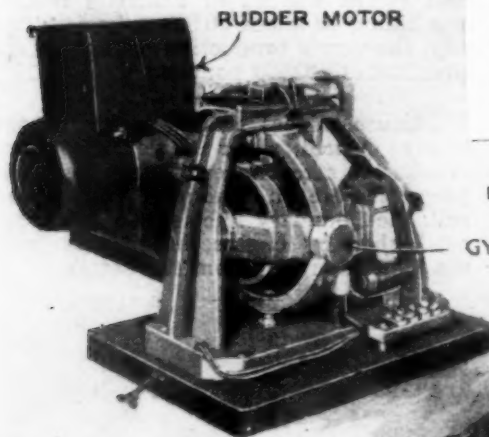
In addition to lightening the labors of the airmen in this manner, the automatic system aids them still more if the second, or banking-and-elevating, gyro is installed where it can be seen readily.



In This Diagram the Automatic Pilot is Shown, in Exaggerated Scale, as Installed in a Naval Flying Boat of the F-5-L Type. One of the Gyros Is in the Nose, the Other Back of the Seats

Here it will serve as a reference plane, or artificial horizon, making it possible for the pilots to fly their ship at night or in heavy fog with the comforting assurance that the wings are level.

■ A plant near Honolulu, H. I., now makes fuel alcohol from pineapple waste. Nine tanks are in use, each capable of holding 4,000 gal. of the waste.



The Cover has been Removed, Above, from the Gyro Unit Seen in the Nose of the Flying Boat, at the Top of the Page. At the Top of the Gyroscope Are the Brush and Two-Part Sector Which Control the Motor, Thus Holding the Plane to Its Course

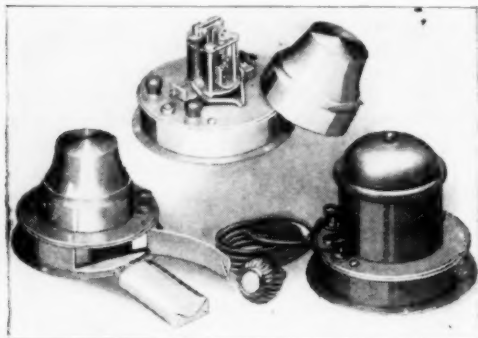
safety features of the system are the magnetic clutches located in the gear boxes of the motors, for, as the controls are operated through these clutches, any fail-



This Is the Unit Seen, at the Top of the Page, Just in Rear of the Pilots' Seats. It Preserves Lateral and Longitudinal Stability in the Same Way That the Other Unit Maintains Direction

BATTERY, BELL, AND BUTTON COMBINED IN ONE CASE

Arguing that the dry battery of a household doorbell system dies finally of chemical action, and not exhaustion,



Left: Two Views of Self-Contained Buzzer, Disassembled. Right: Complete Bell Fitted for Operation from a Distance

really supplying very little current, an eastern concern now has brought out a bell using tiny flashlight batteries. One of these, in two or three-cell size, is contained in the round metal base of the bell itself, making a compact set of ornamental appearance. A button on the base makes the set self-contained for desk use, while as a doorbell, the regular button is connected to posts on the base, no other wiring being necessary. The outfit also is made with a buzzer instead of a bell.

DYNAMOMETER CAR MEASURES TRACTOR POWER IN FIELD

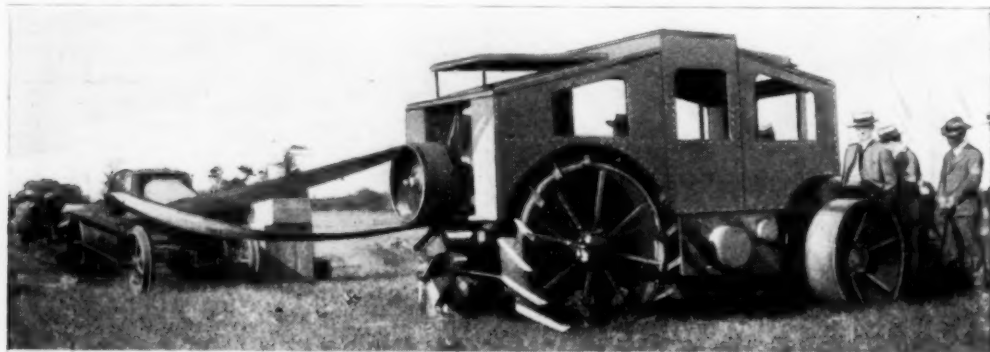
Farm tractors in the field, and therefore under actual working conditions, are measured for both brake horsepower and drawbar pull by a new dynamometer car employed by a large maker of farm im-

plements. The machine itself resembles a tractor with an inclosed metal body. A Prony brake, with a number of brake bands operated by air cylinders, is connected to a pulley for the belt test, and to the ground wheels for the drawbar test. The machine in the latter case is hauled by the tractor being tried, the drawbar being connected to a hydraulic cylinder that actuates the indicating instruments. Compressed air is supplied by a small electric pump, operated by a storage battery that is charged by an engine-generator set. The whole outfit with the exception of the battery is contained in a compartment at the side of the body accessible from the outside.

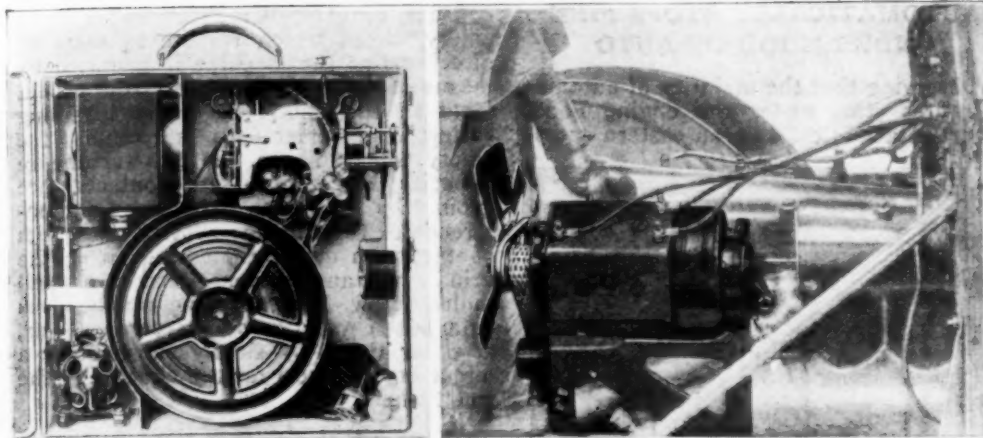
STUDY EXTRACTION OF GLUE FROM FLIPPERS OF SEAL

The way to a new and easily exploited source of glue is opened by recent experiments of the Bureau of Standards with a barrel of salted seal flippers, shipped to Washington, D. C., from the Pribilof Islands of Alaska. This work demonstrated that 67 per cent of the weight of the salted flipper could be secured as glue of good quality. The significance of this result is realized when it is known that, as the four flippers of the fur seal average eight pounds in weight, and as the Bureau of Fisheries reports the killing of about 30,000 animals annually, the yearly production of flippers approximates 240,000 pounds.

Because miners staking claims in the newly opened silver fields of eastern Alaska are often uncertain whether their properties are on American or Canadian soil, the boundary line is now being re-established by engineering parties from the Dominion and from the States.



New Tractor Dynamometer Car, Containing a Compressed-Air Prony Brake: It is Seen Here Testing a Tractor for Pulley Horsepower in the Field, but Is Equally Useful for the Drawbar Test



That Current for the Motion-Picture Projector may Be Available Anywhere, There Is Now Manufactured a Small Generator Which is Mounted under the Hood of the Automobile, as Pictured at the Right, and is Operated by the Engine. A Typical Portable Projector is Seen at the Left as Packed in a Carrying Case

GENERATOR FOR MOVIE SHOWS MOUNTED IN AUTO HOOD

Machines that project good motion pictures are now available in such portable form that giving modern exhibitions in the most remote places is merely a matter of carrying an extra suitcase. The one difficulty not always easily overcome is the supply of electric current. To dispose even of this problem for all time, the manufacturer of a highly successful form of portable projector now has devised a small electric generator, with fittings which enable it to be mounted under the hood of a standard and popular type of light auto. In this position it is readily operated by the engine of the auto, delivering enough direct current at 30 to 35 volts to run lamps for illuminating a hall as well as projecting a picture. The generator terminals are wired to a jack on the dashboard, the lamp cable carrying a plug to fit. With this outfit, current for a show is always available, from a source invisible, but as reliable as the car itself.

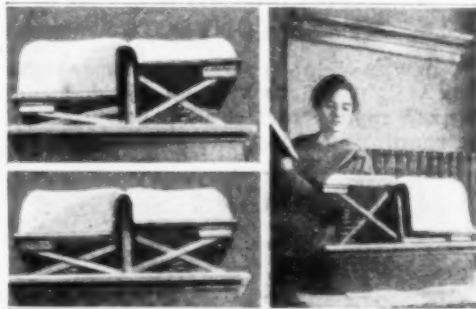
FORMER SEA RAIDER TO CARRY AMERICAN TRADE EXHIBIT

The steamship "Von Steuben," which, as the German raider "Kronprinz Wilhelm," terrorized the seven seas in 1915, has recently been purchased from the United States Shipping Board for the sum of \$1,500,000, and is now being refitted for a cruise around the world in the interests of American trade. This voyage is scheduled to start on Jan. 15, 1921, after the vessel has taken aboard exhib-

its and representatives from 700 of America's largest manufacturing concerns. In addition to the important ports of Europe, the itinerary includes coast cities of South America, Australia, New Zealand, Japan, China, and India.

USE OF BULKY DICTIONARIES MADE EASY BY NEW HOLDER

A book holder, or support, of recent invention interests unfailingly those who have experienced the awkwardness of handling, on a small table, a ponderous Bible, dictionary, or similar bulky volume. It consists of a horizontal roller bar, on either side of which is a spring-mounted surface. On these are laid the covers of the book. Whether the book be opened,

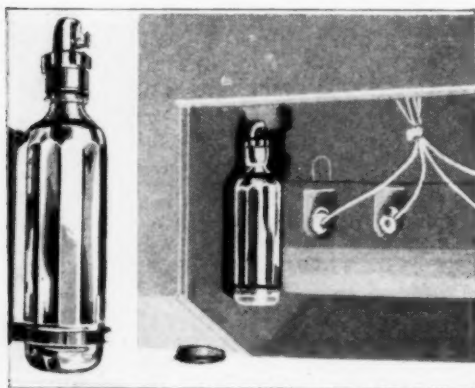


The Book Holder is Shown in Use, at the Right. At the Left It will be Seen That the Right and Left-Hand Pages Are Always at the Same Height

now, at front, middle, or back, the right and left-hand pages will always be level, and at the same height above the table top.

AUTOMATICALLY STOPS FIRE UNDER HOOD OF AUTO

Observing that the majority of automobile fires start under the engine hood, where attack is difficult, an eastern acces-

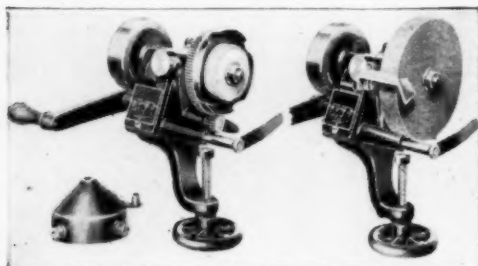


The Extinguisher, Seen in Detail at the Left, is Mounted under the Hood and near the Carburetor. The Plug Melts at the First Flame

sory manufacturer now has brought out an extinguisher that operates automatically in that location. The container, of heavy glass, carries the extinguishing liquid under 35-lb. pressure, and is capped by a fusible plug which is set for 200° F., resisting engine heat, but melting at once on the approach of flame. The fluid is discharged in a fanlike stream, generating a fire-quenching gas that fills the hood. The extinguisher is mounted near the engine and carburetor under the hood, but is easily removed and operated by hand. It is also adapted for household use.

SMALL MACHINE GRINDS TIMER CONTACTS

A new machine for grinding timer contacts weighs only seven pounds and can be fixed readily to the shop bench or to the running board of the automobile. It

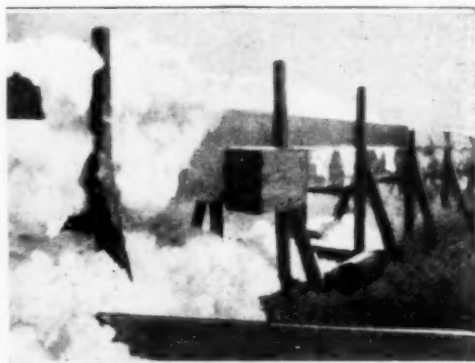


The Machine for Grinding Timer Contacts Is Ready for Use, at the Left. A Larger Emery Wheel has Replaced the Chuck and Smaller Wheel, at the Right

consists, roughly, of a chuck and a small emery wheel, which revolve in opposite directions as the machine is operated by means of the hand crank, or from a belt. Held in the chuck by a flat retaining spring, the timer cap surrounds the emery wheel; hence, the two turning in opposite directions, the contacts are ground by the wheel. The inner circumference of the timer is kept in tangential contact with the emery wheel during the grinding by an occasional turn on a small milled screw. The machine can be used as a bench grinder for sharpening tools, at other times, by simply substituting a larger emery wheel for the chuck and the small wheel.

SEA FOAM RISES LIKE LATHER FROM FLUME OF SALT PLANT

Asked to identify the subject of the accompanying photograph the reader might with reason be perplexed. It is not, as he might guess, a trough full of lather for the wholesale barbering of the bolshevist armies, but the intake flume of an evap-



The White Masses of Foam Rise Continually from the Sea Water in the Flume as It Flows to the Evaporating Inclosures of the Salt Plant

orating plant in southern California. Through the flume the water flows from the ocean to the diked inclosures where it is subjected to the action of the sun, with salt as the result. From the flume the foam rises continually in white, iridescent masses, often to be picked up by the wind and tossed down the beach.

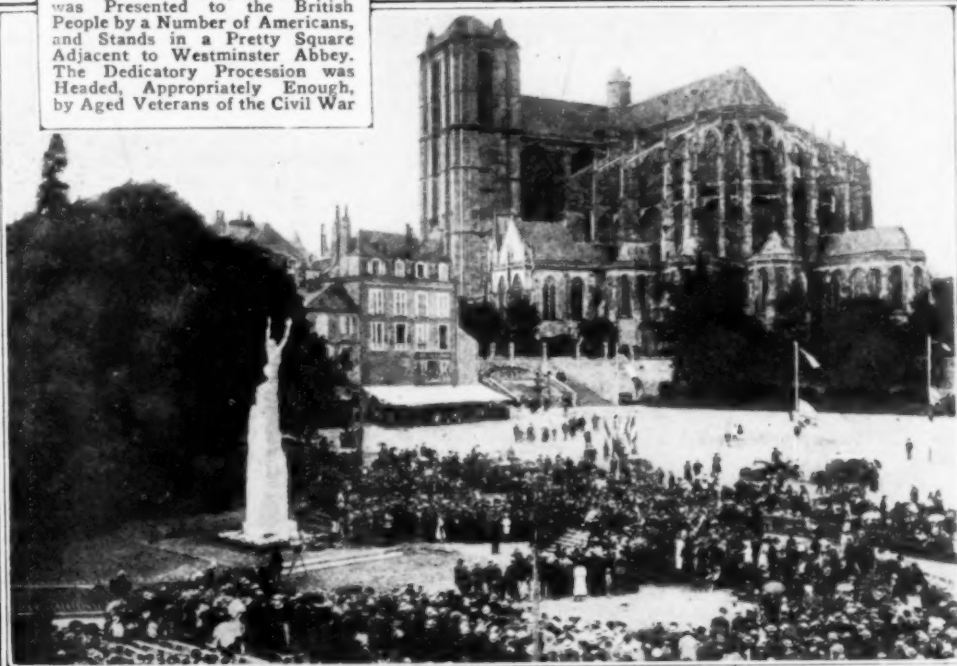
☛The oil-burning transatlantic liner "Aquitania" recently steamed for almost four hours at the rate of 31 miles an hour, so surpassing by a good mile an hour the standing record, held by the "Mauretania," and proving itself the fastest of the world's merchant ships.

LINCOLN AND WRIGHT MEMORIALIZED OVERSEAS



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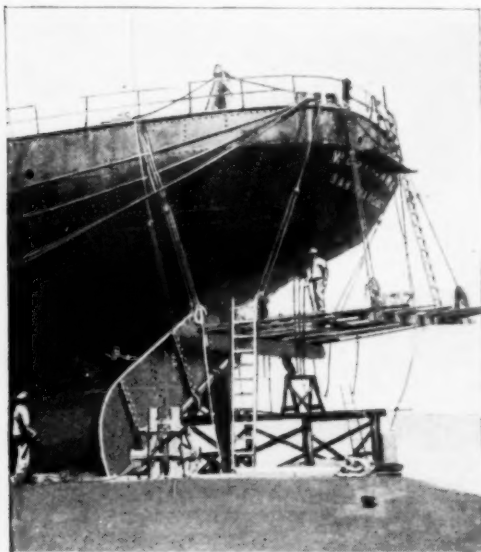
This Summer Saw the Unveiling in Foreign Countries of Monuments to the Memory of Two Great Americans. The Statue of Abraham Lincoln, by St. Gaudens, was Presented to the British People by a Number of Americans, and Stands in a Pretty Square Adjacent to Westminster Abbey. The Dedicatory Procession was Headed, Appropriately Enough, by Aged Veterans of the Civil War



Wilbur Wright, Pioneer Airman, is Memorialized by the Arresting Shaft Dedicated Recently in the City of Le Mans, France. It Was Here, in 1908, It will be Recalled, That Wright Discomfited His Journalistic Ridiculers by Making a Sensational, Continuous Flight of One Hour and a Half. This Differs from the Lincoln Monument, it will be Seen, in That It Is Pure Symbolism. The Figure Strains Upward as the Embodiment of the Pioneer's Unconquerable Determination to Rise in Successful Mechanical Flight

REPAIRMEN HANG PLATFORM UNDER STERN OF SHIP

In place of the little boatswain's chairs and single planks usually hung over the rail for work on a ship's sides or stern, a



The Big Platform, 20 Feet Square, was Hung beneath the Ship's Stern to Facilitate Work on the Replacement of the Rudder

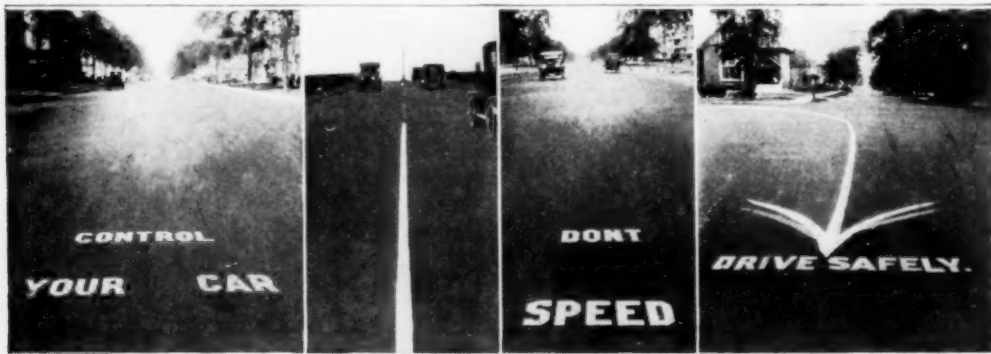
great platform approximately 20 ft. square was employed in a recent job done at an outfitting dock on the waterfront of San Francisco, Calif. Suspended beneath the stern of a big steel freighter by six lines of rope, this broad stage was so stable that ladders were safely rested against it, and so convenient for the workers that the work was soon done. The task was the replacement of the ship's rudder.

PLANES TO CARRY RESCUERS TO MINE DISASTERS

As a result of an inquiry begun in the fall of 1919 by the Bureau of Mines, a coöperative agreement has been made recently whereby McCook Field at Dayton, Ohio, will send airplanes on request to the bureau's safety station at Vincennes, Ind. Here the planes will take on engineers and oxygen apparatus. They will then leave for the landing field nearest the scene of the disaster, the location of this field having been ascertained from data now being collected. These data will include maps indicating landing places, and their proximity to all mines, towns, and railway stations.

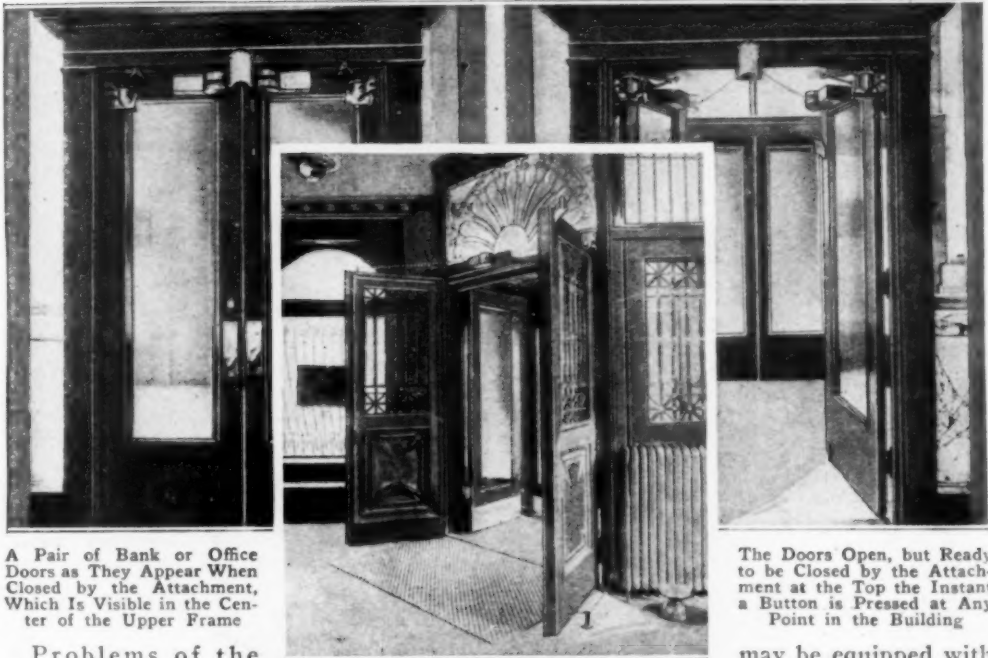
SIGNS PAINTED ON PAVEMENTS WARN CARELESS MOTORISTS

By painting the pavements of the various boulevards with admonitory signs, the authorities of Detroit, Mich., have made sure that however little the motorist may know of the municipal ordinances, he will be deprived of every excuse for careless driving. These signs usually consist of two or three words, in white letters a foot high, and are placed where most needed. The words "Don't Speed," for example, are seen by the motorist as he turns his car into a long straightaway stretch, and finds his foot itching for the accelerator. Similarly the warning "Control Your Car," appears a block or two distant from a dangerous railroad crossing. In addition to these worded warnings, broad white center lines appear at curves and bridge approaches to discourage the tendency to "cut corners."



These Signs on the Boulevards of Detroit, Michigan, Make Careless Driving Inexcusable. They are Located, from Left to Right, a Block or Two from a Railroad Crossing, on the Approach to a Bridge, at the Entrance to a Long Straightaway Stretch, and at One End of a Dangerous Curve. The Letters Are a Foot High and are Made with a Heavy White Paint

AUTOMATIC DOOR CLOSER TRAPS BANK ROBBERS



A Pair of Bank or Office Doors as They Appear When Closed by the Attachment, Which Is Visible in the Center of the Upper Frame

On These Self-Latching Doors the Arrangement Is Somewhat Different, the Mechanism Being on the Casing Instead of the Doors

The Doors Open, but Ready to be Closed by the Attachment at the Top the Instant a Button is Pressed at Any Point in the Building

Problems of the gravest character and import frequently are solved, after complex measures have failed, by methods of the utmost simplicity. Take the current epidemic of bank robberies, for example. Probably only bankers know the extent to which special policing systems, ingenious signaling arrangements, and instruction and drilling of employes have been tried and found wanting in the practical test. Forestalling, foiling, or capturing an audacious and determined crook, or gang of them, bent on obtaining money from a bank without the conventional details, has continued, seemingly, to be a matter rather of luck than of science.

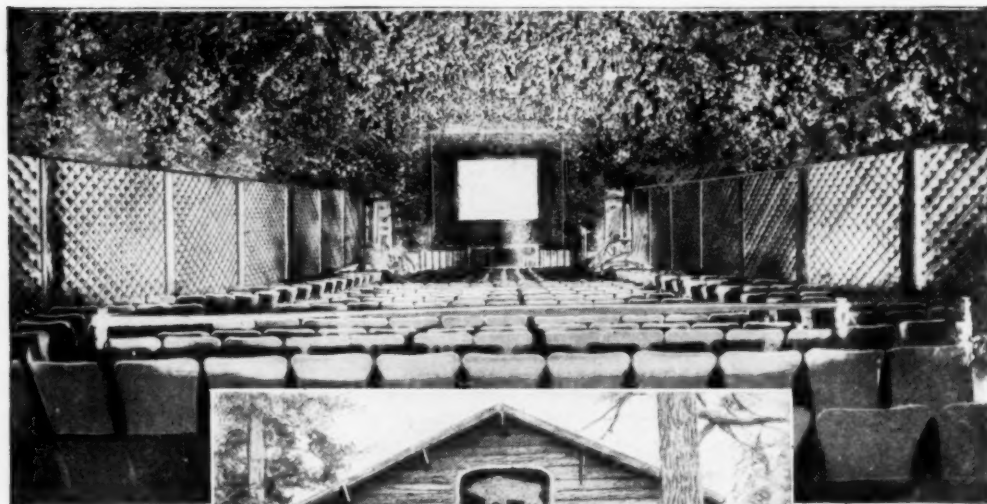
It is fitting, though unusual, that two police officers, full of experience in the ways of New York criminals, should have been first to see the mechanical remedy for this situation, and to apply for patents on a mechanism to accomplish it. The function of this new device, almost absurdly elemental and effective, is merely to close the bank doors, thus trapping the suspected malefactor in the very act of villainy. It requires the pressure of finger or foot on a button to do this; but the button may be located anywhere, or dozens of them scattered about the room or building at every strategic point. Windows as well as doors, and even skylights,

the circuit is completed, they all close instantly and inexorably. Then, the robber trapped beyond escape, an alarm is sounded, outside, or in the police station, or anywhere desired. It is declared to be a curious bit of criminal psychology that a burglar fights only when there is hope of escape, and so, caught, he submits without resistance.

In one New York bank the new door closer had just been installed when it captured its first victim, a suspected forger. Another bank has equipped both inner and outer doors with them, so that when the fleeing culprit reaches the outer one, the inner one is closed, and he is trapped in the vestibule. The usefulness of the system obviously is not confined to banks, as it may be applied to any room or building where valuables are kept. One railroad is reported to have fitted its express and money cars with door closers, and it has been suggested that fire doors might be made, by its aid, more effective in shutting out a still more dangerous enemy.

☐ The largest drydock in the Mediterranean is to be built at Naples, Italy, as part of the port development.

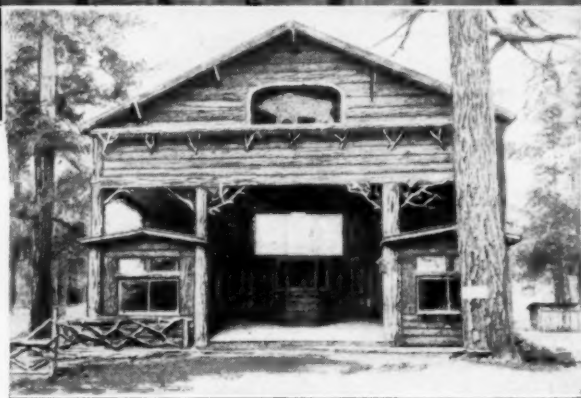
METROPOLITAN THEATER HIGH IN MOUNTAINS



The Mountain Movie
Seats 500 Persons
Comfortably

Motion - picture performances in a theater that compares well with the best in the big cities is a feature of the life at Pine Knot, Calif.,

that usually surprises vacationists who have traveled by stage or motor car to this isolated retreat in the San Bernardino Mountains, almost 7,000 ft. above sea level. The theater is housed in a wooden, shingled structure with an ornamental front done in the style of "'49." On right and left, at the front, are two concession booths, one sheltering the



Flanking the Ticket Booth of the Mountain Moving-Picture Theater are Seen the Soda Fountain and the Photograph Shop

Trellises and Arching Bows Decorate the Interior

soda fountain, the other a photograph shop. The interior, with its seating capacity of 500, is made to harmonize with the rustic note of the walls with latticework, and the ceiling with arching branches of white oak. It is lighted indirectly by the establishment's own generating set, is well protected against fire, and is equipped with an organ and the most modern electrically driven projecting machines, as well as the usual conveniences for the audience.

SECOND ARMY-TRUCK TRAIN CROSSES CONTINENT

Once again the Motor Transport Corps, U.S.A., is sending a convoy across the continent for the purpose of testing highways, and more particularly the units of the convoy themselves. Last year, it may be recalled, the train traveled from Washington, D. C., to San Francisco by way of Chicago and the Northwest, over the Lincoln Highway. This year, however, the southern route is being used. Starting from the national capital, the machines followed the Bankhead National

Highway through Virginia, the Carolinas, Georgia, Alabama, Mississippi, Arkansas, and Texas; and at the time this account appears, should be approaching Los Angeles, Calif., their destination. In addition to many makes of trucks, the units being tried out include passenger cars, carryalls, and ambulances.

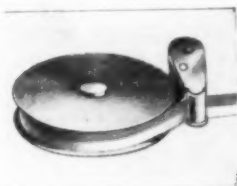
■ A plan for borrowing books from public libraries with the privilege of returning them to libraries in other cities is now being investigated as to its possibilities by an association of American commercial travelers.

BULRUSHES YIELD SUGAR, ALCOHOL, AND BEER

As a result of a German professor's discovery that the roots of the ordinary bulrush contain as much as 30 per cent of cane sugar, special dredges are now being built for the purpose of harvesting them. The roots grow in thick horizontal masses, and in one part of Germany are believed to underlie everywhere a tract of marshy land comprising 500,000 acres. Though sugar is the product chiefly sought, secondary processes yield alcohol and a nutritive cattle food. From the juice there is made, also, a strong beer resembling porter.

OILER ATTACHMENT LENGTHENS LIFE OF TYPEWRITER RIBBON

The belief that most typewriter ribbons are discarded when only one-eighth of the ink and one-fifth of the fabric have been consumed is given as the reason for the recent appearance on the market of a tiny attachment which gives longer life to the ribbon.



This it does by oiling the fabric continuously. Attached near the reel of almost any standard machine, it consists of a container in which are a wick of felt and a brass roller. Between these the ribbon is threaded. The wick is saturated at intervals with a drop of oil introduced through a hole in the top.

TINY MOTOR IN CLOCK SHOWS VARIATIONS IN FREQUENCY

Direct comparison of electric alternating current with the movement of a reliable clock, giving prompt indication of deviations in the frequency, is made possible by a new form of clock for generating stations. The comparison dial carries two hands, a black one turned by the clock works, and a gold one run by a tiny synchronous motor, both making one revolution in five minutes. The motor measures only $2\frac{1}{8}$ by $2\frac{5}{8}$ by $2\frac{1}{16}$ in., and consumes but four watts. It is self-starting, and reaches synchronism one second after current is turned on. Change in the current frequency is indicated by the gain or loss of the gold needle, in comparison with the black, and the neces-

sary adjustment may be made at once. On another dial a single hand is differentially geared to both motor and clock

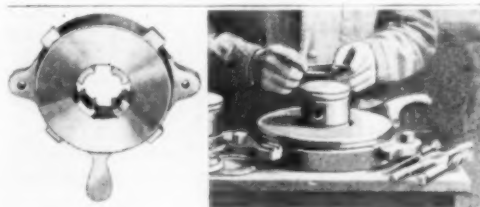


The Clock is Seen at the Right Ready for Installation in the Generating Station. At the Left Is the Mechanism

works, and normally remains stationary, but swings one way or the other at any change.

NEW VISE FOR GARAGES IS ANNULAR IN SHAPE

A new vise, meant particularly for automobile-repair work, looks at first glance like a steel ring, 12 in. in diameter, with four jaws penetrating it radially, and with a stout handle projecting from the outer circumference. Bolted flat upon the top of the workbench, the vise will receive any bolt, gear, piston, etc., measuring from $\frac{1}{4}$ to $4\frac{5}{8}$ in. in diameter. To force the jaws toward the center, and so to grasp the object, the operator pushes the handle around the circumference once or more as required. Two sets of jaws

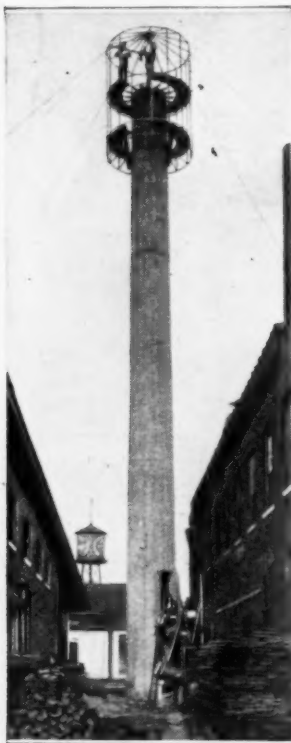


The New Vise is Seen from the Top, at the Left, and in Use upon the Workbench, at the Right

are provided, incidentally, one for holding rough and the other for holding highly finished pieces.

BUILD CONCRETE CHIMNEYS WITH AID OF MACHINE

Mechanical methods are gradually changing the processes of concrete construction, and now building even so difficult an object as a tall monolithic stack may be accomplished by machine. In the new system, originated in Indiana, a steel center mast supports the forms and construction cage, which are moved upward as each section of the stack is completed. The sheet-steel forms are made to overlap as the rising stack tapers up, the outer forms, corrugated to mold half-round ribs in the surface, being removable when placing the reinforcing. The working cage and platforms are made secure by guys, and may be protected by a canvas cover.



the surface, being removable when placing the reinforcing. The working cage and platforms are made secure by guys, and may be protected by a canvas cover.

GOVERNMENT OFFERS FOR SALE COMPLETE INDUSTRIAL CITY

The most gigantic sale of industrial property ever undertaken by the United States or, probably, any other government, came to an end on September 2 with the close of the bidding. The property is "Old Hickory," built during the war, and known as the largest smokeless-powder manufacturing plant in the world. The site is near Nashville, Tenn., on the navigable Cumberland River and within 100 miles of three apparently inexhaustible coal fields. The plant proper covers 1,800 acres and consists of 1,112 buildings served by 94 miles of standard and narrow-gauge railway with a reclassification yard of 660-car capacity. The coal-handling, refrigerating, and water-pumping facilities are more than adequate,

the last, in fact, being capable of supplying a city as large as Boston. Adjoining this manufacturing area are 560 acres on which are 3,867 homes, stores, and civic and social buildings, providing ample accommodations for every feature of normal community life.

COLORADO GETS TRAFFIC CODE FOR COUNTRY HIGHWAYS

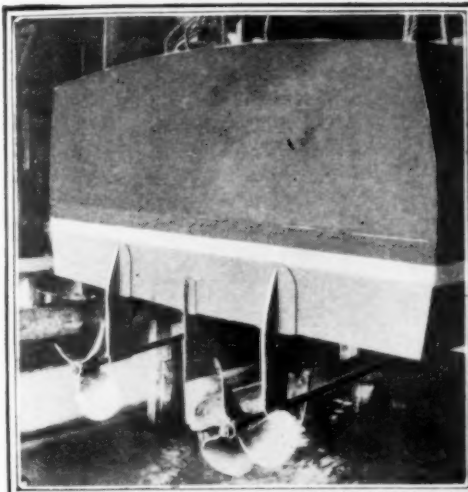
Traffic along rural roads is to be almost as carefully regulated hereafter as on the city streets, according to the provisions of a code formulated recently by the highway commission of Colorado. Of most concern to motorists is the establishment of 35 miles an hour as the maximum speed permitted. Farmers are advised, too, that after nightfall their wagons must be equipped with taillights. No vehicle, whether auto, truck, or wagon, can have a bed width of more than nine feet, and neither may be so loaded that the driver cannot view the road in rear. Tractors and other vehicles having lugs on the wheels are not allowed on the highways at any time.

GREEN "CARPET" INCORPORATED IN CEMENT FLOOR AND WALK

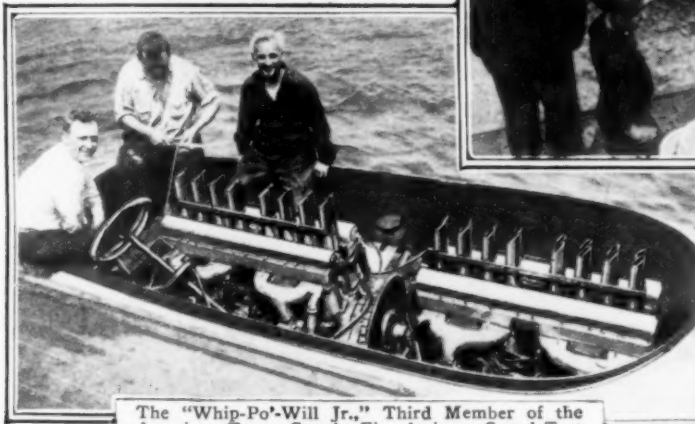
An air of perpetual festivity, like that of a reception or wedding, is worn by one residence in a western city as a result of the ingenuity used in laying the cement floor of the front porch and the cement walk from porch to street. In the middle of the walk, first, there was laid cement in which a green coloring ingredient had been mixed. This strip, about 18 in. wide, was continued up the front steps. On the porch it was broadened out into a rectangle which includes all of the floor save for a white border. The general effect achieved is that of a bright, green carpet and long runner.



"MISS AMERICA" WINS INTERNATIONAL RACES



The "Miss Detroit V," Pictured at the Right, and in Stern View, Above, Was Third in the First Race, but in the Second Recovered Itself, and Crossed the Line Only Half a Minute behind the Winning "Miss America." Both are Equipped with Two 12-Cylinder Marine Engines Aggregating 840 Horsepower



The "Whip-Po-Will Jr.," Third Member of the American Team, Caught Fire during a Speed Test Four Days before the First Race, and Eventually Sank. In the View Above are Seen the Two 450-Horsepower Engines, Mounted in Tandem to Drive a Single Screw

Just 15 Days After the Yacht "Resolute" Finally Defeated the Challenging "Shamrock IV," in American Waters, the American Motorboat Flotilla Won the Second and Decisive Contest for the Coveted Harmsworth Trophy, off the Southern Coast of England. Both Races were Won by the Same Boat, "Miss America" of Detroit



This Is the "Miss America," Which Brings the Harmsworth Trophy and the International Motorboat Championship to America as a Result of Its Performances off the Isle of Wight. Its Fastest Lap in the First Race was Made at a Speed of 56.63 Knots, and in the Second Race at the Rate of 56.41 Knots. The Average Speed for Both Days Was 50.5 Knots, or 58.15 Miles an Hour

MEMORIAL TO HEROIC DEAD OF DISTRICT OF COLUMBIA

In the District Building at Washington, a structure which corresponds to the city hall of the ordinary municipality,



This Marble Tablet was Recently Unveiled in Memory of the Employees of the District of Columbia Who Died in the World War

employees of the District of Columbia recently dedicated to the memory of 13 former coworkers, who lost their lives in the World War, a beautiful and rather unusual tablet. The material is white marble; and the design is interesting in that, above the names and dedicatory lines, there is seen the reclining figure of a wounded soldier. The head is upraised as though for the utterance of a last farewell. The tablet is about five feet high, and has for background a large decorative window.

DUELING MALES OF ELK TRIBE DIE WITH ANTLERS LOCKED

Though but few woodsmen have been witnesses to the breeding-time duels of the males of the elk, or moose, tribe, the

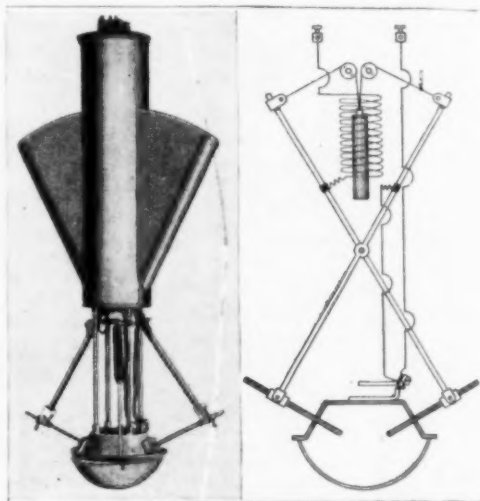


That Sometimes Both Participants Die in the Breeding-Time Duels of the Male Elk is Proved by This Photograph Snapped in Western Oklahoma

frequency of these combats is proved by repeated discoveries of the dead and dying bodies of the vanquished. And that sometimes both succumb is proved by a photograph snapped last spring in the wilds of western Oklahoma. Though the photographer came upon the bodies a few days after their discovery by the wolves, he found the interlocked antlers and magnificent heads still intact.

ARC LAMP FOR PHOTO WORK OPERATES HORIZONTALLY

For photographic work, the actinic power of the electric arc, particularly with a large separation of the carbons, gives it a value difficult to replace. A new form of lamp designed in England maintains a long horizontal arc especially useful for the overhead lighting of film studios, or for photo printing. The carbons are carried on the lower ends of long crossed rods, pivoted together at the center. A weight pulling on cords



View of the Complete Horizontal-Arc Lamp as It Appears Ready for Use, and a Diagram Revealing Its Unusual Method of Regulation

attached to the upper ends of the arms normally draws them inward until the carbon points touch. When current flows, however, a solenoid coil lifts the weight, and the carbons separate, drawing an arc $1\frac{1}{2}$ to 2 in. long. The arc is inclosed in a metal case, with a hinged glass bowl below, and a small magnet on top of the case holds the leaping flame in its correct horizontal position. The lamp takes 200 to 300 volts, equivalent to 150 to 170 volts across the points, and uses 10 to 11 amperes.



In Rear of the New Car, at the Left, is Seen the Motor Wheel Which Supplies Motive Power and is Controlled from the Steering Wheel. Essentially, the Body Is a Simple Buckboard upon Which have been Placed the Two Seats. Side Curtains Inclose the Entire Car during Inclement Weather. At the Right is Seen the Front of the Vehicle, with Its Single, Gas-Burning Headlight

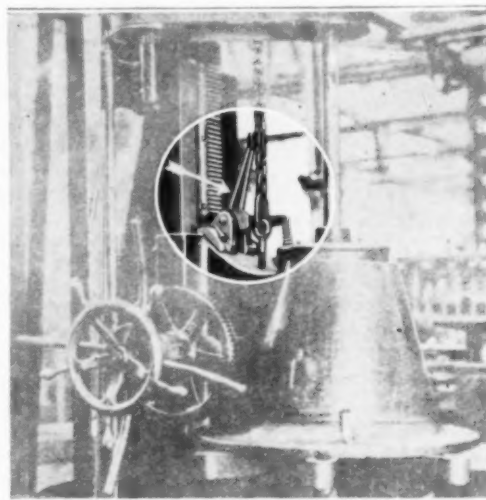
MOTOR-WHEEL BUCKBOARD HAS COVERED BODY

A new vehicle that is to appear in the motor world strives for utility rather than style. It is propelled by a $2\frac{1}{2}$ -hp. motor wheel and will carry two passengers. The power wheel is controlled from the steering wheel and is provided with a reversing device. The car is equipped with a foot brake and gas light. The frame is built on the buckboard principle, with a 6-ft. wheelbase. A kicking rod is used to give initial impetus to the car. Side curtains are provided for inclement weather or for converting the rear into a package container. The curtains and top are of high-grade imitation leather. It may be made into a roadster by folding down the back half of the top and the back seat. The car can easily be shipped by merely taking down the top, as its total weight is only 250 pounds.

SAFETY MECHANISM ARRESTS FALL OF BIG SPINDLE HEAD

A simple safety mechanism has recently been introduced in the machine shops of a great American manufactory to protect the operators of the multiple-spindle drill presses. The heavy cast-iron head of this machine is suspended by a chain, the other end of which is attached to a counterweight, and is raised and lowered by means of a handwheel pinion which meshes with a vertical rack. Formerly, it is evident, when the chain snapped, the head fell—and with disastrous results if some part of the operator's body was underneath. To arrest this fall is the function of the safety mechanism. It consists

of a two-armed dog, fixed to the top of the head, and with one arm pressing normally against the chain. This pressure is maintained by the pull of a coil spring on the second arm. When the chain breaks, the spring pulls the arms through



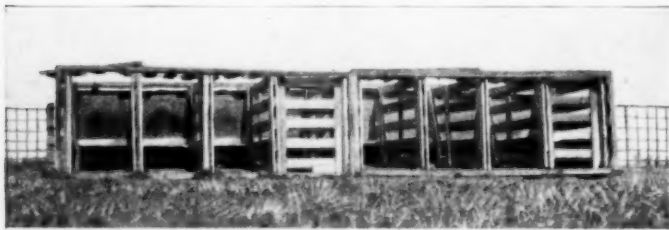
The Two-Armed Safety Dog is Fixed to the Top of the Head, with One Arm Pressing against the Chain

a small angle, the dog engages with the vertical rack, and the descent of the head is stopped.

☐ A government college of fisheries, like those maintained by Great Britain, Norway, Japan, and Germany, is now proposed for the city of Halifax, N. S. The school would provide instruction in seamanship, navigation, and the care of motor engines, in addition to work with improved methods of catching and curing fish and of utilizing the by-products.

PIGS EAT EXPERIMENTAL DIET IN INDIVIDUAL PENS

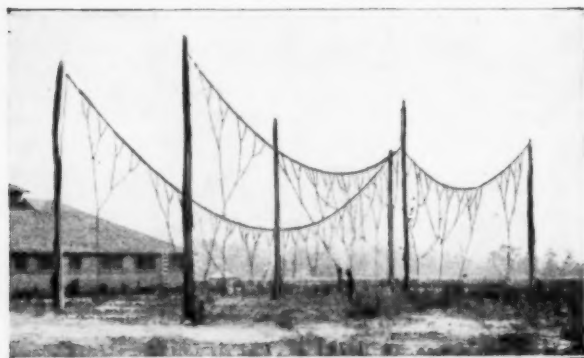
Instead of feeding its pigs *en masse*—or *en muss*, one is tempted to say—the



Eight of the Little Feeding Pens are Seen. Feeding the Pigs as Individuals in These Inclosures, the Experiment Station Is Able to Study the Effect of Diet Control in Each

experiment station of one mid-western state now feeds them from individual troughs. This is done in order that the effects of diet control may be studied in the separate animals. Each of the troughs

is placed in a little pen, like a manger in a horse stall; and into this pen the pig is trained to go at mealtime. When all the pigs are in place, the gates of the pens are dropped behind them, and the rations are distributed according to schedule. Later this schedule is compared with the recorded weights of the animals.



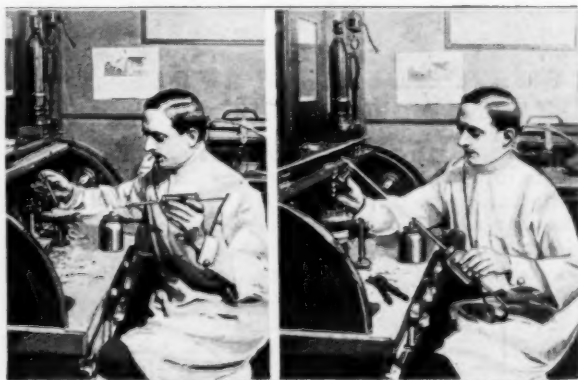
To Avoid the Employment of a Costly Observation, or Kite, Balloon, These Six Poles are Used at One Army Field to Take Its Place for Instructing Cadets of the Military Balloon Service in the Rigging of Their Craft

POLES REPLACE BALLOON IN INSTRUCTION CENTER

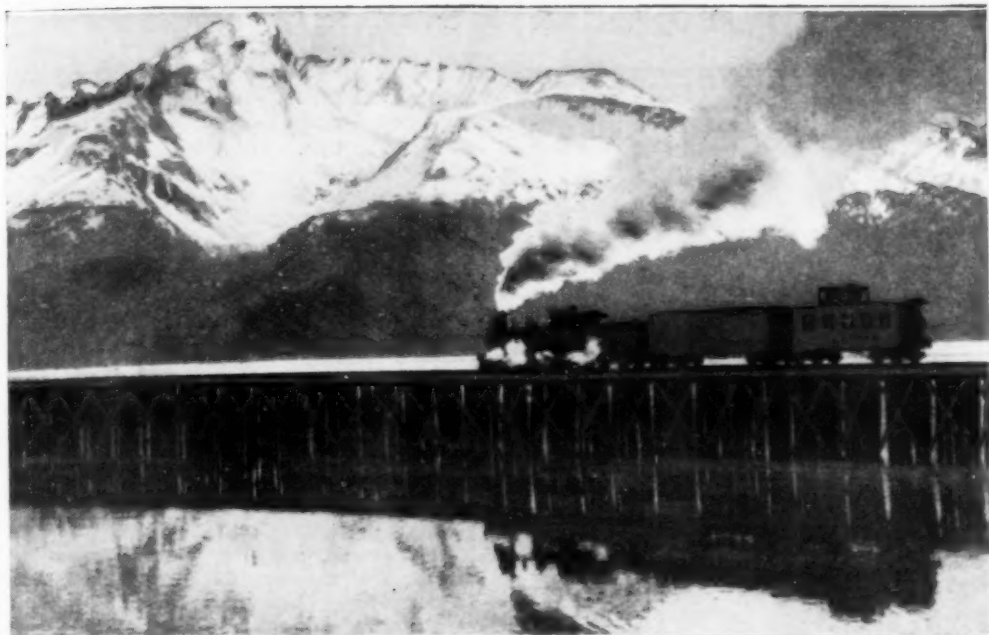
The problem of instructing the cadets in the various methods of rigging an observation, or kite, balloon without using one of the costly bags in the process has been solved at one army field by the erection of six tall poles. From the tops of the poles are suspended the roughly horizontal strips which simulate the belly-bands of the balloon; and from these in turn are hung the cords of the rigging. It is these cords that the cadets learn to knot and arrange in the daily lessons.

IMPROVED MOUTH BLOWTORCH FOR DENTAL WORK

To provide a portable furnace for dental crown and bridge work, and to take the place of the usual gasoline torch for general soldering, an Oklahoma dentist has designed a simple mouth-operated blowpipe that is proving very useful. A cylindrical air chamber serves as a handle for the long nozzle, and carries a flexible tube which is placed in the operator's mouth. By steady blowing, the flame of an oil, alcohol, gasoline, or gas burner may be projected accurately onto the work, and a high degree of heat developed. In the shop or office equipped with a compressed-air supply, this may, of course, be used for operating the torch instead of blowing it by the mouth.



The Nozzle can be Pivoted around the Top of the Fuel Can, as may be Observed from a Study of the Two Pictures. The Cylindrical Air Chamber Serves as a Handle for the Nozzle, and Carries the Tube Which Connects with the Operator's Mouth. Where an Air-Pressure Supply Is at Hand, This may be Used Instead of the Mouth Operation



WIDE WORLD PHOTO
The Alaskan Railroad's First Train, Steaming across One of the Many Trestles, Which, with Sundry Cuts, Fills, Culverts, and Bridges, Help to Negotiate the Difficult 30 Miles of Turnagain Arm's North Shore

GOVERNMENT RAILROAD SOON TO REACH HEART OF ALASKA

BY PAUL A. JENKINS

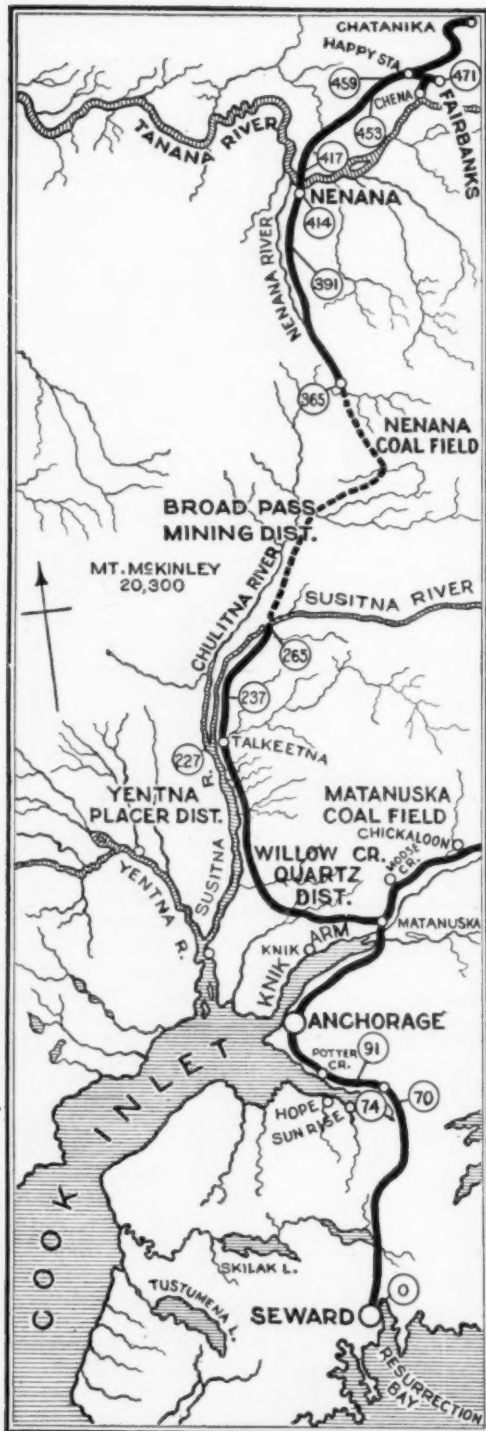
ADMITTEDLY the Congressional Record is hard reading. But as the American citizen slowly brings his interest to a focus on American affairs, after half a decade of watching European wars, there is one page of an old issue that deserves a glance. Here is recorded an act of Congress, March 12, 1914, which empowers the president "... to designate and cause to be located a route or routes for a line or lines of railroad in the Territory of Alaska not to exceed in the aggregate one thousand miles, to be so located as to connect one or more of the open Pacific Ocean harbors on the southern coast of Alaska with the navigable waters in the interior of Alaska, and with a coal field or fields, so as best to aid in the development of agricultural and mineral or other resources of Alaska, and the settlement of the public lands therein, . . ." With memory freshened, the citizen will perhaps want to know what has been done.

Soon after the authorization of this work, 13 surveying parties were in the field; and by 1915 their reports were in, and the route had been chosen. One ter-

minus was to be the town of Seward, an "open Pacific Ocean port;" the second, on the opposite side of the Alaska Range, was to be the town of Fairbanks, in the splendid valley of the Yukon system. The rivers of the Yukon watershed are navigable, it must be understood, only in the summertime. The first steamer down from White Horse usually reaches Fairbanks about the middle of June, and the first up from St. Michael, on the coast of Bering Sea, about July 10. As the last steamer leaves for either port about October 1, it is seen that all freight for the



A Typical Alaskan Farm Scene, near Matanuska, with Its Log Dwelling in the Foreground and the Fertile Hillside Beyond



The Course of the Alaskan Railroad: The Solid Lines Indicate the Trackage Already Laid, the Dotted Line the 100-Mile Stretch at Present Marked Only by the Surveyors' Stakes

entire year must be handled during this short season of about three months, and the need for the railroad is evident.

Thus the construction of about 500 miles of railroad was the task assigned to the Alaskan Engineering Commission; and the situation today can be epitomized by the statement that they have completed all but an approximate fifth of this total. From the terminal dock at Seward the line runs northward through the gold and copper country of the Kenai Peninsula to "Mile 70," where it strikes to the west and twists and turns thereafter for 40 miles along the precipitous shore of Turnagain Arm. At "Mile 114" is the little community of Anchorage, "child" and headquarters of the railroad. Thence the rails run through farming country bordering Knik Arm and the Susitna River, paralleling the latter until the stream curves away to the east. And it is to about this point that the construction has attained. Merely indicated by the surveyors' stakes, now, the line slips through the Alaska Range by way of Broad Pass, elevation 2,319 ft., and reaches the Nenana coal field. Here, at about "Mile 365," the rails are met with once again, and can now be followed through gold-mining and agricultural areas to the tiny town of Nenana, at "Mile 414," and to Fairbanks, finally, at "Mile 471."

Obviously, much is to be done before Dec. 31, 1922, the date for completion set by Congress when it made its latest appropriation, of \$17,000,000. Yet, the railroad already has rendered invaluable service to interior and coastal Alaska by making accessible two large coal fields. Firewood is fast disappearing from the banks of creeks and streams near by, the people of Fairbanks find, and, if life and industry are to be maintained, it must be replaced by other fuel. Providentially enough, and as mentioned, the railroad connects the town with the Nenana field to the south. A mine has been developed right beside the track, indeed, making it unnecessary to push the line into the heart of the area. To get coal for Seward, however, a lateral line, 37 miles long, has been extended from "Mile 152" to the town of Chickaloon in the Matanuska field, where mines yield anthracite and high-grade bituminous coal. It was this coal which tests by the U. S. Navy showed to be quite as good as the best from Virginia or West Virginia. The railroad connects this rich area with tide-water, and there is a downgrade all the way to Seward. Anchorage, however,

will probably be developed as the chief shipping port.

Such, in the large, are the results of six years' labor. But mention must be made in passing of one illuminating detail which suggests, better than charts or statistics, the comforting changes which the railroad effects in the life of the vicinity. This is the fact that, between Seward and Anchorage, the road is now operating a buffet car. Here the traveler can secure an elaborate dinner of fresh mountain trout with a rasher of bacon for only \$1.25, while Matanuska potatoes can be had for 15 cents an order, and fresh fruits for little more than the charge made in the States. One can imagine what this means to the veteran "sourdough" who can remember paying \$2.50 only a few years ago for a plate of pork and beans.

The obstacles surmounted by the Alaskan Engineering Commission in achieving these results have been many and multifarious, making no mention even of the obvious difficulties imposed by long, hard winters. There is the matter of finances, for instance. To quote from the last report of the secretary of the interior: "... each year we have exhausted our appropriation before the work contemplated was done. We could not

say in October of one year what the cost of anything a year or more later would be, and we ran out of money earlier than anticipated. It [the road] has not been built as cheaply as expected because it has been built on a rising market for everything that went into its construction, from labor, lumber, food supplies, machinery, and steel, to rail and ocean transportation."

Foremost among the physical obstacles was the nature of the route along the northern shore of Turnagain Arm. Here, for almost 30 miles, the rock rises precipitously and irregularly from the sea,

making it impossible to avoid heavy work even by the constant introduction of curvature. At intervals there are short benches on which the roadbed was laid; but for the most part the bed had to be laid on cuts and fills from the rock face,



WIDE WORLD PHOTO

That the Alaskan Railroad Is Ready to Use Modern Rolling Stock is Demonstrated by the Shipment of This Up-to-Date Passenger Coach, Which is Here Seen being Loaded into a Freight Steamer at Seattle for the Long Trip to Seward

To make matters worse, the slopes of these fills usually had to be carried down below the water line, making them subject to constant erosion by the heavy tides. Timber culverts, trestles, and truss bridges are numerous, and it is estimated that almost two miles of snowsheds will have to be built before the line is altogether safe from snow slides. Portions of this stretch have cost \$200,000 a mile; and yet this figure seems not excessive when it is learned that even to blast a mule trail in one section required an expenditure of \$25,000 a mile.

Nor have the building and maintenance

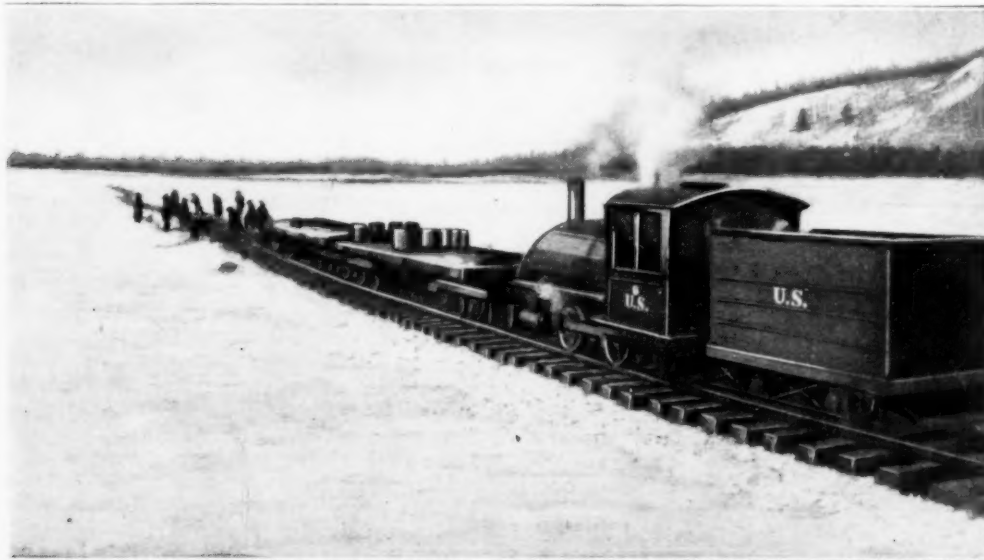
of the northern section of the railroad been without their vicissitudes of fortune. For this transmontane end of the line,

the focal point of trouble had been the town of Nenana, located at "Mile 414" near the confluence of the Tanana and Nenana rivers. During midsummer recently, for example, the tributary stream was swollen by the melting of glacial snows to such proportions that it left its ancient channel and washed out 12 miles of track. To make repetition impossible, it was necessary to move the line two to two and a half miles eastward. The real difficulty, however, is not the taming of the capricious rivers, but the matter of getting the little trains across the broad Tanana. Eventually, the government will span the stream with a permanent steel bridge, half a mile long; but lacking a bridge, the railroad is now compelled, in the summertime, to ferry its cars from shore to shore. With the coming of winter this becomes impossible; so each day the ice is tested, and when it is stout enough, ties and rails are laid upon its surface, and trains are run as upon solid land. This is done with entire safety, as the ice and snow become so thick that the biggest river boats are sometimes almost hidden from sight.

The long freeze-up at this place is not an unmitigated nuisance,



Near "Mile 365" a Coal Mine has been Developed Right at the Side of the Track, Making It Unnecessary to Penetrate the Extensive Coal Fields Themselves. The Lower Opening into This Mine Passes under the Main Line of the Railroad



A Section of Track That is Rebuilt Every Year Is That Laid on the Ice across the Tanana River. Construction Commences as Soon as the Tests Show That the Regular Fall Freeze has Set In for a Long Stay



The Frozen Tanana River, across Which the Trains are Run on the Ice in Winter, and Ferried in the Summer: At the Left Is a River Steamer Caught by the Ice as It Lay at Anchor, and Frozen In. At the Right, the Same Steamer is Seen Just After It has been Chopped Out, to Save It from Crushing

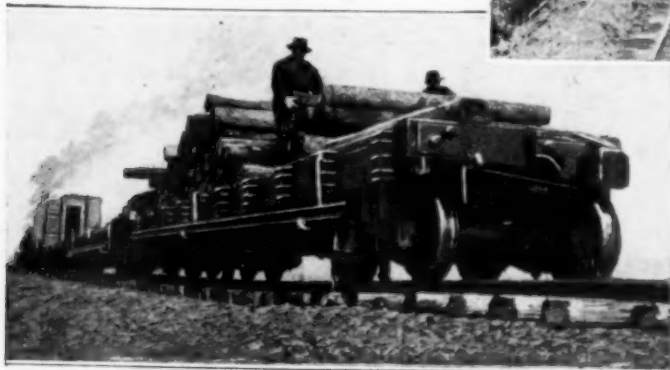
however, as each spring the approach of the break-up is made the excuse for a betting pool, with the money going, of course, to the one guessing the day and hour of the event. And that there may be no doubt as to the actual time, a pole is imbedded in the ice, and is attached by a long rope to a steam whistle. In consequence, when the ice begins to move, whether at midnight or noon, the whole community is notified.

Much of the equipment used to date has previously seen service in the Canal Zone. In 1915, in particular, steamships chartered by the Alaskan Engineering Commission brought northward four locomotives, several steam shovels, numerous flat and dump cars, and much stationary machinery. Other material has been shipped from the States, notably from Seattle, Wash. Nevertheless, work so close to the arctic circle and so distant from the base of supplies remains a pioneering proposition, with shortcomings of the equipment calling

frequently for the devising of ingenious makeshifts. When, for example, a track-laying machine was desired recently, one was made from the materials at hand. This was accomplished by suspending from the side-post sockets of flat cars heavy bars of steel, terminating at their lower ends in horizontal rollers. These bars are of varying lengths, and are so distributed along the length of the work train that they diminish progressively, in height above the ground, from one end to the other. They are high, that is, at the rear end, on which the rails are piled, and low at the front end, which carries



Laying Track across the Tundras: The Ballast is Laid on Logs Sunk in the Swamp



The Flat-Car Track-Laying Machine: Hooked Bars Carrying Rollers are Hung from the Post Sockets, and the Rails Run Off from the Rollers

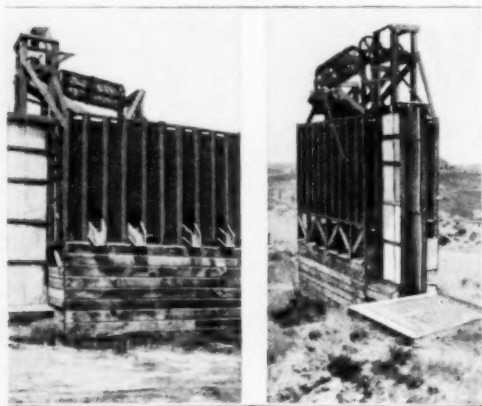
the ties. Accordingly, when the track gang signals that ties have been laid for another rail length, two rails are pushed over the sides of the flat car and onto the roller, to be carried forward by gravity to the waiting gang at the end of the train.

Another interesting method is that employed for securing a solid and permanent roadbed on the flat tundras, or treeless swamps, covered deep with the moss of centuries. During the summer, while the swamps are soft, logs are sunk, criss-cross, until the frozen subsoil is reached; then other logs are added until a crib foundation is formed. On this base the gravel ballast is laid to a depth of several

feet. With the coming of the following summer, the gravel blanket serves as a seal which prevents the thawing of the earth below, and so preserves the crib against disintegration and decay. That this frozen, log-supported roadbed will endure forever is the contention of old-time Alaskans, who testify that they have dug well-preserved logs out of frozen gravel at depths down to 200 feet.

ROAD GANG BUILDS OWN SAND-GRADING MACHINE AND BINS

For the purpose of grading and storing sand to be used in concrete work, a road-construction party employed by the state



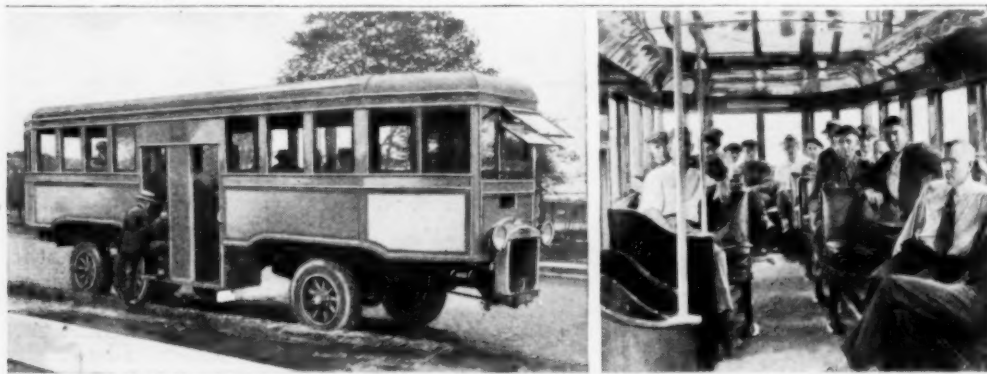
Side and End Views of the Sand-Grading and Storing Machine: The Revolving-Drum Sieve at the Top Grades the Sand into the Vertical Bins

of Nevada has recently built, largely of wood and corrugated iron, a rude but effective machine. It consists of a sub-surface hopper, a vertical bucket conveyor, a revolving-drum sieve at the top,

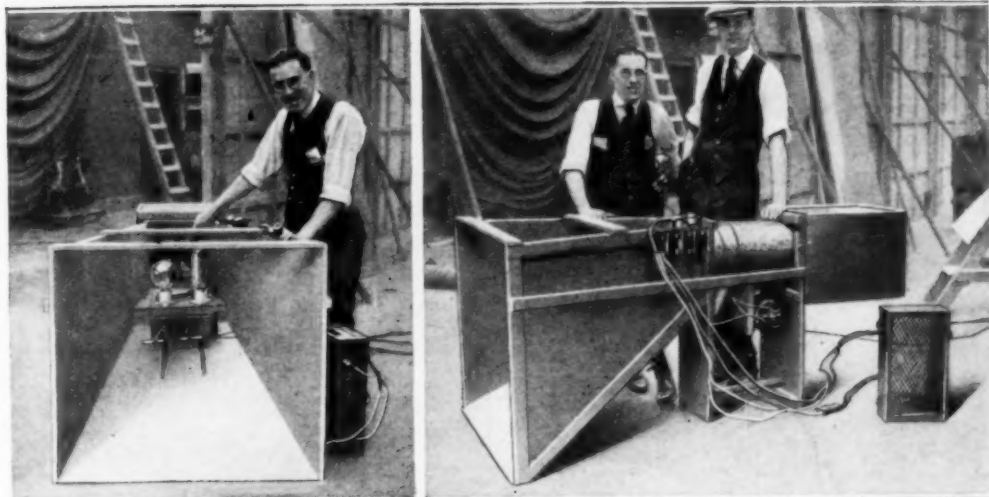
and bins into which the sand drops from the sieve. Ungraded sand, dumped into the hopper by the wagons, is carried by the conveyor to the sieve. Through the meshes the finer sand drops into the first bin, while the coarser continues through the drum, and falls out at the end into a second bin. Each bin is emptied through two gravity chutes.

BIG EIGHTY-PASSENGER BUS RIDES ON SIX WHEELS

A six-wheeled passenger automobile, believed to be the first of its kind in America, was one of the scores of miscellaneous vehicles used by the 22 rubber companies of Akron, Ohio, to haul their 65,000 employes to and from work during the days of the recent street-car strike. The new bus resembles a side-entrance street car in body design and size, and, in fact, seats 44 passengers, with standing room for 36 more. The six-cylinder power plant is carried in front, between the frame members, where it interferes in no way with the seating arrangement. Though a double truck is used only at the rear, provision was made at the time of manufacture for replacing the two front wheels with a second double truck if it should be found desirable.



Exterior and Interior Views of the Big Six-Wheel Passenger Bus Used for Carrying Factory Employees during a Strike: The Four-Wheel Truck Is at the Rear End; the Inside, Equipped like a Parlor Car, Seats 44 and Has Standing Room for 36 More



Front and Side Views of the Ingenious Trap Used to Exterminate Insects Attracted by the Bright Lights of a Movie Studio: A Suction Pump Draws the Bugs past the Lamps into the Screened Receptacle

INSECTS AROUND MOVIE LAMPS EXTERMINATED BY TRAP

Motion-picture studios in California, with their bright electric arcs, are constantly beset by a plague of insects, which often become so numerous as to cloud the lights. At one plant the difficulty has now been overcome by the invention of an ingenious trap. Two 1,000-cp. incandescent lamps attract the bugs into a large wooden funnel, from which a suction pump draws them through a drum, made from a milk can, into a capacious screened receptacle. In a recent night test, a total "bag" of 10 lb. of bugs was made, estimated to number some 12,000 individuals. In less than 10 minutes the studio was entirely cleared of its troublesome visitors. The use of the trap has eliminated much loss in "spotted film."

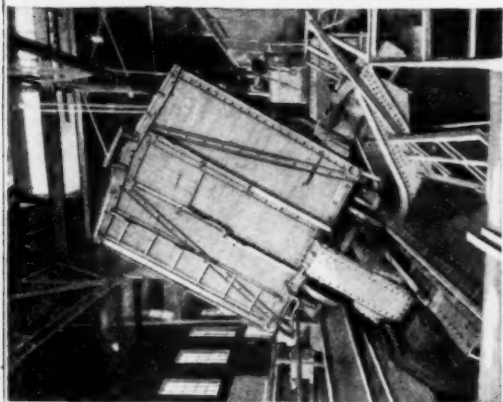
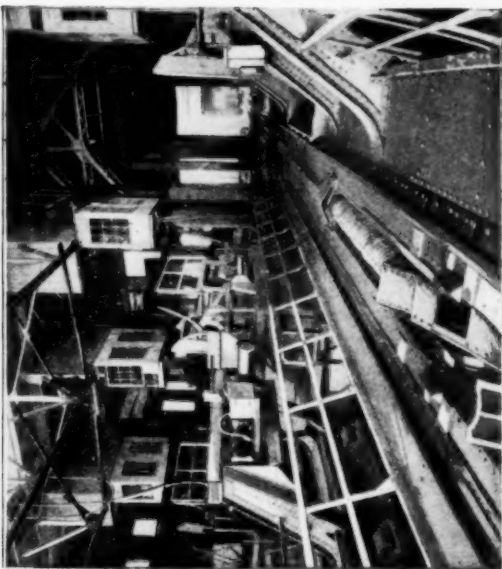
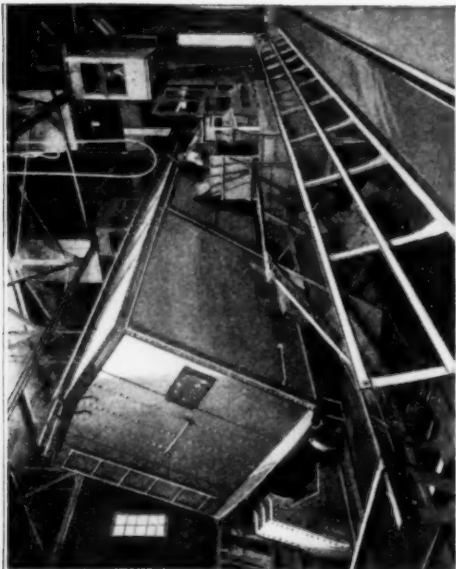
MILE-LONG CABLE IS ONLY APPROACH TO LOFTY MINE

A cableway more than a mile long, and almost perpendicular in its upper length, is the only connection between the outside world and a gold mine which perches like an eagle's nest on a lofty crag in the American Rockies. At its lower end the cableway terminates in the crushing mill, to which the ore is dropped in a small car. This car is used, also, for carrying supplies to the miners, and for their personal transportation to the mill in case of accident. The cable is inspected most frequently in winter, when a break would mean the end of operations for the sea-

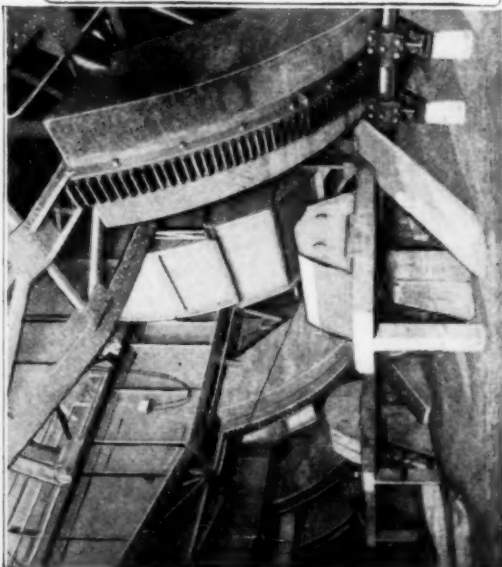
son. There are no roads or paths down the mountainside, and an ascent through the heavy snow would be practically impossible.



From the Crushing Mill in the Foreground the Cableway is Seen to Stretch Upward for More than a Mile to the Gold Mine on the Summit



In Many Ways Resembling the Car Tipper
 Now in General Use for Unloading Coal,
 This Tilting Unloader Empties Grain Cars in
 10 Minutes. In the Upper Left-Hand Corner
 the Car is Seen Tilted Endwise 45 Degrees,
 as Well as Sidewise 30 Degrees. While Its
 Load of Grain Spills Out of the Door into
 the Hopper. The Center Picture Shows the
 Car First Tilted Sidewise as the Automatic
 Door Opener Comes in Operation. In
 the Upper Right-Hand View the Door Is
 Open and the Grain Beginning to Run Out,
 Before the Endwise Tilting Has Begun. In
 the Lower Left Corner is a Floor View of
 Four of the Giant Unloaders. Recently In-
 stalled in an Eastern Grain Elevator. The
 Picture in the Lower Right-Hand Corner
 is a Top, or Track, View of One of the
 Unloaders, Empty but Ready to Receive a
 Loaded Car. At the Extreme Left of the
 Picture may be Seen a Second Similar Ma-
 chine. The Door Opener and Grain Hopper
 Are Visible at the Right. With Four of
 These Machines 12 Men have Unloaded
 240 Cars in One Working Day



GRAIN UNLOADER EMPTIES CAR IN TEN MINUTES

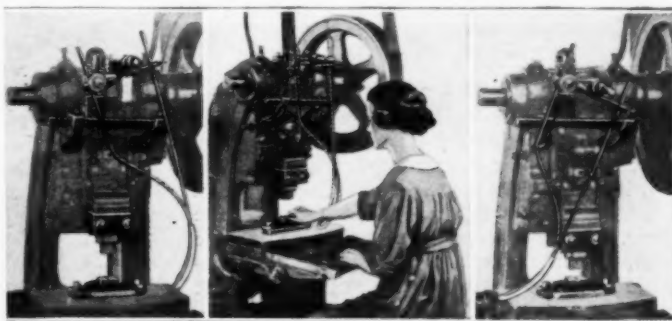
Patterning, perhaps, after the car tipplers now in general use for unloading coal cars, one American firm has just brought out monster mechanisms which unload a box car full of grain in 6 to 10 minutes. The first four of these machines, installed in a concrete grain elevator on the Baltimore waterfront, consist each essentially of a rocking platform and a tipping cradle. When the filled car has been pushed upon the rails of the cradle, the operator starts an electrical motor and so causes two clamps to rise from between the rails and press tightly against the

couplers at both ends of the car. Other motors then push in the temporary door and tip the car upon its side. The grain is now flowing out of the door and down the hopper, but as little moves from the ends of the car, another motor is started and the car is tilted longitudinally at an angle of 45°, first to the right and then to the left. The motors are employed in reverse order to bring the car back to horizontal. A conception of the efficiency of these big machines is gained from the report that with the four at Baltimore 12 men can unload 240 cars in eight hours.

PUNCH-PRESS GUARD PUSHES WORKER'S HAND FROM DIE

A safety guard for punch presses, now being introduced, makes injury to the operator almost impossible, by brushing his hand to one side in the unusual event that it has not been withdrawn from the die when the punch starts to come down. The wire arm which sweeps across the front of the press in this way is given its reciprocating motion by a pin which is attached to the crankshaft bearing cap. Being so simple, and requiring no connection with lever or treadle, the mechanism

can be attached to any press in 20 minutes. At any time thereafter, the swinging arm can be removed or replaced in one minute. Rubber covers the lower end, to prevent bruising the worker's arm.



In the Photographs at Right and Left the Safety Guard is Shown at Both Ends of Its Travel. In the Middle Photograph the Operator Demonstrates How the Guard Sweeps the Hand Aside as the Punch Starts to Come Down

MODEL-AIRPLANE RACES HELD OVER WATER

New impetus has been given to the building and racing of model airplanes

in Chicago by a local club's discovery that a meet held over the surface of lake or river is far more interesting than a contest staged, as usual, on some stretch of meadowland. The water is kinder than the land, too, to balky craft that drop out of a race in a nose dive or similar erratic performance. The midget planes are prepared for their ascent from the water by the addition of three floats of the lightest weight consistent with strength and adequacy of the structure.



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Inspection of the Model Airplanes will Show That Each has been Equipped with Three Tiny Floats to Make Possible an Ascent from the Water

CLAIM ELECTRIC-HEATED CAP PROMOTES HAIR GROWTH

A cap the size and shape of a drum major's shako, supported by a rod on the

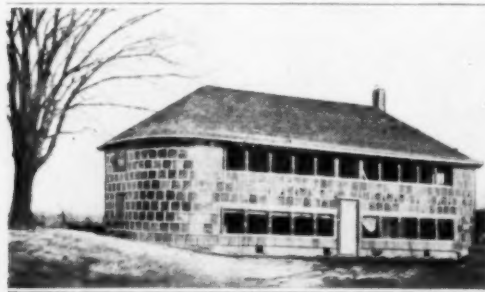


An Electrically Heated Cap Which Treats the User's Hair to a Temperature of 300 Degrees

back of a chair and heated internally by electric current to a temperature of 300° F., is being demonstrated in England as a means of improving the growth of the hair. A switch on the top plate of the cap, and a thermometer on the side, enable the attendant to maintain a constant and correct degree of heat.

TWO-STORY POULTRY HOUSE MADE OF SILO TILE

Defective silo tile was the material used recently in the construction of an interesting two-story poultry house. All the blocks were curved, naturally, so the farmer had to lay his straight courses by placing outward the convex face of one

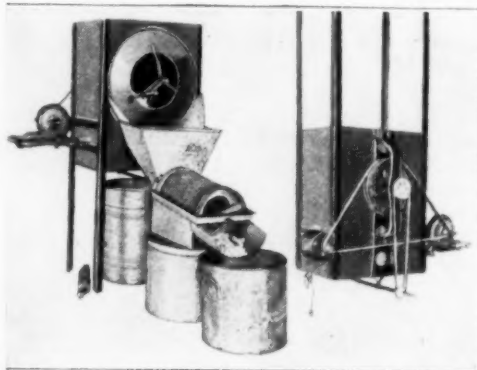


This Two-Story Poultry House was Built of Defective Silo Tile. The Straight Courses were Laid by Alternating Concave and Convex Faces

block, the concave face of the next, and so on. Pillars were made, ingeniously enough, by stringing cylindrical drain tiles on iron rods, and filling the interiors with cement. The house is interesting as much for its interior layout, though, as for its construction. On the first floor are the sitting boxes, the brooders, and the feeding apparatus. On the second floor are the roosts, and the feed bins, which are connected by pipes to the feeding trays below. In the rear of the second floor is an entrance door, approached from without by means of an inclined driveway.

ONE MOTOR OPERATES POPPING MACHINE AND SIFTER

A new machine for popping corn on a commercial scale is noteworthy in that the electric motor which turns the popping drum and blower revolves, also, the sifter which removes the hard grains as the popped corn tumbles out of the drum. This sifter is a separate machine, and is turned by the motor through a belt and a shaft mounted beneath the popper. Both machines are made of



The Corn-Popping Machine is Seen in Use, at the Left. The Four Legs are Used as Suspension Members, in the View at the Right

metal. The popper stands on its own legs, though, or can be hung from the ceiling by using these legs as suspension members. This second position has the advantage that the floor is unobstructed; hence sweeping is easy, and the barrels for the waste and the finished product are moved about with more convenience.

☐The statue which the American people are to erect on the battlefield of the Marne will be of pyramidal form, 40 ft. high, the sculptor announces, and will be made of imperishable American granite.

ARMY-PLANE FLIGHT TO NOME SUCCESSFUL

With the arrival of four U. S. army air-planes at Nome, Alaska, at 5:30 p. m., August 23, a 4,300-mile flight was completed that held more of significance than is ordinarily included even in so great an undertaking. The flight was made in 55 hours' actual flying time, the planes having left Mineola, N. Y., at 12:33 p. m., July 15. The route followed included Erie, Pa.; Grand Rapids, Mich.; Winona, Minn.; Fargo and Portal, N. D.; Saskatoon, Edmonton, Jasper, Fort George, and Hazelton, Canada; Wrangell, Whitehorse, Dawson, Fairbanks, Ruby, and Nome, Alaska. These "jumps" averaged about 270 miles, the longest being 350 and the shortest 200. The latter part of the route, from the airman's viewpoint, was virtually unexplored territory, its only advance preparation being arranged by an army officer who journeyed ahead to search out landing fields and establish repair depots. The four planes were manned by five officers and three noncommissioned officers of the air service. They are of the DH-4-B type, with their gasoline tanks shifted to a position behind the Liberty motor, and a capacity of 117 gal. of fuel and 12 gal. of oil.

Three distinct purposes, all of great importance, are served by the success of this flight, which was conducted with the cordial coöperation of the Canadian government and the aid of the weather bureaus of both nations. The first is the opening

of a military air route to Asia, whose shores are but 50 miles from Cape Prince of Wales. The second is the establishment of a mail and commercial airway, which will shorten the time from Alaska to the States from weeks to days. And the third is the mapping of some 3,500 square miles of unexplored country about the



This Map Shows the Airway Followed by the Army Airmen on Their Recently Completed Flight from Mineola, New York, to Nome, Alaska, as Well as the Mileages of the "Jumps" Forming the 4,300-Mile Tour

flats of the upper Yukon River—a three days' task for the flying photographers, but a labor of three years for a ground surveying party.

Easily classifying among the longest flights yet taken, the trip from New York to Nome nevertheless represented but a scant half of the flying squadron's entire task, which includes in its itinerary a return trip to Mitchel Field at Mineola. The airmen started on the homeward trail a few days after their sensational arrival.

BURSTING INCANDESCENT BULB SETS DRY GRASS AFIRE

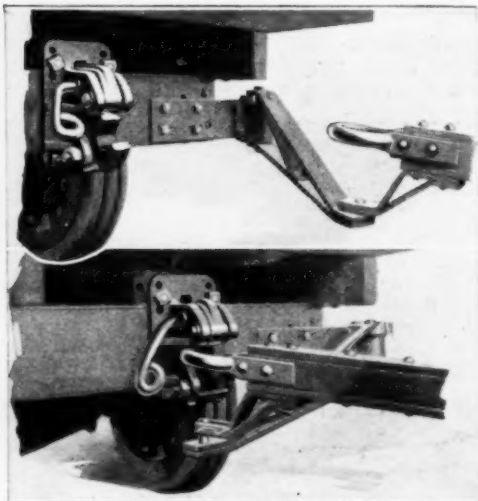
Evidence that the high-power incandescent lamps now so commonly used for street lighting may not be wholly innocent as a possible source of fire was observed in southern California recently. A bulb hanging 20 ft. above the ground suddenly burst, and the white-hot particles of metal it scattered, instantly ignited the dry grass at the foot of the pole. Fire wardens of the district now are advocat-

ing the use of suitable guards about the lamps, to prevent the fall of broken filaments when the bulbs burst.

By installing inexpensive receiving sets, Michigan farmers soon will be able to hear daily radiotelephone reports on market conditions and the weather, and even to listen to lectures and music. The state agricultural college is preparing to render such service regularly, and plans later even to supply the farmers with receiving equipment.

COUPLES TRAILER TO TRUCK WITHOUT MANUAL AID

Automatic couplers for railroad cars passed through a long evolutionary pe-



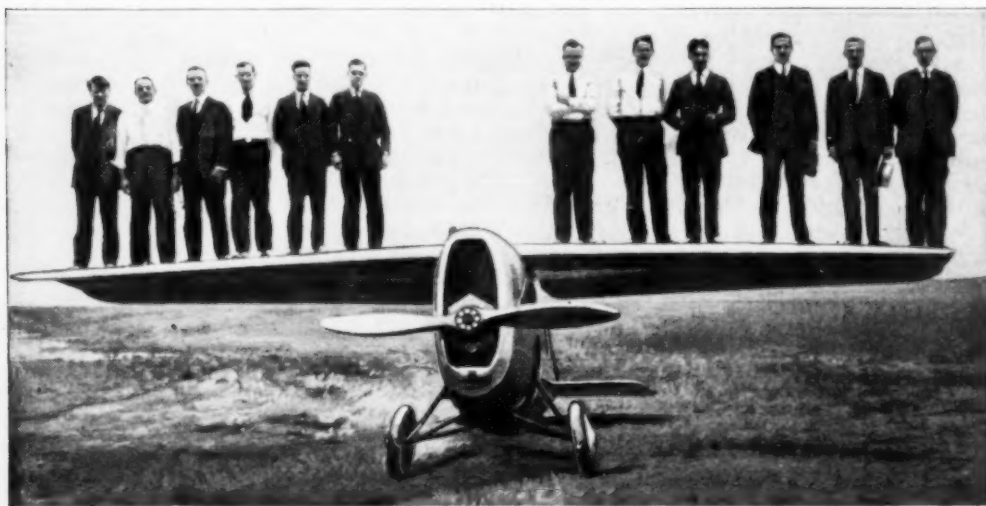
Above: The Trailer Clevis Hooked to the Swinging Arm of the Truck. Below: The Clevis Swung Automatically into the Lock Grip of the Truck

riod, but safety couplers for connecting trailers to motor trucks appear to have

sprung at once to practical form. One attached to an Ohio-made truck consists of an automatic grip in the center of the rear beam, and a steel arm hinged at the side. With this arrangement, the driver backs the truck to within 20 in. of the trailer, without special regard for alinement, and then dismounts and hooks the hinged arm to the clevis of the trailer. Then he backs the truck the rest of the way, and the arm swings the clevis accurately and safely into the grip, where it locks.

CLIMATIC HISTORY INDICATED BY WIDTH OF TREE RINGS

Some time ago scientists found a fairly accurate relation between the seasonal rainfall and the width of annual tree rings. Now it is pointed out by a western observer that the rings of trees growing in permanently wet soil are of practically uniform width, while those dependent upon capricious rainfalls for their growth are quite variable. Thus by careful study of the rings of trees of great age, such as the California redwoods, it may be possible to read climatic changes covering a period of thousands of years and on this basis make "long-distance" weather forecasts.



MIDGET RACING MONOPLANE HAS CANTILEVER WINGS

WIDE WORLD PHOTO

CANTILEVER wings with a total spread of only 22½ ft., and landing gear that entirely disappears into the 22-ft. body, are interesting features of the new Dayton-Wright "R-B" monoplane, one of the three American entries for the Gordon Bennett races in France, Sept. 27 to Oct. 3. Turning a crank on the instrument board raises the landing gear and flattens out the wings, the operation requiring 12 to 15 seconds. Changing the wing curve decreases the landing speed and increases the racing speed. The wings, of three-ply veneer without struts or wire braces, supported 12 men, six to a side, in the final factory tests. The body is built up of strips of wood and fabric in alternate layers. A 250-hp. engine is used, and the plane is expected to make 200 miles an hour.



At the Entrance to Denver's Commodious New Camp for Motor Tourists Is This Decorative Gateway. Here the Tourist Finds the Registration Booth, with the Clerk in Attendance, and the Service Station, to Which Gasoline is Piped Directly from the Railroad, 100 Yards Distant

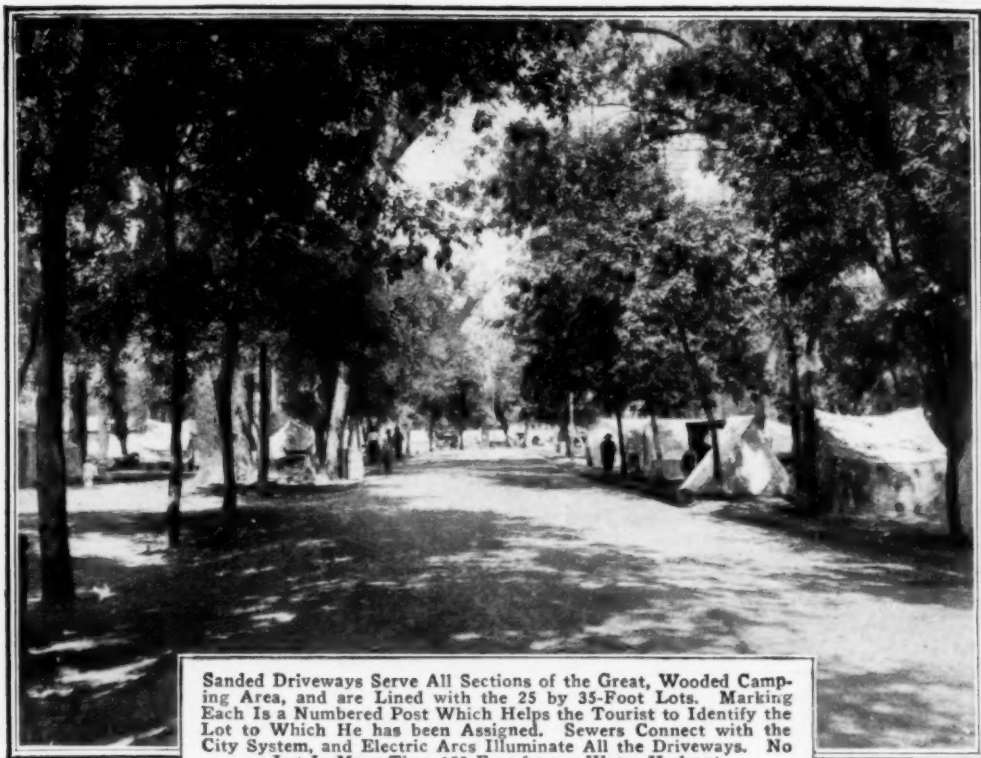
HALF a dozen years ago the automobile camp ground for tourists was practically an unknown experiment. Today every city and town of any importance on the main highways between the Mississippi River and the Pacific coast has its auto camp, set aside especially for the motorist and improved for his convenience. In the larger camps anywhere from 3,000 to 10,000 cars park during the summer months. The auto camp is the modern counterpart of the far eastern caravansary, differing from it mainly in the different styles of locomotion employed by the traveler and in the purpose for which it was established. The caravansary was established as a trade necessity, whereas the auto camp was created by the demand of the pleasure seekers. Denver was the first city to establish a municipal camp in one of its city parks, and to equip it especially for the motor tourist. Since the beginning, the camp has been moved twice,

is now located permanently in Overland Park, one of the finest and largest of the Denver parks. The improvements are more extensive and elaborate than those in any motor camp in America today. Overland, including 160 acres of ground on the banks of the South Platte River, was purchased a year ago. Formerly it was a private horse-racing park. When the city acquired it, it was equipped with a mile-and-a-quarter race track, grand stand, clubhouse, and half a dozen commodious frame buildings, erected for housing an interstate fair.



Even the Federal Forest Service Goes Out of Its Way to Serve the Motorists, Posting Road Maps of This Sort for Their Particular Benefit

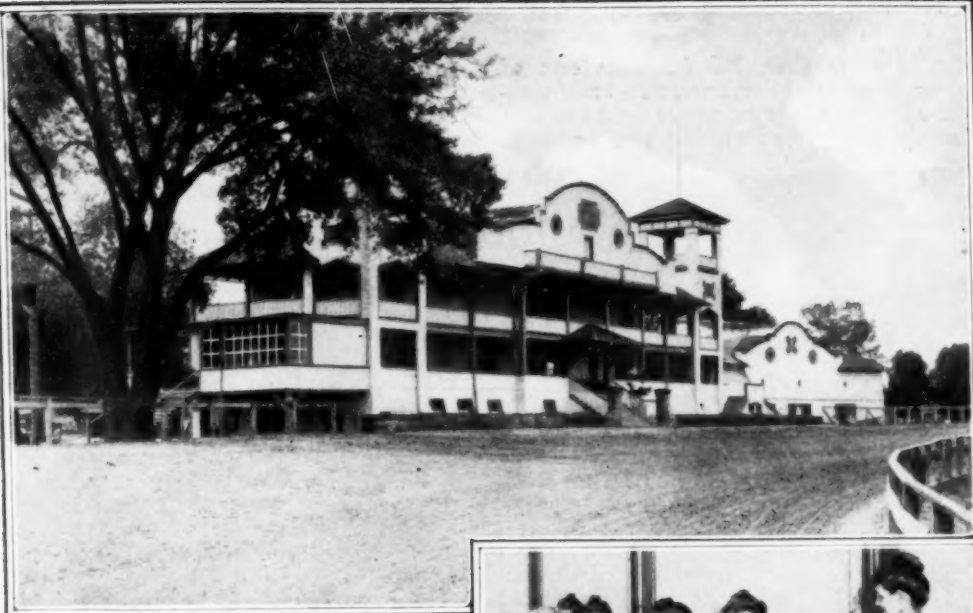
The city authorities have platted a camping area underneath the trees, large enough to accommodate 3,500 persons. The camp was laid out along the well-sanded driveways of the park, each camper's lot, marked by numbered posts, being 25 by 35 ft. Camp grounds were gridironed with water pipes from the city water mains and equipped with service hydrants so that no



Sanded Driveways Serve All Sections of the Great, Wooded Camping Area, and are Lined with the 25 by 35-Foot Lots. Marking Each Is a Numbered Post Which Helps the Tourist to Identify the Lot to Which He has been Assigned. Sewers Connect with the City System, and Electric Arcs Illuminate All the Driveways. No Lot Is More Than 150 Feet from a Water Hydrant



A Feature of the Camp Is the Mile-and-a-Quarter Race Track, Which was Photographed from an Airplane, as Shown Above, on the Occasion of a Motorcycle Race That Attracted a Crowd of 60,000. The Majority of These, of Course, Were Residents from the City Near By. The Inset at the Right Shows One of the Water Hydrants Which Supply the Campers



Front of the Clubhouse for Motor Tourists in Overland Park, Denver, Facing the Race Track, Formerly Used for Horses, but Now Given Over to the Entertainment of Visitors, by Motorcycle Races and Similar Events: The 24-Room House Has Every Convenience



A Free Laundry for the Use of the Campers Is One Remarkable Feature of the Big Clubhouse, and Hot and Cold Water Are Constantly on Tap. This Is Also True of the Free Shower Baths, for Men on the First Floor, and for Women on the Third Floor



A Completely Stocked Grocery Store and Market Occupies Part of the First Floor, Where the Campers may Obtain the Raw Materials for Their Camp-Cooked Meals, or, if They Prefer, may Purchase Home-Cooked Foods Hot from a Steam Table with Which the Store is Equipped

tent is more than 150 ft. from one of these. Sanitary sewers were laid and connected with the city sewer system, and electric arcs placed along the right of

cles, used in camp life. On the third floor are located a rest room and hot and cold showers for the women, as well as rooms for the attendants. The building has large

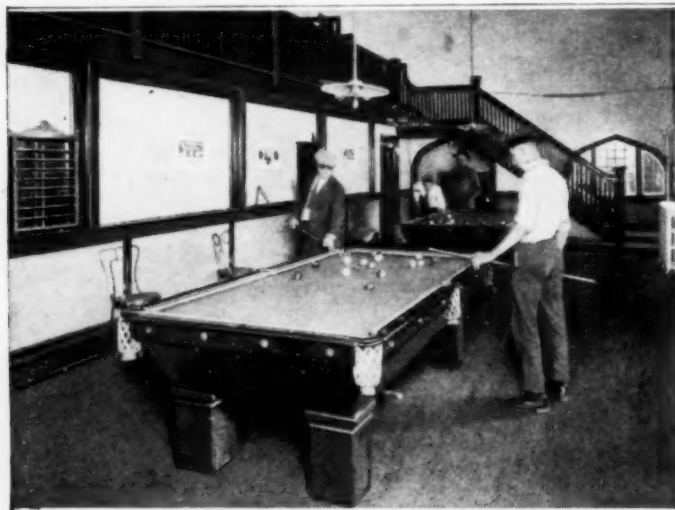
roomy verandas where refreshments may be served.

At the entrance of the park is located a large gateway containing the tourists' registration booth and a complete gasoline service station. There is no charge for the occupancy of lots, and the permits, good for two weeks, may be extended upon application. The filling station is under the concessionaire.

One of the large exposition buildings has been fully equipped as a public comfort station for men and women and has cement floors and porcelain fittings. There are several other similarly equipped comfort stations in the park. Among the additional

accommodations, to be installed for the season of 1921, is an automobile-repair shop and moving-picture theater that will seat 400, both of which are to be placed in one of the exposition buildings.

As high as 3,500 tourists have camped in the Overland Park in one night, and



The Concessionaire in Charge of the Big Clubhouse has Installed Every Convenience, Including, on the First Floor, a Spacious Pool and Billiard Parlor for the Men. On This Floor, Also, the Men Find the Barber Shop and Shower Baths

ways and streets of motor town. The city attendants include a park superintendent, a clerk to register guests and issue permits, a number of police officers, and men to clean the camp.

The outstanding improvement, however, has been the transformation of the clubhouse into a 24-room house for the motorists. A concessionaire was placed in charge and installed every conceivable convenience. On the first floor are located a grocery store and market, a steam table, where home-cooked foods may be purchased, a billiard and pool room for the men, barber shop, free hot and cold showers for men, and a free laundry, equipped with tubs, and hot and cold water, for the women campers. On the second floor are a dining room, soda fountain, lounging room where free dancing is enjoyed, and a room equipped with all manner of clothing, tents, and similar arti-



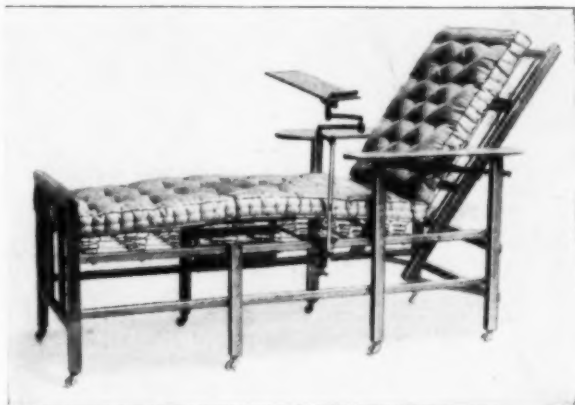
On the Second Floor of the Clubhouse Is the Lounging Room, Where Dancing may be Enjoyed. As Suggested by the Tables and Chairs, the Soda Fountain Is Near By. On This Floor, Also, Is the Dining Room

the city authorities expect a much larger population in the motor city before the end of the present season. The camp area may be extended to almost any extent desired. One entertainment given for the tourists early in the season brought a crowd of 60,000 to the park. This consisted of motorcycle races, which attracted the most noted riders to the city. Entertainments of a similar nature will be provided in the future.

Not only has the camp proved immensely popular with tourists, but it has become one of the show places of Denver. A few years ago the motor tourist was glad to receive permission from a western city to pitch his tent almost anywhere, but now western cities are vying with one another to kill the fatted calf for him, as evidenced by the fact that Denver has dedicated a quarter-of-a-million-dollar park for this purpose.

LOUNGING CHAIR HAS COIL SPRINGS LIKE BED

A lounging chair, which the makers guarantee to be the most comfortable made, is now procurable for the summer cottage, or for the all-year-round use of the invalid. The unusual comfort is secured by supporting the two long cushions on deep coil springs, 24 for the back and 32 for the horizontal cushion. The back rest can be adjusted by the person in the chair, thanks to a pair of springs beneath the seat which prevent the back's falling when the support is released for adjustment. The frame of the chair is made of hard wood and is easily movable, being mounted on ball-bearing casters.



The Lounging Chair is Made Unusually Comfortable by the Provision of 24 Deep Coil Springs for the Back, and 32 for the Horizontal Cushion. The Back Rest Is Adjustable

SNOW PUSHED FROM FLAT CARS BY UNLOADER AT RIVER BANK

To facilitate the removal of snow from its many miles of surface track, the rapid-transit company of Brooklyn, N. Y., has devised, and last winter actually used, a machine which for want of a better name is called the snow pusher. It is simply a four-wheeled work car upon which is carried a long battering ram, bearing as its head a heavy vertical plate. The car moves back and forth under its own power on an elevated stub track on the bank of the East River. The flat car, piled high with snow, is halted between the car and the river, and perpendicular to the stub track. As the little car moves forward, the ram

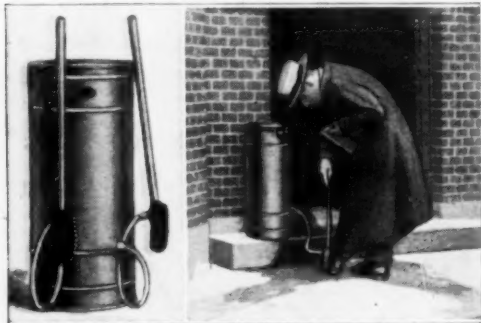
pushes half the load off the flat car and into the river. The flat car is then advanced a few feet, and the rest of the load removed. During one heavy blizzard 46,666 carloads, it is said, were dumped into the river in this way.



The Battering Ram Carried by the Car at the Right Pushes the Load off the Flat Car and into the River

FOUNTAIN BRUSHES FOR SHOES AT BUILDING ENTRANCES

A modern adaptation of an ancient custom is seen when the Japanese business man of today enters one of the many office buildings in Tokyo now



The Fountain Shoe Brush of Japan, and the Way the Business Man of Tokyo Uses It to Clean His Footwear before Entering a Public Building

equipped with the so-called fountain brushes. A century ago he would have removed his primitive footgear; but now he does nothing of the sort. As his American shoes are not so easily slipped off, he simply washes them. This he accomplishes by using a long-handled brush, the bristles of which are connected by a rubber tube to a small galvanized-iron tank. The water is admitted to the brush as the user presses the valve in the handle.

SIDEWALK ADDED TO TRESTLE TO PROTECT TRESPASSERS

Having found warning signs ineffective in keeping pedestrians off its trestles, the Salt Lake Railroad is now making the best of an exasperating situation by equipping the most "popular" of the

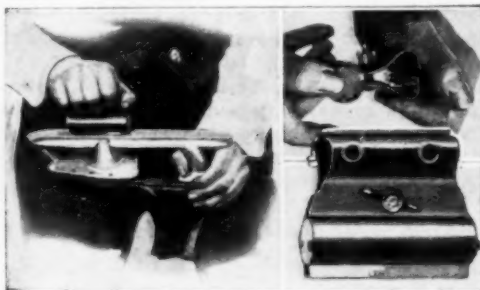


To Save the Lives of the Trespassers Who Persistently Ignore Warning Signs, the Railroad has Added the Sidewalk to Its Trestle

bridges with sidewalks. The first of these have been seen near Long Beach, Calif., and it is understood that more are to be built. The walks are constructed by running timbers out, cantilever fashion, from the bridge structure, then adding a hand-rail and floor of heavy planks.

SKATE-SHARPENING TOOL PRODUCES HOLLOW EDGE

The need filled by a little skate-sharpening tool now sold can be appreciated by every skater who has lost a day or more of his favorite winter sport because his skates were at the hardware store, being sharpened. With this tool the skater can himself do his grinding, quickly and with unvarying accuracy. It consists of a cylindrical abrasive stone which is inclosed between two plates of metal. Below the stone, these terminate in flanges which guide it along the blade. Above it, they are curved to form a grip for the hand. By means of a coil spring and wingnut, the parts can be moved toward



Left: The Skate Sharpener in Use. Right: Above, Turning Abrasive Stone When Worn; Below, Detail, Showing Adjustment Nut

or away from each other, so making it possible to adjust the flanges to the width of the skate blade used. The stone is revolved through a few degrees when worn in order that it may always produce the much desired hollow edge.

THE SALTON SEA STOCKED WITH SHRIMPS AND CRABS

A shipment of 5,000 Lake Ponchartrain shrimps, and 2,500 Louisiana crabs, was recently received by the California State Fish and Game Commission, and liberated in the Salton Sea, of southern California.

An analysis of the water of the Salton Sea, and a careful study of the conditions existing there, have revealed that the "Desert Brine Pool," which recently came into prominence by reason of its mullet

fisheries, offers an ideal habitat for the propagation of shellfish. The conditions of salinity, temperature, and food supply are believed to be just right for Louisiana shrimps and crabs, and by stocking the sea with them the commission hopes to create a new source of human-food supply, and a valuable commercial industry.

FIRST AERIAL ACROBAT DIES IN WRECKAGE OF AIRPLANE

While motion-picture cameras clicked, an airplane nose-dived into the darkness near Los Angeles, Calif., recently with torches flaming at the wing tips. The fall was called for by the scenario. At an altitude of 1,000 ft., however, the horrors of reality displaced the thrills of make-believe, and the plane passed out of control. In the crash and conflagration that followed, both pilot and passenger were mutilated beyond recognition. The passenger, and hero of the "movie" romance being filmed, was Lieut. Omar Locklear, whose brief post-war career as an aerial acrobat linked the name in the minds of thousands with fearless defiance of gravity. He was the first to perform regularly the feat of changing from plane to plane in mid-air with the precarious aid of a swinging rope ladder.

SPECIAL ALTIMETER NOW MADE FOR THE AUTOMOBILE

Every autoist who has motored from coast to coast or toured mountainous country will realize the need that is filled by a dashboard instrument now being sold by an American manufacturer of scientific instruments. It is an altimeter, which indicates in



feet the approximate altitude of the car's travel, and in appearance and construction is not unlike those seen on the instrument board of every airplane. As its action is dependent on the relation be-

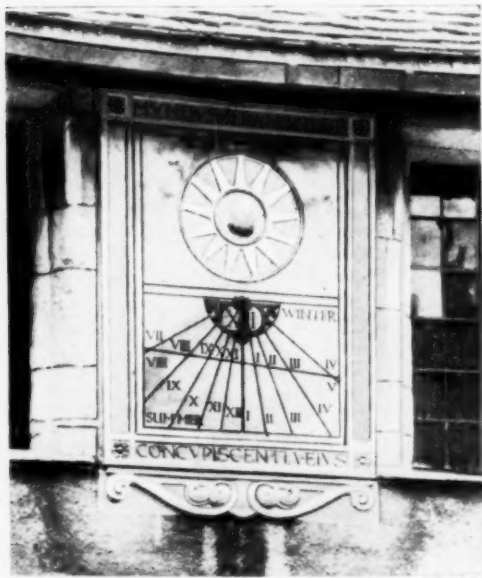


A Buried Motor, the Skeleton of a Wing, a Clutter of Rods and Wires—All That Remained of the Locklear Plane after Its Disastrous Nose Dive. Above: The Rescued Motor About to be Loaded into a Truck

tween altitude and air pressure, it will serve a secondary purpose by warning the tourist of probable changes in the weather.

RESTORED SUNDIAL RECORDS SUMMER AND WINTER TIME

During recent renovations at Corpus Christi College of Cambridge, England, workmen found, on a wall of the ancient



The Approximately Correct Time is Displayed both Winter and Summer by This Sundial on a Wall of the Ancient Quadrangle at Corpus Christi College, Cambridge, England

smaller quadrangle, fragments of an equally ancient sundial. This has now been restored in marble and bronze. It is of more than historical interest, however, in that it displays an approximation to the correct time during both summer and winter. By providing calibrations for the two seasons, that is, an attempt is made to reduce to smallest terms the varying discrepancy between mean and apparent solar time.

THE LIMITING CONDITIONS OF LIFE IN THE TROPICS

The range of temperature variation of the human body is so small as to be practically negligible in comparison with the wide differences which obtain in nature. In order that life may continue, the temperature of the blood must be essentially the same in the arctic regions as it is at

the equator. For cold climates the temperature can be maintained by artificial sources, and by clothes which conserve the heat. Life, however, is continued where the temperature of the air is above that of the body. In this case the heat which the body continues to produce is dissipated without important increase of body temperature by evaporation of moisture in the lungs and over the surface of the body. There must, however, be some limiting condition beyond which life will be impossible. This subject is treated in a scientific paper recently appearing on "The Effect of High Temperature, Humidity, and Wind on the Human Body." It is stated that where the temperature of the air exceeds that of the body, there is for each combination of temperature and humidity, a wind velocity above which heat will be added to the living body by contact or convection, more rapidly than it can be removed by evaporation. Under these conditions life cannot continue. As an example it is stated that when the humidity is eight per cent and the air temperature is 122° F., life becomes impossible with a wind velocity of 15 meters (about 49.2 ft.) per second, and that this may explain the fatal simoom.

CAMERA CATCHES COWBOY "BULLDOGGING" STEER

The cowboy sport of "bulldogging" wild steers, fresh from the plains, has thrilled thousands of spectators in the course of the various "round-ups" held during late years in Cheyenne, Wyo., and other cities of the West. Seldom, however, has the photographer been able to catch the very climax of the stunt, as he has done so perfectly in the accompanying view, snapped recently during the annual event at Wichita Falls, Texas.



The Camera has Registered the Very Climax of the "Bulldogging." The Steer Is About to "Flop"



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Three of the Portable Machines are Seen in These Views at Their Work of Cutting and Threading Pipe. Between the Wheels of Each Is the Electric Motor, to Which Current is Supplied by Means of a Long Cable. At the End of the Shaft Are the Bevel Gears through Which the Die Head is Revolved

PIPE-CUTTING AND THREADING MACHINE IS PORTABLE

Pipe cutting and threading on a construction or repair job is usually a slow manual process. This work can now be done with all the speed of the stationary machine, however, by means of a small portable unit just developed. It consists of a powerful electric motor carried between two steel wheels and provided with a five-foot extension shaft. At the end of this shaft are the bevel gears through which the die head is revolved. The machine will complete in 15 minutes, it is said, a thread which would require the strenuous efforts of two men for two hours if cut by hand.

WOODEN TO REPLACE IRON HANDS OF FAMOUS CLOCK

The famous post-office clock which from its lofty perch above Pennsylvania Avenue has announced the time to the people of Washington, D. C., for many years, is shortly to be equipped with four new sets of hands. The old iron hands weigh approximately 75 lb. apiece, and are 5½ and 7½ ft. long. The new hands will be of wood, of the same dimensions, but will weigh only a fifth as much.

MYSTERIOUS DEATHS OF LIVE STOCK FOLLOWED BY AUTOPSY

The practice of holding a "post mortem" over the carcass of every animal that dies from an unknown ailment, now the rule on many American farms, is one that deserves the consideration of every

farmer with capital invested in live stock. On these farms it is realized that mysterious deaths are all too frequently the prelude to costly epidemics. In consequence, every animal dying suddenly and unexpectedly is removed at once from the pasture or stable and carried to an isolated part of the farm. A veterinarian having dissected the body, the carcass is



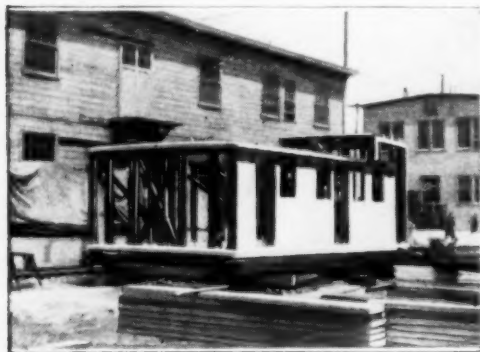
To Protect the Herd, the Dead Calf has been Removed to an Isolated Part of the Farm, Where the Veterinarian Holds His Autopsy

thrown into a quicklime pit where it is soon powerless to harm the herd. If anthrax or some other communicable disease is declared to have been the cause of death, proper protective measures are taken with all haste.

¶The old courthouse at Vandalia, Ill., once the state capitol building, has recently been purchased by the state for \$60,000 and will be preserved as a relic.

CABINS AND HULLS OF SMALL VESSELS BUILT SEPARATELY

The practice of constructing hulls and deck structures separately is now being tried out by one American shipbuilding



To Hasten the Completion of the Small Wooden Vessels, the Hulls and Cabins are Built Separately. The Framing of a Cabin is Seen Here

company for the purpose of expediting work on rush orders for small wooden vessels. While the hull is being erected on the ways, in other words, the cabin is built near by. Completed simultaneously, the two are joined by lifting the cabin into place and bolting it to the beams of the deck.

MACHINE MAKES HOLES IN ROQUEFORT CHEESE

The venerable vaudeville gag about the workman who bores the holes in Swiss cheese was probably originated by a jokesmith who did not know that the American imitation Roquefort cheese actually receives this treatment. And now,



This Machine Riddles the Cheese with Many Holes and So Hastens the Growth of the Mold, or Fungus

further, a machine has been developed for this work. It consists, fundamentally, of a large number of vertical needles which are pushed down through the cheese as a hand lever is depressed. A heavy coil spring then aids the operator in retracting the needles. The purpose of making these holes, incidentally, is to aerate the interior, and so quicken the growth of the mold, or fungus, which gives the substance its familiar flavor and appearance.

RANGER BUILDS ASSISTANT FOR OTHER END OF SAW

Anyone who has attempted to use a lumberman's two-handed saw unaided will be surprised to learn that in the Cochetopa National Forest of Colorado there lives a solitary ranger who cuts all his firewood with this wobbly tool. To make this solo performance possible he has built a tripod of scantlings, from the apex of which a fourth, shorter scantling hangs, pendulum-fashion. To the lower



By Pivoting One End of His Tool to the Pendulum-like Scantling, the Forest Ranger is Enabled to Use the Two-Handed Saw

end of this pendulum he pivots one end of his long saw, thus providing himself with a silent assistant.

AMATEUR'S ONE-WIRE AERIAL RECEIVES RADIO MESSAGE

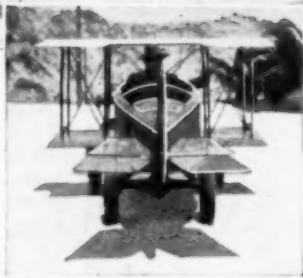
Radio-telephone messages sent out from Washington, D. C., were received recently by an amateur operator in western North Carolina, whose station is equipped with an aerial consisting only of a single wire 700 ft. long. The distance is about 450 miles. The operator at the Washington naval station was testing a telephone-transmitting set, and sent calls to a number of points, all of which were heard by the amateur station. All the messages were received between 11:40 p. m. and 1:12 in the morning.

ADVERTISING AUTOMOBILE HAS AIRPLANE BODY



Front, Side, and Rear Views of the Auto with Airplane Body, Used for Advertising Purposes by a California Concern: It Holds Two Passengers

One business concern of San Francisco, Calif., has received a good deal of advertising recently through the popular interest aroused by the freak body it has built for one of its automobiles. It takes the form of an airplane fuselage to which are attached abbreviated upper and lower wings. Behind the driver's seat is a second passenger "cockpit." In front



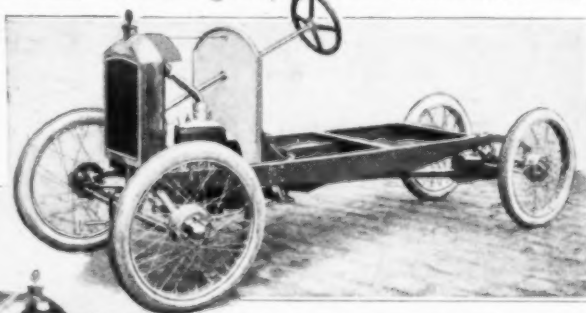
A Small Hand Lever Operates the Elevators of the Plane, While the Rudder Moves with the Steering Wheel. The Rear Wheels Are Narrow Tread

is a propeller which can be revolved by the engine if desired. In rear is the tail unit, made with surprising fidelity to aeronautical practice. The rudder moves with the steering wheel as this is turned to left or right, while the elevators are operated by a small hand lever. The tread of the rear wheels was decreased to bring them close to the fuselage,

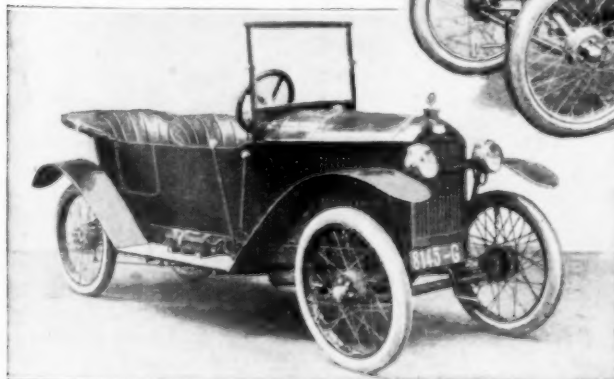
FRENCH CYCLECAR MADE LIKE REGULAR AUTO

Except in size, a new French cyclecar of well-known make more closely resembles a regular touring car than is usual in these small vehicles. Each seat, however, accommodates but one passenger, and the gear-shift and emergency-brake levers are outside the body, on the running board. A four-cylinder, water-cooled, overhead-valve mo-

tor, of 2-in. bore and $3\frac{3}{8}$ -in. stroke, running at 1,880 r.p.m., drives through a worm gear, the transmission and



The Chassis with the Hood Removed, Revealing the Four-Cylinder Water-Cooled Engine in Front, and the Transmission and Differential in Back



A New French Cyclecar That Resembles a Regular Touring Car in Everything but Size: The Gear and Brake Levers Are on the Running Board

differential being housed together on the rear axle. A transverse front spring and quarter-elliptical rear springs support the body, and the tires are 26 by 2.6 in. The little car is capable of 31 miles an hour. Naturally it is quite economical of fuel.

CONCRETE TOWERS REPLACE STEEL HEADFRAMES

The squat obelisks of concrete which the archeologist of 3000 A. D. will observe on entering an iron-ore region of



This Concrete Obelisk Is Not a Monument, but a "Headframe" over the Mouth of a Michigan Iron Mine

northern Michigan will puzzle him perhaps until he finds that each covers the mouth of a mine shaft. They are substitutes for the familiar headframes of timber or girder construction, in fact, and were put up recently by a company of Ishpeming as being cheaper than the others both in upkeep and initial cost. Each is of reinforced concrete, measures 37 ft. square at the base, and rises to a height of 98 ft. Situated on a hill, they resemble huge exotic monuments when viewed from a distance.

ANCIENT TREE SAVED BY AMERICAN FLAGS

"Woodman, Spare That Tree." Several very large, old trees were ordered by the city council at Cedar Heights, Ia., to be cut down in order to straighten the roads and make them less dangerous. One es-

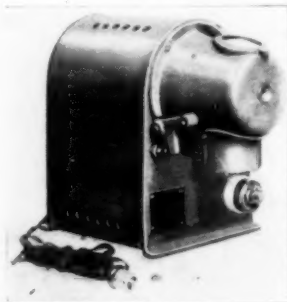
pecially fine oak, over 100 years old and 30 in. in diameter, stood near the entrance to the village and near the center of the street. The owner begged the council to spare it and then, before the axmen arrived, nearly heartbroken over its possible loss, draped a large flag about the tree, thinking this would save it. It was the same flag that floated from her porch through all the long war when her son was fighting for his country overseas. A prominent city official's wife then sent her large flag to be draped about the tree, and numerous smaller flags fluttered from the branches; one of the two large ones being draped about the body trunk of the tree so that an ax could not touch it. Then two old veterans of the Civil War were summoned to stand on each side of the tree and guard it. Workmen who came to chop off limbs left when they saw the flag-draped tree.

BIG STEAMER COMPLETES TRIP FROM SEATTLE TO CHICAGO

Claims of seaport accessibility for the cities of the Great Lakes were justified the other day, when the "Iroquois," a 235-ft. oil-burning steamer, entered the Chicago River after a 9,000-mile trip from Seattle, Wash. A crew of fresh-water sailors from Chicago, sent west by train, navigated the new passenger ship down the Pacific coast, through the Panama Canal, along the Atlantic side and into Montreal, then up the St. Lawrence River to the Great Lakes.

INSULATED WIRES AND CORDS STRIPPED BY MOTOR

One of the most tedious of hand operations, stripping the insulation from the ends of electric wires and cords, may now be performed by motor-driven knife blades. The machine is self-contained, and the operator simply thrusts the end of the wire into a hole, presses a pedal, and withdraws the wire stripped. Strands of conductor cord come out tightly twisted, ready for connection. In one plant, two such machines take the place of 10 workers.



NEW INSTALLATION METHOD MAKES LIGHTS MOVABLE

Despite the fact that its existence has never occurred to 99 of 100 users of electricity, the present method of installing electric-lighting fixtures involves one serious disadvantage. The fixtures are fastened permanently, that is, to walls and ceilings. In the home, for example, interior decorations must often be planned around the illuminating units, when it would be much better to arrange the furnishings, and subsequently place the chandeliers and bracket lights, like so many old-fashioned kerosene lamps, wherever they may be most fittingly installed.

And this very flexibility has now been made possible by the invention of a new method of connecting wires and fixtures. Flush with the surface of walls and ceilings, first of all, there are placed little receptacles which resemble the ordinary push-plug sockets. Now, from the base of each bracket fixture project two curved arms, like the claws of a hammer. To attach the fixture to any of the numerous wall receptacles, the claws are simply inserted into the slots, and the fixture is brought to horizontal. Large ornamental wall fixtures are attached in

the same way, except that the claws project from a plug, and the fixture is suspended from this plug much in the same manner as a hat on a hook.

In the same fashion, the ceiling plugs



In the Insert: The Hooked Plug on Which the Wall-Bracket Fixtures are Hung

Left: Inserting the Hooked Plug into the Wall Receptacle. Center: Preparing to Hang the Bracket on the Hooks of the Plug. Right: The Bracket Fixture Installed

serve the dual purpose of electrical-contact making and weight bearing. They differ from the wall plugs, however, in that each consists of two S-shaped, pivoted claws which, after they have been inserted and moved toward each other, serve as a toggle bolt to sustain the weight of the heavy chandelier.

FULL-SIZE ORDNANCE MODELS ARE LESSONS IN HUGENESS

Visitors to the Imperial War Museum in London who, interested in artillery, have wondered why the size of heavy ordnance should not go on increasing indefinitely, now have a chance to realize just how enormous an 18-in. naval gun really is. A full-size wooden model of such a weapon has been placed on exhibition, and its vast length and massive mountings go far toward convincing the theorists that further extension must be limited. The original gun weighs 149 tons, and fires a 3,333-lb. projectile with a 630-lb. charge. A projectile for a 20-in. gun also is on display. It stands over 7 ft. high, weighs $2\frac{1}{2}$ tons, and can pierce 30 in. of hard-faced armor at 10 miles, or 60 in. at close range, when it leaves the gun with an initial velocity of 2,500 foot-seconds, and the enormous muzzle energy of 250,000 foot-tons.

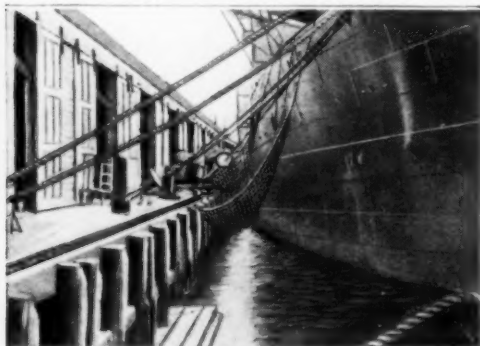


Cross Section of a Ceiling Receptacle, Showing How the Fixture Is Held by Two Hooks

Left: The Method of Attaching a Removable Drop Light to the Ceiling Plate. Center: The Ceiling Plate Itself. Right: The Plate Sustaining a Heavy Weight

NETS FROM DOCK TO SHIP'S SIDE CATCH FALLING CARGO

Heavy nets stretched from ship's side to dock to catch falling cargo have not been an uncommon sight along the

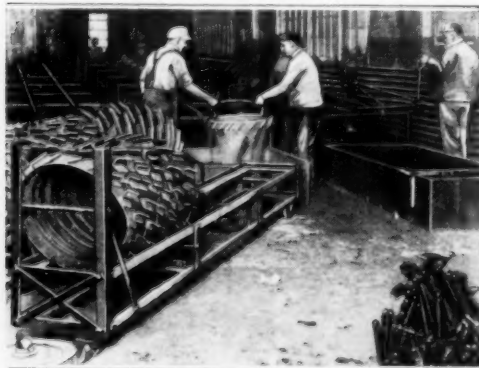


The Heavy Nets between Dock and Ship Catch Any Cargo Which may Drop from the Sling in Its Passage from Dock to Hold

waterfronts of the world. Captains of the steamships operated by one Japanese company are now compelled, however, to take this precaution, not occasionally, but at every docking. The standing order is the result of the company's recent discovery that too many claims for lost shipments could be traced to breaking of a sling as it was being lifted, full of cargo, from dock to hold, or vice versa.

TRACTOR PARTS PAINTED IN RECORD TIME

To understand why the United States, with about seven per cent of the world's population, is able to turn out more than 80 per cent of the world's automotive mechanisms, one need only glance into any of our larger manufactories and ob-

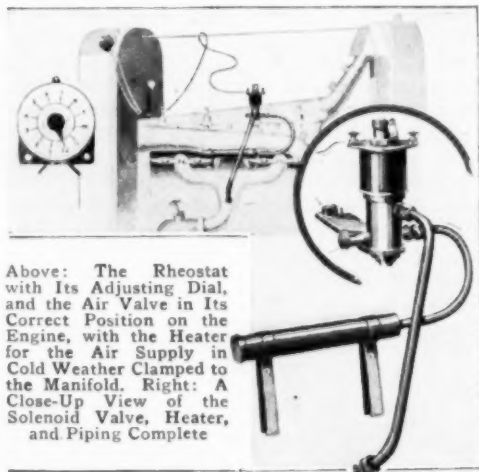


Rushed to the Scene in the Long Truck, the Rims are Ducked in the Paint Tank, Then are Placed on the Conveyor in the Background

serve the unprecedented mass-production methods that prevail. Such a glimpse is given by the accompanying photograph. Here wheel rims for a well-known brand of "baby tractor" are being painted. Rushed on long trucks to the paint tank, 30 at a load, the rims are "ducked" by two workmen; then are placed on a conveyor. Draining as they travel, the rims pass to a third workman, who stacks them in the drying oven. Paint dropped en route is caught by a trough and carried back to the tank.

ELECTRIC AIR VALVE ON AUTO REDUCES GASOLINE USED

Admission of extra air to the engine intake manifold through an auxiliary passage is the principle employed in an ingenious auto accessory recently put on the market. The feature of the device is that it operates only when the car is running at 10 miles an hour or more. The air valve is an iron plunger operated



Above: The Rheostat with Its Adjusting Dial, and the Air Valve in Its Correct Position on the Engine, with the Heater for the Air Supply in Cold Weather Clamped to the Manifold. Right: A Close-Up View of the Solenoid Valve, Heater, and Piping Complete

by a solenoid coil connected to the magneto of the car, through a rheostat adjustable to all conditions. Cold air is used only in hot weather, the winter supply being preheated by passing through a small chamber in contact with the engine. Tests indicate a considerable saving in fuel consumption when the attachment is used.

¶ The disparity of recent announcements as to the acreage within 15 miles of railroad still available for settlement in the three prairie provinces of western Canada has elicited from a Canadian pioneer and statistician this estimate: Manitoba, 4,032,000; Saskatchewan, 17,186,000; Alberta, 12,600,000; total, 33,818,000 acres.



The Three-Ton Tractor, Designed to Take the Place of Horses for Hauling Field Ordnance, Surmounts Obstacles with Extraordinary Agility, Thanks to the Peculiar Spring Suspension of Its Idler Wheels

REMARKABLE NEW TYPES OF MOTORIZED ORDNANCE

BY PAUL H. WOODRUFF

THREE remarkable pieces of motorized ordnance, practically the advance guard of the coming era of horseless armies, have now been produced by American military engineers. One of them is a three-ton tractor with the agility and speed of a galloping horse, another is a self-propelling 3-in.-gun mount of amphibious power, that fords a stream until its top is awash, and the third is a motor mount for a 6-in. gun, using both kinds of treads and weighing complete only 22 tons.

The three-ton tractor, of the endless-tread type, is peculiar for the spring sus-

pension of its idler wheels. In each tread chain four rollers bear against the ground side, and four against the top, all hung on the ends of cantilever springs pivoted to the frame. The tread snakes its way over almost incredible obstructions, while the upper rollers take up the shifting slack caused by contour changes below. There is a separate clutch-controlled high and low gear for each side, and the machine is steered by putting one side in low and the other in high, making a smooth turn. There is also a two-speed gear at the engine, making a total of four speeds.

Special waterproofing is the feature of



The Self-Propelling Three-Inch-Gun Mount Is Remarkable for Its Waterproof Qualities, and Fords Streams without Difficulty. The Engine Takes Air through a Vertical Pipe, Extended to the Top of the Machine

the 3-in. gun mount, and is later to be added to all the other motorized equipment. The eight-cylinder engine exhausts

cranks, and the machine is steered with a wheel. A 120-hp. engine drives the wheels through a four-speed transmission and internal gears. The gun itself weighs six tons, and the whole weight has been kept down to meet the limitations of highway bridges.



The Eight Large Wheels Which Distinguish the Mount of the Six-Inch Gun Make the Endless Tread Highly Effective in Climbing over Obstacles. The Weight of the Outfit Complete Is Only 22 Tons

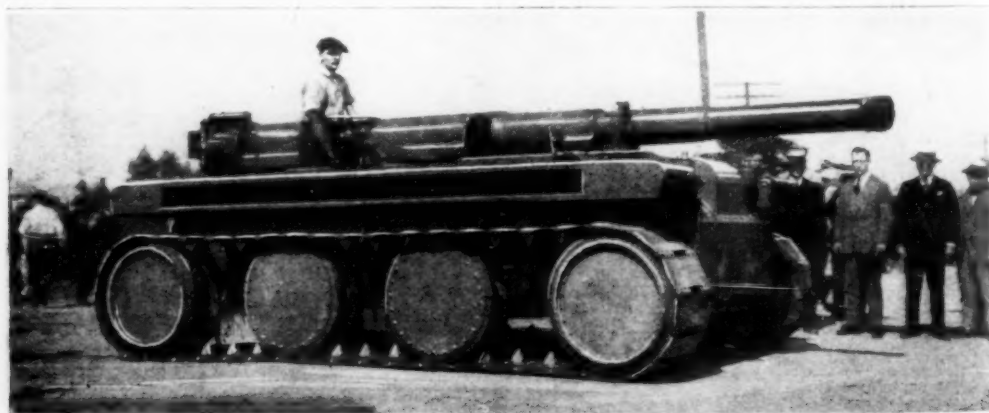
under water while fording, and the electrical fittings, including spark plugs, distributor, and ignition apparatus, are buried in waterproofing compound. The air intake is a vertical pipe running up to the top of the machine, and while its end is out of water, the engine will run.

Four large wheels on each side distinguish the larger gun mount, and they make the endless tread highly effective in climbing over obstacles. Thus equipped, the machine is steered by pulling a lever that releases a clutch on one side, and throws on a brake, each side having its own lever. For road use, however, the endless tread is removed, the two inner wheels of each side are drawn up by hand

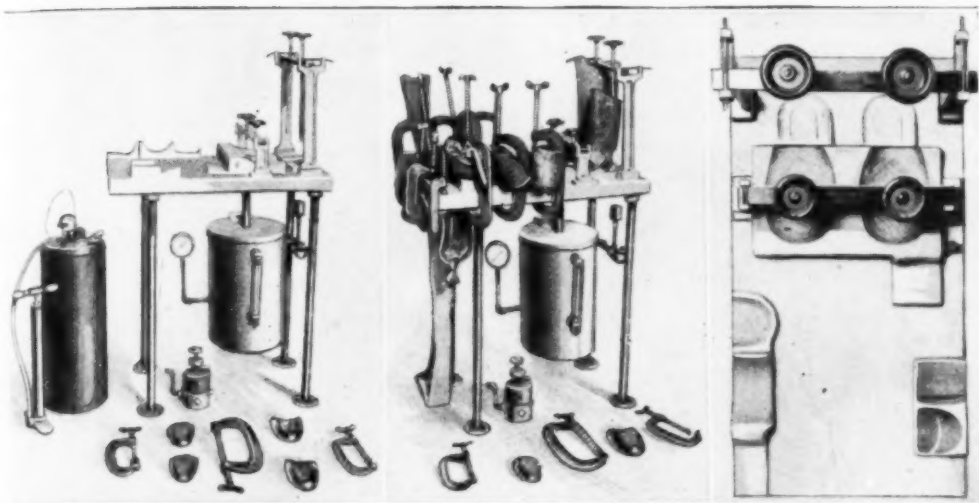
test against profiteering landlords" they call it. Already a plot measuring 100 by 110 ft. has been selected in the vicinity of 110th Street and Broadway, and architects have completed preliminary drawings. These depict the first two floors as devoted chiefly to churchly purposes. Here is the auditorium, with a capacity of 500, the parish "house," recreation rooms, the assembly hall, etc. The next few floors are partitioned off into business suites, and the remainder into apartments for the accommodation of 60 families. Topping the structure is a roof garden, which will be available for the kindergarten and other work of the church as well as for the enjoyment of the tenants.

TO BUILD CHURCH, APARTMENT, AND OFFICE BUILDING IN ONE

A 16-story building containing business offices, family apartments, and a church auditorium is the unprecedented project now being supported by the congregation of a large church in New York City. A "pro-



This New Mount for the Six-Inch Gun is Driven by a 120-Horsepower Engine through a Four-Speed Transmission. When Smooth Roads are Encountered, the Endless Tread may be Removed, the Two Inner Wheels on Each Side Drawn Up by Means of Hand Cranks, and the Machine can Then be Steered like an Automobile



The New Vulcanizing Machine is Seen Ready for Use, at the Left. Beneath the Hot-Plate Top of the Table Is the Steam Boiler. A Variety of Objects, Including a Boot, a Hot-Water Bag, and an Inner Tube are being Treated, in the Middle. At the Right, the Table Top is Viewed from Above

NEW VULCANIZING MACHINE FOR RUBBER FOOTWEAR

A machine for vulcanizing rubber boots and shoes, which applies the heat externally instead of internally, has recently been developed by a Michigan inventor. With earlier machines it was necessary to heat the entire boot, while in the new one only the part to be vulcanized is heated.

It consists of a cast-iron table, underneath and a part of which is a hot plate. Beneath this, again, is a complete boiler which generates the steam for curing. The top of the table is fitted with molds of various required shapes to accommodate hot-water bottles, bathing caps, inner tubes, and, in fact, practically any article that has a flat surface. In the case of a boot or shoe a special dry filler is used to hold it in shape.

The operation of the machine is quite simple. The part to be repaired is cleaned thoroughly either with gasoline or with a wire brush, a small patch of specially compounded rubber is placed on the spot to be fixed, the article is placed over the proper mold or form, the heat applied, and in 10 to 20 minutes the patch is thoroughly cooked on.

Half of its order of 1,000 ready-made wooden houses has already been delivered by an American firm to purchasers in the devastated districts of Arras and Lens in northern France. Each house contains three rooms and is about 23 ft. square.

WHEELED LEVER IS EFFICIENT SUBSTITUTE FOR HAND TRUCK

A patented trucking tool, which is nothing more than a long hickory lever terminating in a steel carriage with two cast-iron wheels, is now being manufactured as a substitute for the old-fashioned hand truck used in every factory, warehouse, freight shed, etc. The peculiar virtue of the tool is that, in securing the load, it is not necessary first to insert the end under the box or bale, as in using the ordinary hand truck. In consequence, whether the load is 50 or 1,500 lb., this operation can be performed by the trucker unassisted. He simply places the tool vertically beside the package, connects the one to the other by means of an adjustable chain, and pulls the lever toward him.

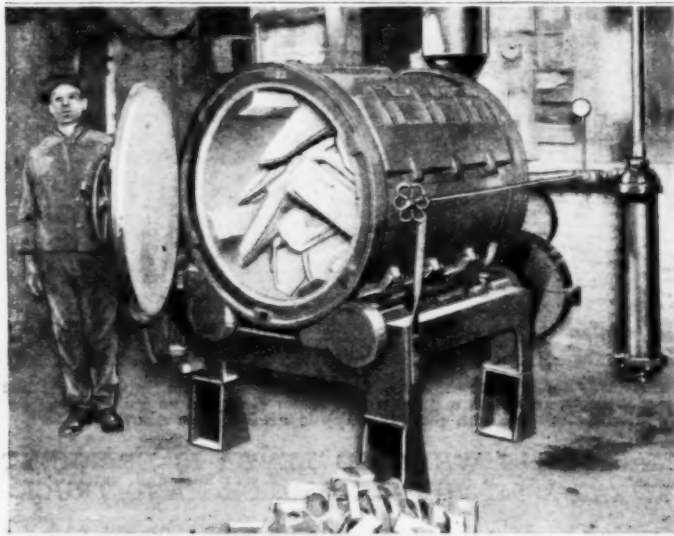
The Worker is Preparing to Tilt the Load Back over the Wheels. The Load is Carried as Pictured at the Left



The package now balances itself over the two wheels. These, incidentally, can be swung to a rearward position when a long package must be handled.

SAND-BLAST TUMBLING BARREL HAS AUTOMATIC FEATURES

Several interesting features are incorporated in the construction of a revolving



The Sand-Blast Barrel with Its End Door Open, Showing a Normal Charge of Castings: The Sand Issues from Nozzles in the Four Cast-Steel Cleats inside the Barrel

sand-blast barrel now being made by an eastern concern. The sand nozzles are carried by four cast-steel cleats inside the barrel, but only the three or more nozzles of one cleat operate at one time, while at the top of a revolution. The sand passes through perforations in the barrel plates, and is returned to the nozzles again. No sand touches the air nozzles. The barrel is made in several sizes, the largest measuring 5 by 6 ft. inside.

PASSION PLAY GIVEN AGAIN BY PEOPLE OF NANCY

Though the Passion play is not being staged at Oberammergau this year, visitors are now flocking every Sunday to the once rival performance at Nancy, France. The French Passion play was first given in 1904, and was an annual event thereafter until 1914, when the war made continuance impossible. It is presented in its own theater under the direction of a local priest, and runs from 9 to 12 in the morning and from 1:30 to 4:30 in the afternoon. In this time 16 scenes are enacted, depicting the New Testament incidents from the birth to the resurrection. Intermissions are filled by tableaux representing prophetic passages of the Old Testament.

EXCAVATORS FIND ALTAR ROOM IN PUEBLO RUIN AT AZTEC

The most satisfactory event to mark so far the work of the American Museum of Natural History in its excavation of the Pueblo ruin at Aztec, N. M., is the recent discovery of what was evidently the holiest shrine of this prehistoric people. It takes the form of a room, bare of furniture, but in perfect condition. The walls are plastered, and are painted in a glaring white with dull-red borders and a frieze of triangular designs. On the ceiling beams are strange marks made by rubbing the palm and fingers in white paint, and then pressing them upon the wood. From these beams hang several strands of beautifully made rope, presumably for the support of some sacred objects. On the ceiling, too, is carved a serpent, two and a half feet in length, and in design unlike anything known to the archeologists in charge.

METAL SPRING AND SPHERE CLIPPED TO VIOLIN BRIDGE

A "vibrating mute" the inventor calls a small attachment for the violin which he is now preparing to manufacture in quantity. It is formed of a finely tempered spring which is clipped to the middle of the bridge, and to the upper end of which is fastened a little sphere of metal. As spring and sphere vibrate with the strings, the attachment is said to impart a singing tremolo and a noticeable mellowness to each note. After a little practice, too, the musician finds it an aid in the imitation of canary and other bird voices. The attachment can be purchased in either a gold finish or a silver finish, as the buyer desires.





DESTROYER "ABBOTT" GOES ON HELL GATE ROCKS

HELL GATE, the turbulent tidal trap that made the passage between Long and Manhattan islands famous for adventure in New York's early days, lost much of its menace nearly a half century ago, when government engineers pulled its most prominent teeth with dynamite. That the channel, however, despite its 200-ft. depth, still is far from wholly innocent was demonstrated only a few weeks ago, when the U. S. destroyer "Abbott" stranded almost underneath the great arch of beautiful Hell Gate bridge, and remained on the rocks long enough to afford an interesting spectacle to many curious city folk. The "Abbott" is one of the navy's newer vessels.

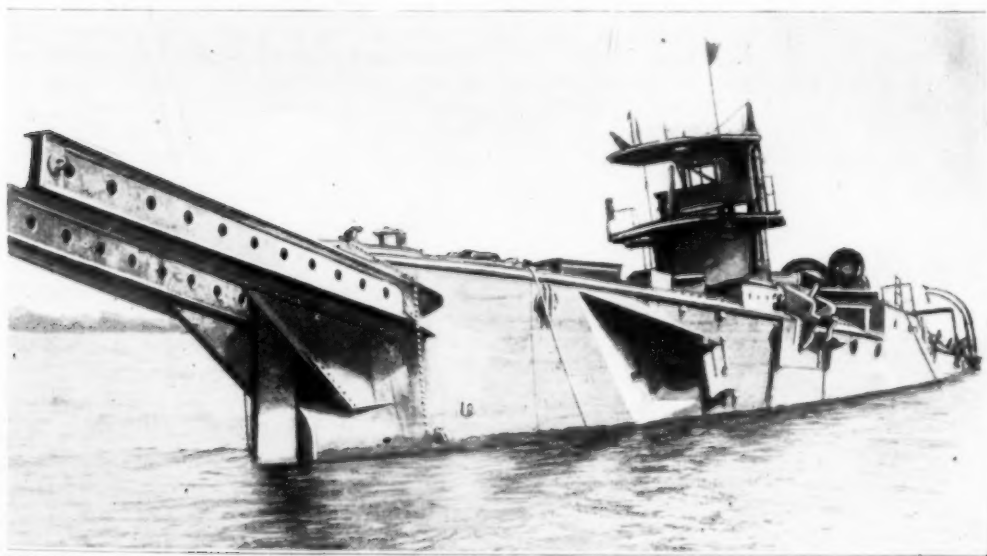


PHOTO BY CENTRAL NEWS

BLOCK SHIPS AT ZEEBRUGGE GIVEN TO BELGIUM

FOUR of the most curious relics of the World War, the ships "Vindictive," "Iphigenia," "Thetis," and "Intrepid," have recently been presented by Great Britain to the government of Belgium. The first was sunk as a block ship in the channel leading to the harbor of Ostend, it will be remembered, on the night of May 9-10, 1918. The other three were sunk for a similar purpose during the fiercer fighting on the mole at Zeebrugge, 17 days before. The concrete which fills the hulls of these cruisers has made their removal difficult. One German attempt to move the "Intrepid" involved, as the photograph shows, the use of massive girders welded to the bow.

PREHISTORIC ICE CRYSTALS LEAVE FOSSIL IMPRINTS

Though the subject seems little related to the affairs of everyday, one American geologist has lately put to the most prac-



This Photograph Shows Not the Fossil Imprints of the Ice Crystals, but the Ridges Left in a Plaster Cast of the Original Rock Surface

tical use the knowledge gained from 30 years' study of "fossil ice crystals." Reasoning from his acquaintance with this obscure subject, in fact, he has been able to check important deductions regarding the location of rock strata in the quicksilver mines of western Texas. These fossil ice crystals are nothing more than the impressions left in prehistoric mud by the freezing of the water content. With the passing of the ages the mud becomes rock, but the markings remain. A block of sandstone found in the Black Hills of South Dakota, for example, has its smooth upper surface covered with a thin, adhesive coating of silt or fine clay. In this clay are the markings, consisting of straight, shallow grooves, $\frac{1}{2}$ to 2 in. in length, and $\frac{1}{16}$ to $\frac{1}{8}$ in. in width. That

these grooves are truly the result of a freezing action seems to be proved by recent observations of mud during the late and early frosts. On several occasions markings identical with the fossil imprints were seen.

BRING SALT-WATER BATHING TO PARIS BY PIPE LINE

That Parisians may be enabled to enjoy the delights of salt-water bathing in hot weather without leaving the city, it is planned to connect a huge natatorium directly with the sea by means of a 3-ft. underground pipe line. The construction of two such lines for conveying oil from Havre to Paris was announced in this magazine last July, and advocates of the salt-water line argue that a third pipe can be installed in the 130-mile trench at little additional expense beyond the cost of the pipe itself.

PUBLIC BOATHOUSE LOCATED HIGH ABOVE WATER

The top of a steep river bank was the odd site chosen when a public boathouse of Cincinnati was moved, recently, from its former location at the very edge of the Ohio River. The frequency of annoying floods and high water was the reason given for the change. To provide for the transportation of his canoes and rowboats from boathouse to water, the proprietor constructed a cradle, and a cableway down which it slides. If desired, in consequence, the customer can spare himself the walk down the embankment by descending to the water in the craft he has rented. At the end of the day, a small gasoline engine is started and the boats are hauled back to the boathouse.



The Cableway Links the Public Boathouse on the Top of the Bank with the Surface of the River, Many Feet Below. Often a Customer Descends to the Water in the Boat He has Rented, as Pictured at the Right. At the Left is Shown the Two Stirrups Which are Placed around the Hull



Horse-Drawn Auto Passing through Denver en Route from Texas to Kansas: This Was the Farmer-Owner's Method of Holding the Motor Car's Speed Down and Keeping It in Line with the Rest of His Horse-and-Wagon Caravan

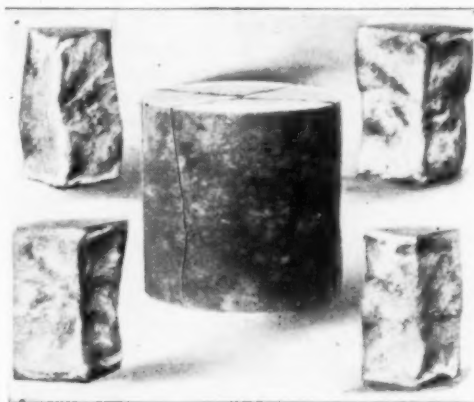
TEAM OF HORSES HAULS AUTO ACROSS THREE STATES

Automobiles have been hauled by animal power when their own gave out, but the deliberate substitution of a horse team for gasoline, to propel a perfectly good motor car over hundreds of miles of road, is unusual, to say the least. Such an equipage, following three prairie schooners, passed through Denver recently, carrying the chattels of the farmer-owner from Texas to Kansas. His explanation was that the horse method held the auto's speed down to that of the wagons, and kept the family together.

CHUNK OF STEEL EXPLODES IN HAND OF WORKMAN

To have a piece of steel explode while held in the hand was the recent and unprecedented experience of a workman employed in a great American industrial laboratory. The piece was of carbon steel, was cylindrical in form, and measured $4\frac{1}{2}$ in. long by 4 in. in diameter. Having withdrawn it from an electric furnace at about $1,380^{\circ}$ F., the worker quenched it in a tank, as he had previously treated hundreds of similar pieces, and then grasped it in his left hand. With a rasp in his right he was about to test the hardness of the steel. Something distracted his attention, and the end of the rasp tapped the flat end of the slug. As though a trigger

had been pulled, the cylinder exploded with a sharp report, and flew from his hand in four pieces. In explanation of the accident the suggestion has been offered that the exterior of the cylinder



The Four Segmental Fragments of the Exploded Steel have been Reassembled, in the Center, to Show the Lines of Fracture

cooled too quickly, and so created a surface tension so great that violent fracture was the result of the lightest touch.

Two small oil wells were opened on city-owned property by one of the harmless quakes which recently have shaken Los Angeles, Calif. Both will be developed for the municipality by the board of public works.

BANTAM AUTOMOBILE PARKED IN BARBER SHOP

The ordinance now in force in a western city prohibiting the parking of auto-



Not Allowed to Park in the Downtown Streets. This Motorist Drove His New Car into the Barber Shop and Checked It

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mobiles in the business section, was circumvented not long after it was passed in a manner quite unforeseen by the city council. Desiring a shave, and unwilling to pay garage rent for so short a time, the motorist drove his new automobile over the curb, through a doorway, and into a barber shop. Here he checked hat and car with the astonished porter. Since that time the car has become a rather familiar sight about the city. It seats only the driver, and has a wheel base of just six feet. Though small, it is made and equipped in every way like the biggest racing speedster.

BRICK DEALER HAS NOVEL DISPLAY ROOMS

Those folks who are going to spend money to build a house can have a real treat planning for the sort of things they want to build it with, if they happen to be in Cincinnati, Ohio. An enterprising building-supply dealer of that city recently constructed one of the finest sales and display rooms for his line of business in the country.

The walls of the first room, which is intended for the reception room and information department, are of a light-tan face brick. Decorative tiles are placed in appropriate positions and, in reality, act as pictures on the walls of a dwelling room. The floor is covered with red tile. The stairway, in brick and tile, leads to

an upper series of salesrooms and is in keeping with the scheme of artistic use of these building materials. Beyond this first room is a larger space where lines of building specialties may be exhibited. Such things as roofing tile, decorative tile, metal, and revolving doors are brought into this room for display to the home builder and his architect. A large mantel of pottery tile is the particular feature of this restful room. Chairs are furnished for the customers, and every means is taken to insure an atmosphere of leisure and ease, and the feeling of doing a rushing piece of shopping is quite obliterated.

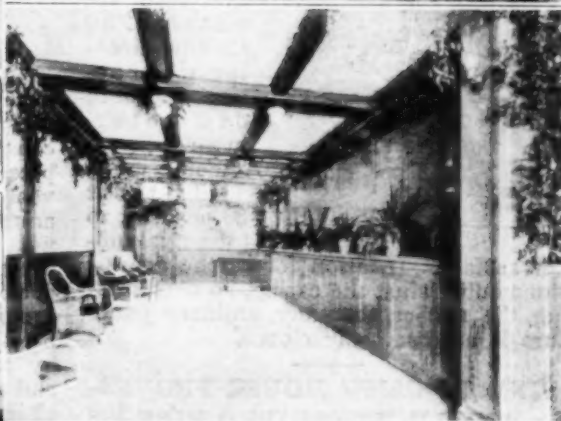
A third room has been fitted with a large cabinet for the displaying of face brick. This cabinet is divided into two parts, the lower one consisting of 26 sections, for the housing of trucks carrying panels of the displayed brick. Each truck carries two panels of brick, and each panel consists of only one style of brick. By using this method the customer is not confused by a multitude of panels on every side, and he is able to make a more satisfactory decision. The upper sections of the cabinet contain single brick samples and the full panels give the effect of just how the



Restful Leisure Is the Effect Aimed At in This Display Room, but Its Particular Feature Is the Homelike Mantel and Fireplace, Constructed of Pottery Tile



The Reception Room of the Building-Material Display Suite Has Walls of Light-Tan Face Brick, and a Floor of Red Tile, While Interesting Ornamental Tiles Decorate the Walls



The Charming Room at the Right is Used for the Seemingly Incongruous Purpose of Displaying Brick. In the Background a Panel of Sample Brick is Seen Pulled Out for Inspection



Brick-and-Tile Stairway Leading to the Offices, Showing Some Uses of Ornamental Tile Panels in the Wall

wall of a house or other building will appear when erected. The floor of the room is made of terrazo, the hardened surface of which is not marred or scratched by the truck wheels.

SELF-SEALING INNER TUBE CURES OWN PUNCTURES

Shaping the rubber to such a cross section that air pressure within compresses



its walls, instead of expanding them, is the principle employed in a new form of self-sealing inner tube for auto tires. In the surface of the tube are nearly 700 shallow circular depressions, $\frac{3}{4}$ in. in diameter, made by a special mold, adding about 30 per cent to the actual rubber surface.

Inflation forces the depressions out against the casing, so compressing the rubber that any ordinary puncture is automatically closed.

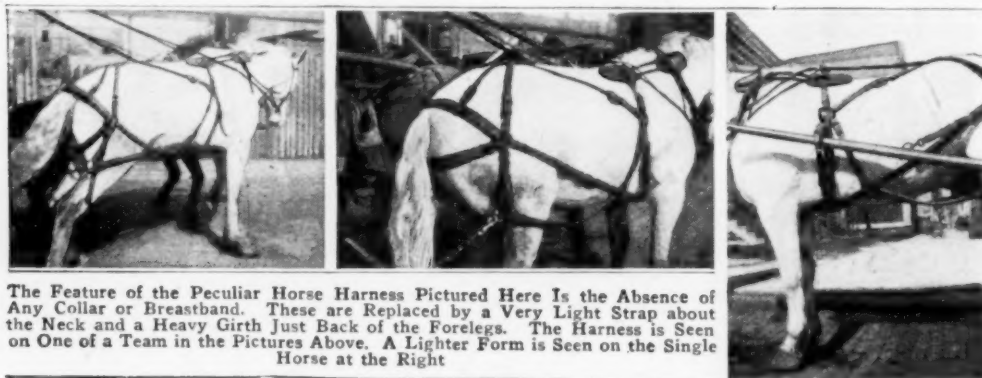
FIND IN CLIFF HOUSE PROVES PEOPLE WORSHIPED FIRE

Although the ancient rites of fire worship are still practiced by the Hopi, Navajo, and Pueblo Indians of the American Southwest, the existence of this cult among the prehistoric cliff dwellers, though suspected, has never been demon-

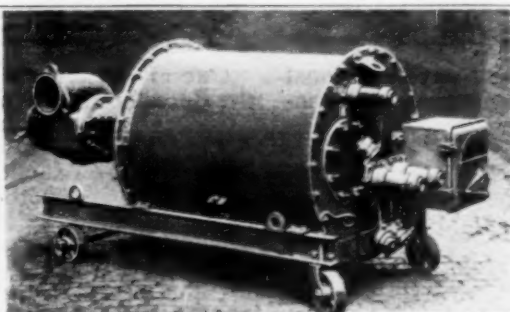
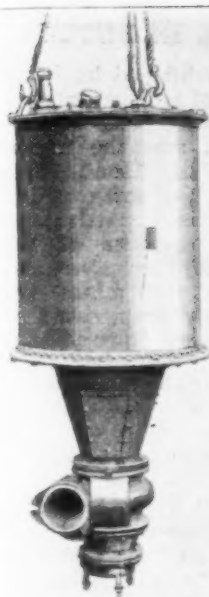
strated before. Proof is now supplied, however, by recent activities of the Smithsonian Institution. In uncovering the cliff dwellings in the Mesa Verde National Park of Colorado, the scientists have found that the great building known for the last few years as "Painted House" was undoubtedly constructed for some special purpose other than habitation, and almost certainly for the ceremonies of fire worship. In the center of the courtyard, for example, is a circular fire pit. Filled with ashes, and far too large for use in cooking, the hole is without a duplicate in any other cliff house. Another evidence of ceremonial use is a painting in one of the rooms. A supernatural being is represented which is still personated by the Hopi Indians in their fire worship.

NEW HORSE HARNESS HAS NO COLLAR

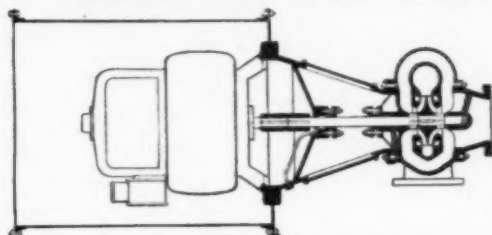
The feature of a patented horse harness developed on the veldts of south Africa and now being tried out in several American cities is the absence of any collar or breastband. This is the result of the inventor's belief that the larger part of the animal's tractive effort should be exerted, not at the base of the neck, but at the junction of barrel and shoulders. Accordingly he places only a very light strap around the neck, but a heavy one just back of the forelegs. The two are joined by small straps paralleling the withers, and a heavier strap between the legs. The claim of increased efficiency made for this arrangement seems to have been justified by a recent demonstration in Chicago, Ill. After repeated failures to start a heavy load when working in the usual harness, a team was fitted with the new harness and hitched to the load again. They succeeded now, four successive times.



The Feature of the Peculiar Horse Harness Pictured Here Is the Absence of Any Collar or Breastband. These are Replaced by a Very Light Strap about the Neck and a Heavy Girth Just Back of the Forelegs. The Harness is Seen on One of a Team in the Pictures Above. A Lighter Form is Seen on the Single Horse at the Right



The Submersible Electric Pump Bolted to Its Four-Wheeled Truck, on Which It is Readily Moved About



Left: The Pump Unit Suspended, Ready for Submerging. Center: Diagrammatic Section through Cylinder, Intercepting Chamber, and Pump. Right: The Pump Working in Water and Discharging against a Head

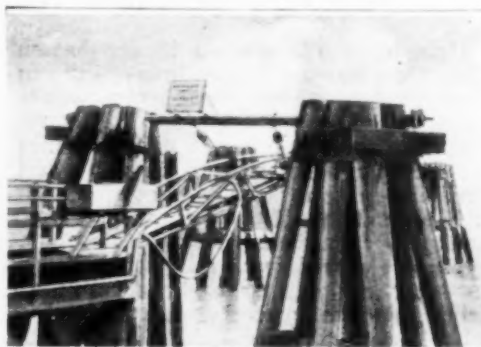
SUBMERSIBLE ELECTRIC PUMP FOR SALVAGING SHIPS

There are many reasons why ability to operate wholly submerged is valuable in a salvage pump, which must meet the extraordinary conditions of emergency. Steamers of one of the large passenger lines have just been equipped with a form of electric pump made by a British concern, which is operated from the ship's auxiliary direct-current lighting set, and works as well under water as above it. A sealed galvanized-steel cylinder incloses the 20-hp. motor, which is ball-bearing and works in any position. The centrifugal pump, at one end, is mounted on a conical intercepting chamber which excludes all water. With 8-in. intake and outlet openings, the pump delivers 1,100 gal. a minute against a 35-ft. head, giving 75-per-cent efficiency, and in a 44-hour test run the temperature of the motor chamber rose only 40°. The set is bolted to a four-wheeled truck, but has lifting rings for lowering into a flooded compartment.

Recent studies of the vagaries of lighting show that it strikes loamy soil most frequently; then, in diminishing order, sandy soil, clay, and chalk. The first is struck 22 times as often, in fact, as the last.

COIL SPRINGS USED ON PIER TO ALLOW SWAYING OF PILES

An interesting use of heavy coil springs in pier construction is now to be seen on the waterfront of San Francisco. There are two of these springs, one at either end of a steel bar, which extends horizontally between two groups of piles for the purpose of supporting the outer end of a hinged gangway. Surrounding the ends of the bar, between retaining nuts and pile surfaces, the coil springs permit the

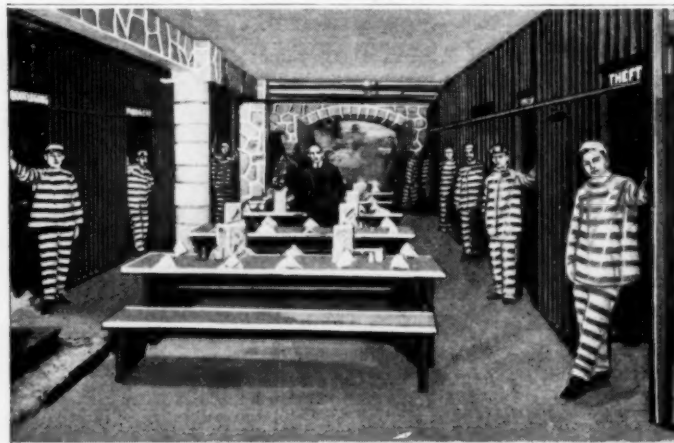


The Coil Springs at the Ends of the Crossbar Permit the Two Groups of Piles to Sway without Causing the Bar to Buckle

two groups of piles to sway toward or away from each other without causing the bar to buckle.

RESTAURANT PATRONS DINE IN PRISON CELLS

One of the most unconventional schemes of interior decoration ever exe-



By Inclosing the Booths in Prison Bars, Substituting Hard Benches for Chairs, and Dressing the Waiters in Convict Costume, the Proprietor of This Restaurant has Achieved the Effect of a Penitentiary Mess Room

cuted has lately transformed the interior of a restaurant in San Francisco, Calif. Every attempt has been made, in short, to make the place look like the mess room of a penitentiary. Down the length of the chamber are arranged long tables, with two hard benches for each. The booths along the sides have been changed to cells by partitions of prison bars. A disturbing semblance of reality has been given to the scene, finally, by garbing all the waiters in striped convict costume.

WAR MATERIAL DECORATES CHURCH INTERIOR

Though swords are no longer beaten into plowshares, it is interesting to learn that a quantity of black walnut which had been set aside for the manufacture of gunstocks for the allied armies has recently been used to decorate and furnish the interior of a Methodist church in Kansas City, Mo. Pews, trim, pulpit furniture, even the panels of the pipe organ, are carved from this wood, giving an effect of richness and harmony as striking as the material is unusual.

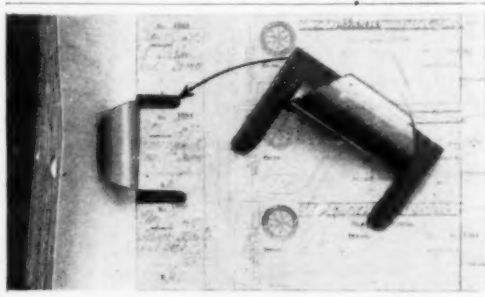
¶The mining experiment station established by the Department of the Interior at Denver in 1910, and moved to Golden in 1917, has now been relocated at Reno, and will be known henceforth as the Rare and Precious Metals Station.

ACCIDENT-PREVENTION WORK BRINGS RESULTS IN BUTTE

One of the reports published lately by the Bureau of Mines is of unusual interest because the field of investigation was the region about Butte, Mont. Here the work of safeguarding the mines is particularly difficult because of the large labor turnover, and because the mines are unusually deep, some of them going down to 2,500 ft. Yet, in every case, where the safety organization has been developed at all, it is found that results are commensurate with effort expended. Thus, one company gives particular attention to fire prevention, and is troubled by no serious fires; another specializes in the prevention of injury, and has a low accident rate; while a third improves ventilation, and so converts an unpopular working into one of the most sanitary.

ACCESSORY FOR BOOKKEEPER'S DESK HOLDS STUB LEAVES

The virtues of a simple clip of recent invention can be appreciated perhaps only by a bookkeeper who has known the exasperation of pressing back the stub leaves of a manifold check book with one hand, while checking entries with the other. The clip is stamped from a single piece of metal, and consists of a curved portion, and two flat arms. With these arms upon the page, the user pushes the clip to the left, where it engages and holds out of his way the backward-folded leaves.



The Clip is Shown in Large Size, at the Right, and in Small Size, in Use, at the Left



The Concrete Mixer and Sand and Cement Cars Re-Laying the Pavement between the Rails Where the Street was Torn Up by the Shovel Only a Short Time Before



The Big Motor-Driven Shovel Operated by Trolley Current, Used to Tear Up the Pavement or to Crack It by Dropping a Weight



Left: The Motor-Driven Air Compressor, Operating Drills That Cut Holes in the Concrete Base of the Pavement. Right: The One-Ton Iron Ball Dropped onto the Concrete by the Motor Shovel to Break It. This is Used Only When the Pavement Proves Too Hard for the Drills to Penetrate



MODERN METHODS ACCELERATE CAR-TRACK LAYING

Laying a new car track in a concrete-paved street is usually regarded as a hard job, but a street-car company in a northern state is using a method that makes rapid and easy work of it. Compressed-air drills are used to cut $1\frac{1}{2}$ -in. holes, 6 in. apart, through the concrete along the edges of the right of way, and a big motor-operated shovel, taking current from the trolley, then digs up concrete and all. When the pavement resists the upheaval, the scoop is taken off the shovel and replaced by a great iron ball, weighing more than a ton. This is dropped repeatedly from a height of 5 ft., and never fails to break the paving into fragments. The air compressor consists of a small car, which runs on either rails or road, and carries four electric air pumps and two tanks, holding 120-lb. pressure. As soon as the paving is up, the ties are laid, and sand is tamped under them with a tool also operated by air. Sand and

cement cars and a concrete mixer follow, and so quickly is the work finished that the concrete frequently is relaid in the same block where the shovel is tearing it up.

STEEL CABLE IN NEW AUTO REPLACES BRAKE RODS

In place of the rigid steel rods which customarily serve to connect the brakes of an automobile with the brake pedal, the latest model of a popular car uses a flexible steel cable. The ends of the cable are connected to the two brake drums, and the pull of the foot lever is exerted through a grooved pulley. This assures an even division of the braking action between the two drums, reducing to a minimum the tendency to skid. Additional advantages claimed are that the cable is self-adjusting, and does not transmit jars and vibrations to the foot.

BUILDING OF OCEAN LINERS RESUMED ON LARGE SCALE

The vessel "Scythia" was launched at Barrow, England, a few months ago as



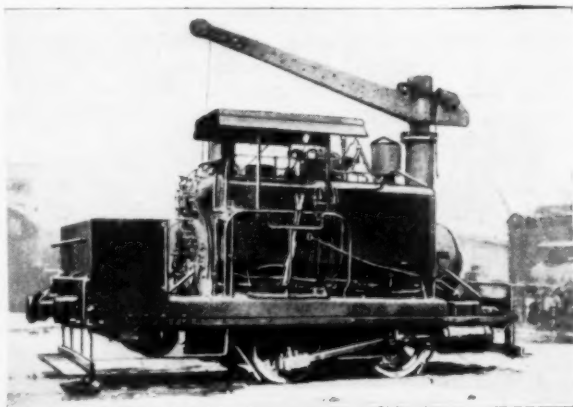
The "Scythia." Soon to be Put in Transatlantic Service as the First of 12 Liners to Compose the Post-War Fleet of a Great Steamship Company, Is an Oil Burner and Has Double Reduction Geared Turbines

the first of 12 big ocean liners which, upon completion of the last at the end of the year, will compose the post-war fleet of a well-known steamship company. Rather typical of the rest, the "Scythia"

deserves description. It is the first vessel of liner type, in the first place, to have double reduction geared turbines, which permit the operation of power plant and propeller at speeds most economical for each. Secondly, it is the largest liner to be built as an oil burner. In consequence of this design this vessel carries only one funnel, though it measures 600 ft. in length and weighs 21,000 tons; and so invalidates the popular conception that multiplicity of funnels signifies speed. The "Scythia" demonstrates its modernity, too, in the comforts provided for passengers of all classes. On the upper promenade deck, for example, are two large lounging rooms disguised by trellises, flowers, and potted shrubs as miniature gardens. Sliding windows will inclose these in time of storm.

SWITCH ENGINE MOUNTS SMALL CRANE

An odd mechanical hybrid is now much used about the terminal shops and roundhouses of a western railroad. It is primarily a switch engine, of the small four-wheeled type, and in this capacity is frequently employed to move dead locomotives from one place to another. In front of the smokestack, however, is placed a small but powerful crane, operated by steam from the engine boiler. And it is as a lifting-moving means that the engine is most used. By means of the crane it is able to pick up heavy locomotive parts, and load them on flat cars. It then turns switch engine, and shunts the cars from shop to shop as desired.



This Switch Engine is Used about the Terminal Shops of a Great Railroad. By Means of Its Crane, It Loads Flat Cars with Heavy Locomotive, or Other, Parts. It Then Pushes the Cars from Shop to Shop as Desired

AERIAL PHOTOGRAPHER AIDS CITY PLANNER



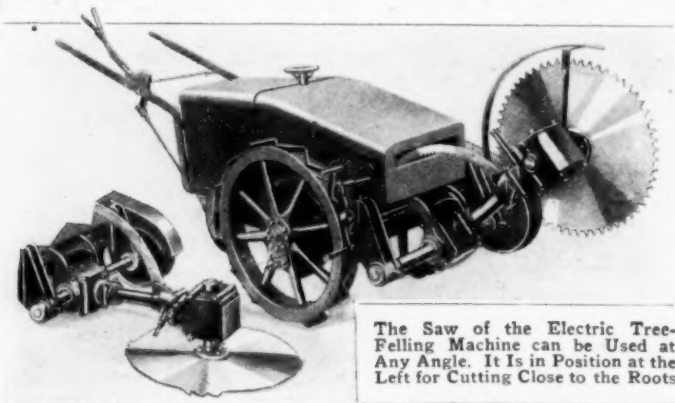
The Aid Which the Aerial Photographer can Give to the City Planner is Well Illustrated by These Two Photographs, Taken from an Army Airplane during the Aeronautical Show Staged at Cleveland, Ohio, Some Weeks Ago. He can Study, Above, the Influence of the Lake Front and the Meandering Cuyahoga River



In This View of the Heart of the City He can Observe the Development of the Comprehensive "Civic Plan." At the Upper Left Is the County Courthouse; above It and to the Right, the City Hall and the Steel Skeleton of the New Public Auditorium. To the Right of the Center, Again, Is the Public Square, upon Which Faces the Stately Federal Building

FRENCH TREE-FELLING SAW IS ELECTRICALLY DRIVEN

The European demand for labor-saving machinery, attributable to the after-



The Saw of the Electric Tree-Felling Machine can be Used at Any Angle. It Is in Position at the Left for Cutting Close to the Roots

war shortage of workers, has recently produced in France an interesting mechanical tree feller and cutter. Mounted

on a small hand-propelled cart, it consists of an electric motor, which gets its current from a portable gasoline generating set, and a circular saw of any desired type. This saw is carried on a shaft which projects from the front of

the "pushcart" and which, by means of a handwheel and toothed rack, can be inclined at any desired angle. The mounting is such, also, that the saw can be set at any angle from vertical to horizontal. When the apparatus is to be used, the cart is pushed up to the standing tree, the saw is adjusted, and the motor is started. As the saw bites into the tree, a second operator turns a crank at the side of the

cart, and so moves the saw horizontally into the cut. The work of cutting up a horizontal log is, obviously, still easier.

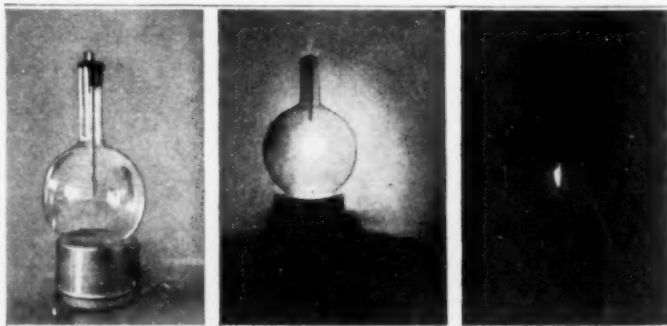
CHEMICAL LIGHT SELF-PHOTOGRAPHED

BY A. SWANSON

CHEMICAL reactions are usually so quiet as not to be noticed, though they are, of course, occurring around us all the time. The particular reaction, which is the subject of this article, is one that takes place with such energy that light is formed, sufficient to take its own picture in a darkened room.

The flask is provided with a cork, and a rod of glass runs through it into the center of the flask, with a small spiral of platinum wire mounted in its end. A few drops of alcohol (wood alcohol will do in this case) are placed in the bottom of the flask, and the cork with the glass rod is put in. The wire is soon heated by the oxidation of the alcohol vapor which occurs only on the surface of the wire itself, and as this oxidation process is the same as burning, as we usually know it, the wire becomes warmed. As the wire heats up, the whole process is accelerated, and the wire becomes hotter and hotter until it glows with a white heat. This

heating effect will continue as long as there is any oxygen left in the flask, and can be renewed by letting in fresh air. As the alcohol is oxidized, it is changed to a new substance which can easily be distinguished by its odor as formaldehyde. In fact, this reaction is the basis for the manufacturing process of this chemical at the present time. The platinum is not used up, but its presence is necessary, as



The Glow of the Platinum Wire Is Invisible in the Photograph, at the Left, Taken in the Daylight. The Remaining Photographs were Taken in the Dark, the Middle One with a Three-Minute, the Other with a Five-Minute Exposure

otherwise the reaction will not take place, even though the two substances were to remain together for years.



Across the Old Bridge, the Location of Which is Indicated at the Left, Motorists could Pass from One Road to the Other with Speed Unabated. Many Fatal Accidents were Attributed to This Condition. The Bridge was Rebuilt in the New Position, Recently, to Make This Speeding Impossible

TRAFFIC ACCIDENTS REDUCED BY RELOCATING BRIDGE

A vehicle bridge near Rose Hill, suburb of Los Angeles, Calif., is distinguished as probably the first of its kind to be torn down and rebuilt because it was too conveniently crossed. The structure spans several railroad tracks and connects two curving but roughly parallel highways. Formerly its relation to the curves was such that the motorist proceeding westward on one road or eastward on the other habitually cut across the road and traversed the bridge without abating his speed. When the number of fatalities attributable to this condition had reached 15, relocation of the structure was ordered by the state highway commission. The situation having been studied, the bridge was torn down and rebuilt with one end in approximately its old position, but

with the other 75 yd. removed. The motorist can now make the crossing only at slow speed.

TOWER FOR OIL DRUMS SOLVES AIRDROME'S FUELING PROBLEM

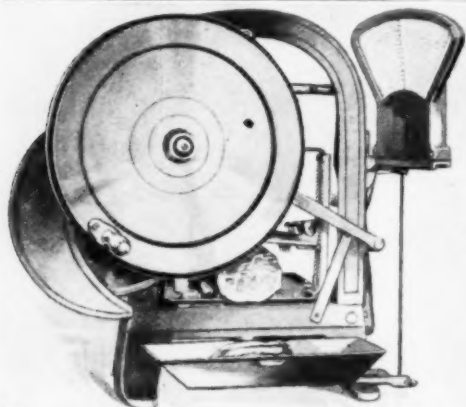
Unwilling to equip his private airdrome with a costly pumping outfit, a western airman has contrived an inexpensive filling station. At the side of his landing field he has built a platform, or tower, a bit higher than the nose of his airplane. By an agreement with the local oil merchant, the big drums of gasoline are delivered upon this platform. This is easily done with the aid of skids from the tailgate of the delivery truck. When the airplane is to be refueled, it is taxied close to the platform, and a hose is stretched from the drum spigot to the fuselage tank. Gravity quickly fills the tank.



The Local Oil Merchant Delivers the Drums of Gasoline to the Top of the Tower, Seen at the Right, and So Makes an Airdrome Pumping Outfit Unnecessary. The Plane is being "Gassed," at the Left

COMPUTING SCALE IS LINKED TO PAN OF MEAT SLICER

The butcher often slights habitually the difficult task of slicing off just so much boiled ham, or other meat, as the cus-



As the Slices of Meat Fall into the Pan of This Machine They Move an Indicator across the Face of the Computing Scale at the Right

tomers requests by adding, and asking payment for, an additional ounce or two. There is no excuse for this practice, however, if his counter is equipped with a meat slicer now marketed. The receiving

pan of this slicer is connected with a computing scale which is in front of the butcher's eyes as he operates the revolving knife. He knows at each instant, in consequence, the weight of meat in the pan.

SUGGESTS MUSEUM FOR FAULTY DESIGNS AND MATERIALS

From an English engineer comes the thought-provoking suggestion that in some technical college there be organized a museum containing specimens, not of achievement and perfection, but of failure and imperfection. Every designer is familiar with certain sorts of trouble, the engineer reminds, yet because of gaps in his experience, is unfamiliar with other kinds which are mere commonplaces to others of his profession. In this museum he could study at will the mistakes of others. The aeronautical engineer would have learned of the corrosion of propeller tips long ago, for example, if he had visited such a museum and there had investigated the pitting which destroys the impellers of centrifugal pumps and the blades in a steam turbine. As other exhibits, the engineer suggests piston rods scored by unsuitable packing, melted firebrick, and so on, almost without limit.

ORNAMENTAL VASE MADE OF 400 POUNDS OF SUGAR

As a monumental decorative piece for the adornment of the dining room during the days of a recent race meet, the chef of a Cincinnati hotel made of confectioner's sugar a huge vase. In this work nearly 400 lb. of the costly material was consumed, much of it being used for the vines, leaves, and wreaths about the pedestal, and for the two handlelike horses' heads which projected from opposite sides of the bowl. In answer to the criticism that such seemingly prodigal waste of sugar was unwarranted in these days of shortage, the proprietor explained that all the sugar would be made available for re-



Almost 400 Pounds of Confectioner's Sugar were Used to Make This Decorative Piece

use by simply melting the vase back into liquid icing. After the meet, in fact, this was done.

[No solder is used for fastening in place the cooling tubes used in a new English form of automobile radiator, and any tube is easily and quickly removed if repair becomes necessary. Special rubber nipples on the top and bottom tank plates receive the ends of the tubes, with sufficient end play so that a tube may be moved slightly endways and lifted out. Manufacturing as well as repair costs are declared to be reduced by the absence of soldering operations.

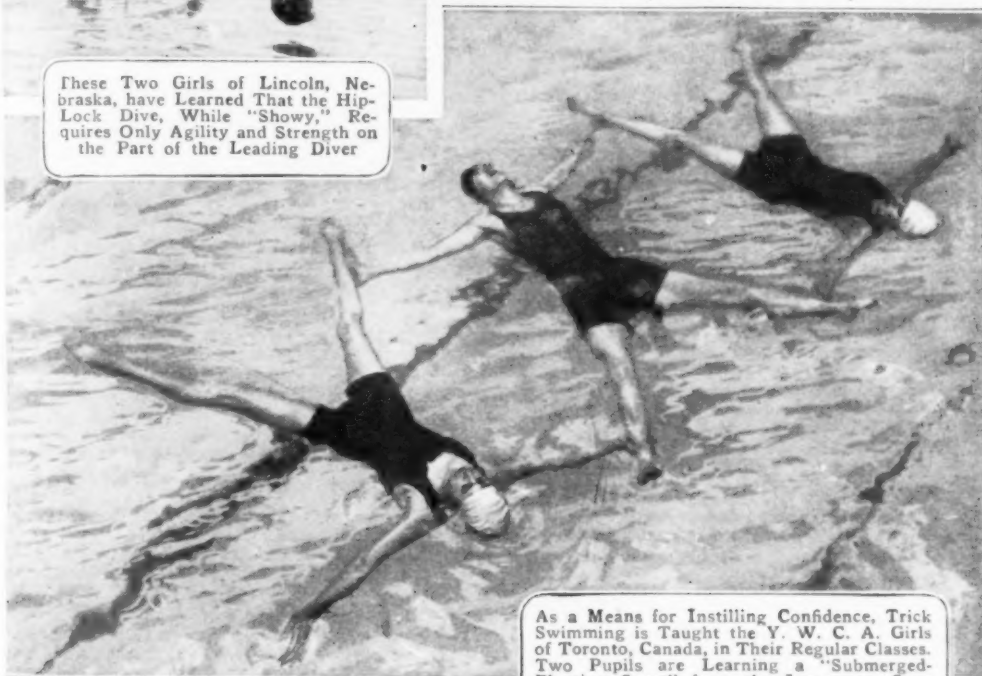
YOUNG AMERICA GROWS AMPHIBIOUS IN SUMMER



These Two Girls of Lincoln, Nebraska, have Learned That the Hip-Lock Dive, While "Showy," Requires Only Agility and Strength on the Part of the Leading Diver



This Legless Veteran has Regained His Pre-War Natatorial Proficiency in the Pool of the Reconstruction Hospital at Washington, District of Columbia



As a Means for Instilling Confidence, Trick Swimming is Taught the Y. W. C. A. Girls of Toronto, Canada, in Their Regular Classes. Two Pupils are Learning a "Submerged-Floating Stunt" from the Instructor, Seen in the Middle



The Life of the American Soldier in the Canal Zone Is Far from All Work and No Play. The Authorities Give Their Encouragement, in Particular, to Swimming and Water Sports. One of the Most Popular of These Is an Aquatic Version of "Pushball," Played, as Shown, with a Ball About Three Feet in Diameter

TAKE SAPLINGS FROM NURSERY WITH U-SHAPED CABLE PLOW

Small trees are removed from a nursery with remarkable expedition by the use



The Stationary Engine and Winding Drum at the Left Pull the Plow at the Right with a Cable, and the U-Shaped Blade Cuts under the Roots of Small Trees and Lifts Them from the Ground

of a novel plow, recently designed for that purpose. The blade is U-shaped, and cuts around and under the tree roots along an entire row at each operation, lifting the trees from the ground. The motive power is a stationary engine geared to a winding drum, and a long cable attached to the plow. Two men, one at the engine and one at the plow, can do more work with this set than a large gang with shovels.

NEW LONG-DISTANCE HONORS FOR WIRELESS TELEPHONE

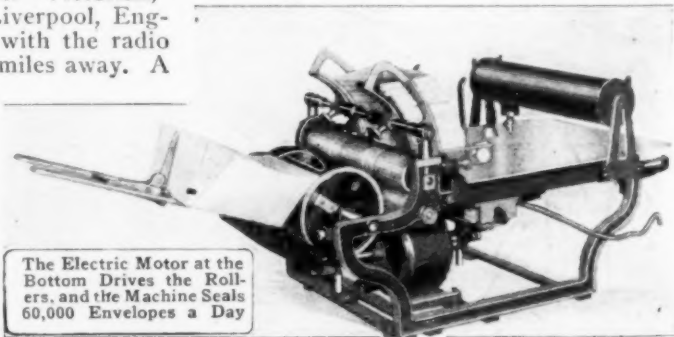
Attempts to telephone through space to a ship at sea met with complete success on July 21, when the steamer "Victorian," on its second day out of Liverpool, England, exchanged messages with the radio station at Chelmsford, 600 miles away. A still greater and unexpected triumph was scored, however, when the station at St. John's, N. F., preparing to pick up the same ship by telephone the next day, heard parts of sentences from the Chelmsford station, recognizing the voice of the operator. The distance is more than 2,000 miles. Later the steamer "Imperator" reported hearing the St. John's station from the Irish coast, 1,500 miles away.

LABORATORY ON WHEELS TOURS MICHIGAN SUMMER RESORTS

The summer hotels, camps, and boarding houses of Michigan were "health" resorts in more than name the past season as a result of a plan proposed by the state commissioner of health. At the suggestion of this official the state organized a corps of analysts and sanitarians, and rebuilt a big motor truck as a portable laboratory. In the vehicle the scientist traveled from resort to resort, stopping at each to examine milk and water supply, to inspect sewage disposal, and to make sure in all other ways that the summer visitor would not be menaced by disease. If no fault was found with conditions, the scientist in charge granted a certificate, to the advertising value of which the proprietor was usually fully alive.

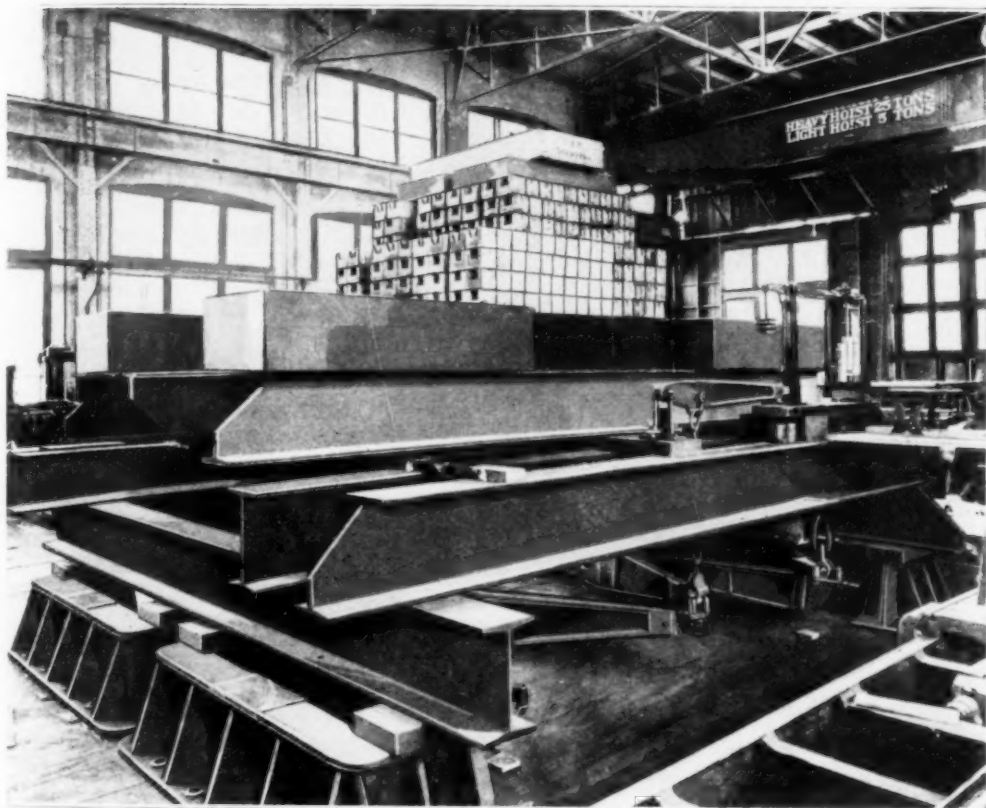
ELECTRIC ENVELOPE SEALER DOES WEEK'S WORK IN DAY

Speed and compactness are characteristics of a new envelope-sealing machine that has recently taken its place among modern office appliances. Occupying a table space only 12 by 14 in., its electrically driven rollers moisten and seal 7,500 envelopes an hour, or 60,000 a day, as many as an expert hand sealer can do in a week. Plain and open-face envelopes, from 6 to 11 in. long and up to 1/4 in.



The Electric Motor at the Bottom Drives the Rollers, and the Machine Seals 60,000 Envelopes a Day

thick, are handled with equal facility, without preparation or adjustment. The machine is especially quiet in operation.



When the Track Scale, Intended for a Monster Grain Elevator, had been Set Up in the Railroad Shop, Standardized Test Weights were Piled upon It, as Illustrated Here, Until a Total Load of 120,000 Pounds was Assembled. Conspicuous Are the Seven 10,000-Pound Weights Belonging to the Bureau of Standards

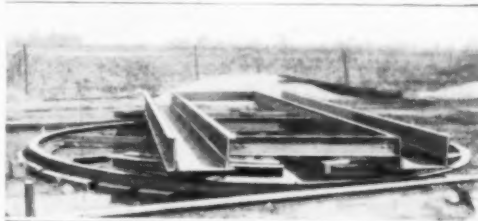
TRACK SCALE FOR ELEVATOR UNDERGOES UNUSUAL TEST

The demand of modern industry for absolute accuracy in methods and machines was never more strikingly exemplified than in the recent testing of a track scale made for a monster grain elevator on the line of an eastern railroad. Upon completion, the scale was set up in one of the railroad shops at Altoona, Pa., under the supervision of the Bureau of Standards. On the platform of the scale were then placed seven of the bureau's 10,000-lb. weights, topped by 50,000 lb. of miscellaneous weights, some owned by the government and some by the railroad. Adding, one finds that the apparent load was 120,000 lb. And so accurate are the standardized weights employed that the apparent total probably differed from the true load by no more than a few ounces.

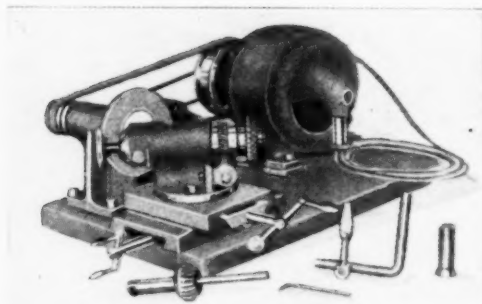
Waste paper was sold in one year by the St. Louis schools for \$17,300, and supplied material for new paper.

TURNTABLE FOR TRUCKS AIDS ROAD BUILDER

A portable turntable of his own design is now being used in Kansas by one contractor to expedite the construction of hard-surfaced roads. This it does by eliminating the usual maneuvering of the big auto trucks before and after they have dumped their loads of material. Arriving at the scene of operations, the truck is simply driven upon the turntable, is turned through 90° or 180°, according as it dumps from the side or rear, and then starts at once for another load.

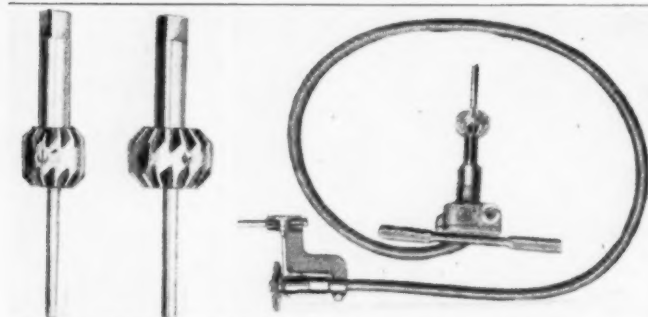


Portable Turntable for Road Building Eliminates Maneuvering of Trucks before and after Dumping



PORTABLE MACHINE REGRINDS AUTO VALVES ACCURATELY

Accurate faces and angles, seldom obtained in regrinding auto valves by ordinary methods, are the particular feature of a new portable machine for that purpose. A $\frac{1}{2}$ -hp. electric motor drives a small high-speed grinding wheel, and, by means of a flexible shaft, a low-speed chuck for the valve. The chuck is set at the desired angle, and the face of the valve may then be moved across the rim of the wheel, or toward it, by turning feed cranks. The valve is finished in a few seconds, and the cutting tool for the valve seat is then ground in the same chuck, assuring an identical angle. No grinding compound is used.



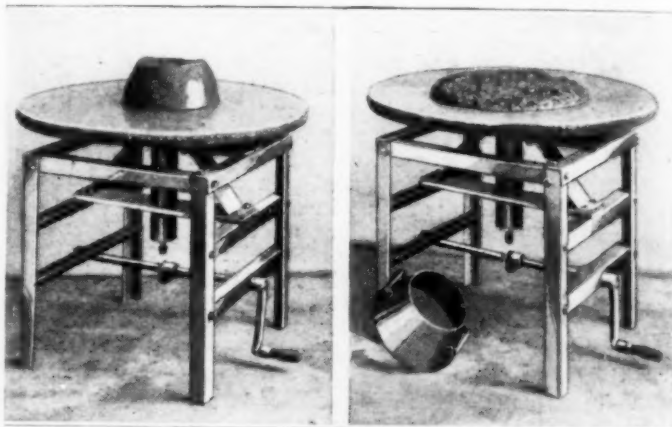
Top: The Electrically Driven Unit of Grinding Wheel and Angular Chuck, Holding a Valve. Bottom: At the Left, Different Sizes of Cutting Tools for the Valves Seats; at the Right, the Flexible Shaft with a Cutting Tool in Its Chuck

☐ The exhaust of an airplane motor is made wholly inaudible, it is asserted, by a new muffler of Swiss manufacture.

FLOW OF CONCRETE MIXTURES TESTED ON ODD TABLE

Tendency of a concrete mixture to flow is dependent on the proportionate quantity of water in it, and has an important bearing upon its ultimate strength and usefulness. A testing table recently devised at the Bureau of Standards gives a definite measurement, called the flowability figure, for each specimen mixture. The round table top is mounted on a plunger, allowing free vertical movement. The shaft of a hand crank below carries a cam which strikes the end of the plunger at each revolution, raising the table top $\frac{1}{2}$ in. and letting it drop. The mixture to be tested is molded in the frustum of a cone, 6 in. high and 8 to 12 in. in diameter, at the table center, the mold withdrawn, and the crank turned 15 times. The extent to which the concrete spreads is its measure

of flow, and its average diameter, divided by the original diameter and multiplied by 100, gives the flowability figure. Since the least amount of water and the lowest flow figure give the strongest concrete, accu-



Left: Testing Table with a Cone Frustum of Concrete Mixture Ready for the Test. Right: The Mixture Spread Out

rate determination of this factor will be of great value. A figure of 150 will serve for material for making bricks, 175 for concrete mortars, and 200 to 225 for reinforced concrete.



The Concrete Diversion Dam in Comanche Creek That Turns the Waters of the Springs into the Concrete-Lined Canals, and through the Numerous Turn-Out Gates, to Irrigate the Big Fort Stockton District

AN AUTOMATIC IRRIGATION SYSTEM

BY W. F. WILCOX

THE Fort Stockton irrigation district in Pecos County, Tex., has the nearest approach to an automatic delivery system that has yet been put into operation. The water comes from springs that gush forth out of the depths of the earth at a temperature of 72°. In the early days these springs—the Comanche springs—supplied the Indian tribe of that name, and later a camping place for the early explorers of the Southwest. Still later, they served a frontier army post known as Fort Stockton.

The waters are now diverted from the bed of Comanche Creek, at a point about 1,000 ft. below the springs, by a concrete dam, and are then conveyed to the lands through concrete-lined canals. For the tract on one side of the creek the water is first taken under the creek bed through a 54-in. siphon. The turn-out gates, of which there are over 50, are so arranged that they can be raised or lowered, and locked, so as to regulate the flow to a hundredth part of a second-foot.

The automatic feature lies in the method of handling the water supply rather than in the operation of the machinery. The flow from the springs being almost constant, the regulation of the delivery of water can be made to a nicety. In the spring, the manager of the irrigation project, knowing the approximate supply for the season, divides this amount into a certain number of equal volumes or "heads."

Each head irrigates the farms of a district, in rotation, for a period of 33 days, and the number of heads is governed by the number of districts in the whole irrigation area. The principal crop grown on the project being alfalfa, which according to local experience should be cut every 33 days, the delivery dates of water

are arranged to come just that often, as stated above. This is done by dividing the entire irrigation tract into districts of equal area and such size that one head of water will rotate around the district in 33 days' time, the farms in the upper part



One of the Several Large Springs That Flow into Comanche Creek, and Supply All the Water for the Fort Stockton Project, Protected from Interference by Concrete and Steel

of each district being irrigated first. When the time for irrigation expires for the first farm, the irrigation period for the next farm begins, and so on, until the

This manner of delivery of water and irrigation on a systematic basis also has to a great extent solved the labor problem. All work of cutting and baling hay may now be undertaken in rotation, and no two men in the same district are irrigating, cutting, or harvesting at the same time. Thus the farmers plan their work accordingly, and men, power balers, harvesting machinery, etc., are kept busy during the entire season.

After the water is started in the spring and the rotation begun, one man handles the entire project, from office work to delivery of water and distribution over an area of 6,000 acres. It has proved to be a big suc-

cess and stands out preëminently as an ideal irrigation system.

BIG MOTOR-TRUCK TRAILER TRANSPORTS EMPLOYEES

A capacious passenger trailer is now operated for the transportation of employees by an industrial concern which prefers this to the maintenance of an automobile bus, which would be used, of course, only in the early morning and at quitting time. The trailer can be coupled to any of the firm's larger trucks; hence



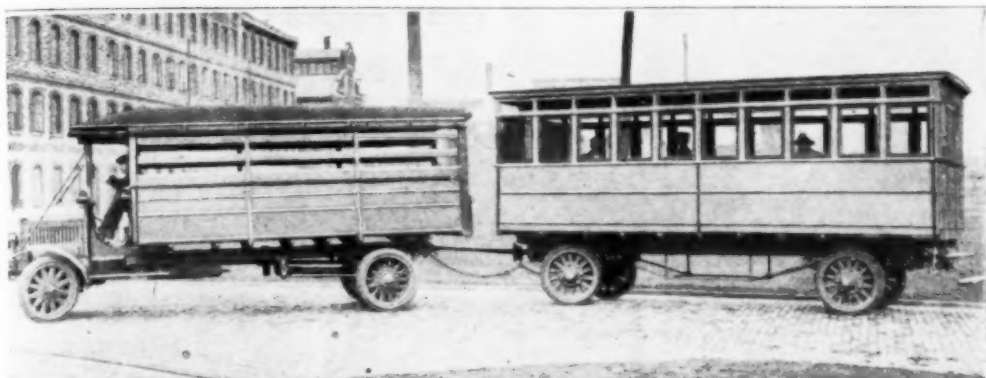
A Concrete-Lined Canal of the Fort Stockton Project under Construction, Leading from the Creek Bed to the Land under Irrigation, with Many Turn-Out Gates and Side Canals

head of water has thus served the whole district, and is ready to start on the next rotation according to prearranged dates.

These dates are fixed by the manager at the beginning of the season, and every farmer within the irrigation area receives a card giving the dates on which he may use the water and for what length of time. This simplifies the work of the management and, besides, furnishes a checking and control system for the use of the water, since each farmer naturally will watch for the arrival of his supply on schedule time and in full quantity.



Just This Side of the Bridge, to the Left, are to be Seen Two of the Iron Turn-Out Gates, Set in Concrete, and Capable of being Raised, Lowered, and Locked in Any Position



Employees of One Industrial Concern are Now Carried to and from Their Work in This Big Trailer. It can be Coupled to Any of the Firm's Larger Trucks, Making the Maintenance of a Passenger Bus Unnecessary. The Capacity Is Approximately 40 Persons

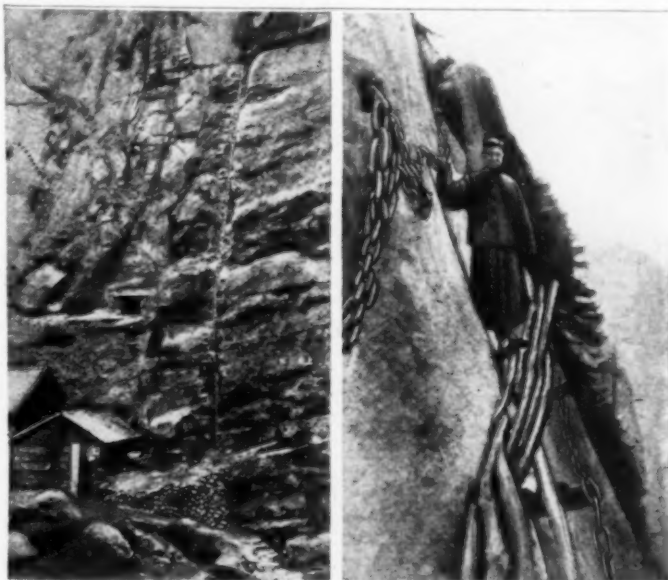
any available truck can be used, and none is withdrawn from regular carrying service for more than a few minutes of the day. The trailer rides comfortably on its long springs, and will accommodate approximately 40 persons on its two longitudinal seats.

CHINESE PILGRIM RISKS LIFE TO CLIMB SACRED MOUNTAIN

Hwa Shan, the mountain sacred to the Taoist religion, and situated about 700 miles inland from Shanghai, China, was recently scaled by two British explorers who have forwarded an interesting report of their experience. They found that Hwa Shan, or the Mountain of Flowers, is an irregular cone of limestone and granite which rises about 6,000 ft. above the great Shensi plain. At the foot is a rest house where each year thousands of pilgrims prepare themselves for the arduous climb which is to propitiate their god, and bring them their heart's desire.

The first half of the journey takes the pilgrim up a long defile, on the right and left walls of which he finds scores of little temples and shrines, hewn out of the solid rock. At these he burns incense and leaves small offerings of money. At the halfway marker there

is a huge temple; and here the real climb begins. One now ascends almost vertically by means of steps or toe holes, cut out of the rock. In one place one wriggles upward through a perpendicular tunnel. On reaching the summit, finally, one comes upon four more temples. To one of these the approach is particularly hazardous, consisting as it does of a 30-yd. "shelf" of boughs, laid on horizontal posts about 18 in. long. These are driven into the face of a precipice that drops away without a break for a quarter of a mile. The huge, rusty chain which serves as a



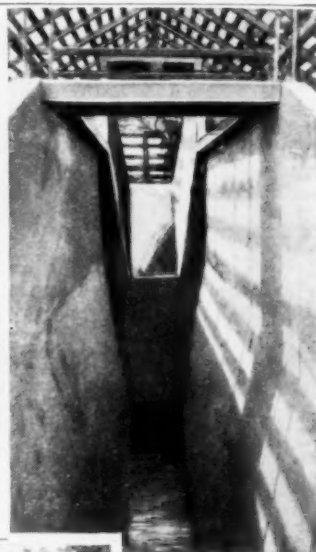
The Approach to One of the Four Summit Temples of Hwa Shan is Seen at the Right. Below the Pilgrim is a Drop of a Quarter Mile. At the Left, One of the Explorers Is Visible above the Roof of a Wayside Temple

handrail actually seems more secure than the structure itself.

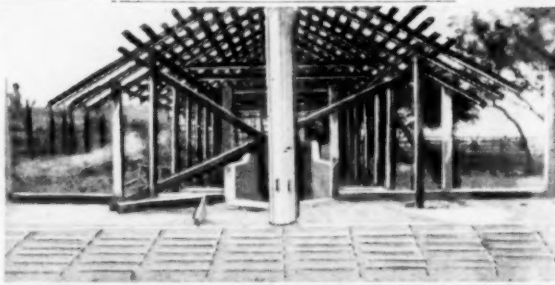
MODERN CATTLE-DIPPING VAT IS BUILT OF CONCRETE



Looking across the Vat at the Exit Stairs That Take the Place of the Usual Unsafe Incline



The Concrete Dipping Vat Itself, with the Inclined Entrance Way Visible at the Distant End



In the Foreground Are the Two Dipping Pens, Before the Fences were Built, and in the Center the Two-Way Arrangement of the Gate Leading from the Vat

The Concrete Walk Approaching the Vat Helps to Clean the Feet of the Cattle before the Dip

Among the cattle raisers of the Southwest, keen to adopt all helpful modern improvements, concrete is finding a variety of uses. One of its most important applications is well illustrated in the recent construction of a concrete cattle-dipping vat on a huge Texas ranch. A corrugated concrete walk 30 ft. long, leading to the entrance, cleans the feet of the animals before their immersion. The high side walls of the vat itself have flanged copings to prevent splashing over,

To assure the dipped cattle a safe exit, the usual incline is replaced by a flight of corrugated stairs, of 4-in. rise and 12-in. tread, slanted down $1\frac{1}{2}$ in. toward the back. At the stair head are two dipping pens, 20 by 40 ft., concrete-paved, with a single gate that opens either while the other is closed, so that one may be filled while the other is draining. Rain water is prevented by a curb from running back into the vat, which is protected by a timber roof.

COMPRESSED-AIR EQUIPMENT DOES WORK OF 40 MEN

An experiment was recently carried out on San Francisco Bay in using compressed air and sand for chipping paint and rust from the interior and exterior of steel steamers. Two men directing two streams of sand against the steel are doing the work that formerly required 40 men equipped with hammers. Not only this, but the new method results in a far better job.

The success of the process has created

such a demand for the equipment, that the owner has installed it on a barge, which can be taken to any steamer while it is anchored in the stream or docked, and the work carried out without interfering with the handling of cargo.

The barge is equipped with air compressors operated by a gasoline engine. Air is piped to two manifolds, one on each side of the barge. Each manifold has 20 connections for 1-in. hose, and two

connections for 2-in. hose. The 2-in. hose lead to the sand-blast tanks. In the first job, these tanks were lowered into the hold of the vessel, but usually they are placed on the deck of the barge. The sand in the tanks is forced through the nozzle on a long hose against the side of the ship. By the use of this equipment it is unnecessary to remove the timbers that are bolted to ribs of the ship, and keep the cargo from the steel shell.

A large hopper for a supply of sand is built in the hold of the barge. From this supply the sand is elevated to two overhead hoppers, and thence runs by gravity into the sand-blast tanks. Bunks for the use of the crew, in case of emergency, are provided in the barge, and there is also a generator for furnishing current for lights on a ship in case this should be necessary.

Not only is the paint and rust knocked off by compressed air, but the ship may be painted by a compressed-air outfit also located on the barge. This equipment consists of a receptacle holding 10 gal. of paint. Two hose lead to the spraying device, which is provided with valves by means of which the spraying device can be adjusted for either heavy or light paint. One man operating this spray is able to

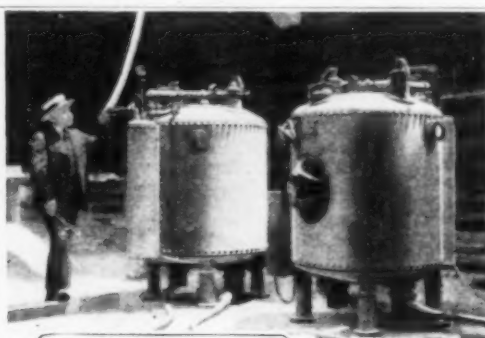


Using the Sand Blast, the Workmen can Clean the Plates of the Hold without Removing the Protecting Timbers

cover more ground than 15 men. The barge is moored alongside of the vessel to be painted, and the spray is either operated from the barge or from the ship. By the paint spray, there is much less paint wasted.



On Each Side of the Barge Is a Manifold with 20 One-Inch Hose Connections



Sand Dropped into These Tanks from the Hoppers is Expelled at High Velocity



At the Right is Seen the Barge upon Which the Sand-Blast Cleaning Equipment has been Installed in Order That It may be Transported Quickly to Any Steamer at Anchor or at Its Pier. The Barge is Equipped, Also, with a Paint Spray, Pictured at the Left

PAPER PULP FROM SAW GRASS

BY HARRY A. MOUNT

IT HAS become axiomatic in the paper industry that there is no substitute for spruce wood in making paper pulp. Thousands of dollars have been spent by manufacturers in an effort to find some mate-

tion of the process. In the first place there is not a sufficient supply of any one material, and it is too expensive to gather corn or cotton stalks from a wide area. The second, and perhaps the most important, difficulty is that, because the material is not compact, only a small amount can be placed in the pulp "digester" at one time, making the production very expensive.

In making spruce-wood pulp, the wood is first chipped and about 12 tons of the chips are placed in a big steel tank in a solution of sulphuric acid. It is cooked under pressure, being constantly agitated by steam, for eight hours or longer, depending upon the grade of paper desired. After this process, the pulp is bleached and then goes to the paper mills.

Of grass, cornstalks, or other similar material, on the other hand, only about four tons can be placed in the digester at one time, and as the same amount of chemicals are required, and the cooking consumes just as much time, this step in the manufacture is altogether too costly.

The first objection—that of insufficient supply—at first applied even to saw grass, for although there is an enormous quantity, it grows in almost inaccessible swamp lands, and cannot be harvested by ordinary methods. With the later development of a special harvesting machine, a



Gathering Saw Grass in the Florida Swamps, Where Some 6,000,000 Acres Produce Two Crops a Year, Yielding 20 Tons of Paper to the Acre. The Plant Is Richer than Spruce in Cellulose Content

rial to replace the rapidly diminishing supply of spruce, without result. And so they have received with a great deal of skepticism the recent announcement that a satisfactory paper can be made from the saw grass of Florida, and that a practical method of production has been developed. Recently a company has been organized, however, and plans are now going forward for building a pulp mill with an initial capacity of 25 tons a day in the saw-grass belt.

Engineers connected with the enterprise say that a preliminary survey reveals that there is in Florida nearly 6,000,000 acres of saw grass. This can be harvested twice a year, yielding 20 tons of paper per acre to each cutting. It would seem therefore that Florida might eventually furnish paper to the whole world, for it is claimed all grades of the commodity, from building papers and cardboard to the finest writing papers and vellums, can be made from the grass.

It is not surprising, in the light of past experiments, that relief to the present paper situation should come from such a source. Fiber suitable for paper making has been produced from a number of plants, among them corn and cotton stalks. The pulp from these sources has been made only on a laboratory scale, however, because two chief difficulties stood in the way of commercial exploita-



A Handful of Unbleached Pulp Made from the Florida Saw Grass, and Suitable for Conversion into Paper

model of which has been successfully operated, this objection seems to have been eliminated. This machine is an amphibi-

ous modification of the wheat harvester that works equally well on land and water, its cutter bars being so arranged that they can be lowered beneath the water as much as four feet, if necessary.

The second difficulty — inability to get a sufficient quantity of material into the digester — has been removed by an entire revision of the pulp-making process. Different chemicals are used, and in order to get a large quantity of grass into the digester, it is first put through a shredder and reduced to a mass, of which 12 tons or more can be treated at once.

When this pulp comes from the digester, it is a very dark mass of long tough fibers, which must be bleached, and in this process such powerful chemicals were, at first, required that the fibers weakened. It is claimed, however, that with a bleaching agent now in use, the fiber comes out of the process tougher than the original unbleached material. By varying the pulping process, any desired grade of pulp can be obtained.



Three Steps in the Process: Left, the Short Lengths of Raw Grass; Center, the Digested but Unbleached Pulp; Right, the Bleached Pulp Ready for the Mill

According to the engineers, pulp of the quality used for "newsprint" can be produced from saw grass at a cost of \$15 a ton, or about one-eighth of the present market price of spruce pulp. The company plans first to demonstrate the possibilities of the product on a commercial scale, and then to lease portions of the

grass areas controlled by it to paper concerns, which will be licensed under patent rights to use the new pulping process.

The plant itself is a hardy perennial, familiar to everyone who has visited Florida. It is apparently immune to destructive pests and even repels animals with its sharp sawlike edges. It requires no cultivation, and is rich in cellulose content, having about seven per cent more, weight for weight, than spruce. Its long tenacious fiber permits higher speed at the paper mill than spruce pulp.

Sample runs of the paper have been made by the Bureau of Standards, and some commercial mills, and these are declared to have been satisfactory.

FIELDS OF LUZON IRRIGATED BY WHEELS OF ANCIENT TYPE

The towering water wheels used for centuries to irrigate the valley of the Euphrates River have their counterparts, it is surprising to learn, in the wheels used to this day by the native farmers of northern Luzon, P. I. Like the wheels of Mesopotamia, those of the Philippines are rudely made of branches and tree trunks; yet they often measure 30 and 40 ft. in diameter. The water buckets are made of bamboo, though, and not of clay. Another difference is that, while the ancient wheels emptied into stone aqueducts of picturesque and permanent construction, the wheel of Luzon usually tips its load into a bamboo trough supported on an unstable structure of spindling

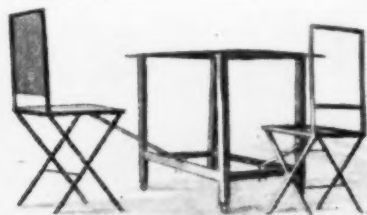
poles. From the trough the water is diverted to the fields as required. Though inefficient, when judged by modern standards, this primitive system irrigates abundantly and satisfactorily the small farms of the region.



This Water Wheel, Reminiscent of the Type Used in the Historic Valley of the Euphrates, Elevates Water to the Bamboo Trough, Whence It Flows to the Fields of a Philippine Farm. This Primitive System Works Satisfactorily

FOLDING DINING-ROOM SET IS COLLAPSED AS UNIT

A newly invented dining-room set, though fit for use in private homes, is



The Chairs of the Folding Dining-Room Set are Attached by Steel Strips to the Leg Braces of the Table



Left: The Chairs have been Folded under the Table Top. Right: The Table Itself has been Folded

meant particularly for service in restaurants and public halls, where the furniture

must frequently be removed and stacked, that the floor may be clear for dancing and similar social activities. Two chairs and a square-topped table compose the set, or unit. The chairs are of collapsible steel construction, and are attached by adjustable steel strips to the leg braces of the table. The table also is collapsible by virtue of its folding top and braces.

SUNKEN-GARDEN BEAUTY SPOT MADE FROM UGLY GULLY

Ornamental gardening, always interesting and worth while, is doubly so when it transforms an eyesore into a beauty spot. A certain residential district in the suburbs of an Ohio city was afflicted with an ugly clay gully, 335 ft. long and at one point 267 ft. wide, a disagreeable contrast to the sightly homes and lawns of the neighborhood. After a tentative planting of shrubbery had shown the way, the residents attacked the problem with vim. The work of a year, now completed, has made the former disfigurement a veritable sunken garden, with formal flower beds and terraces, rough hickory pergolas loaded with blooming ramblers, and a rustic stone fountain where once was a muddy spring. The practical side of gardening is shown by the use of creepers, rooted into the sloping sides, to prevent erosion and maintain the symmetry of the new landscape.



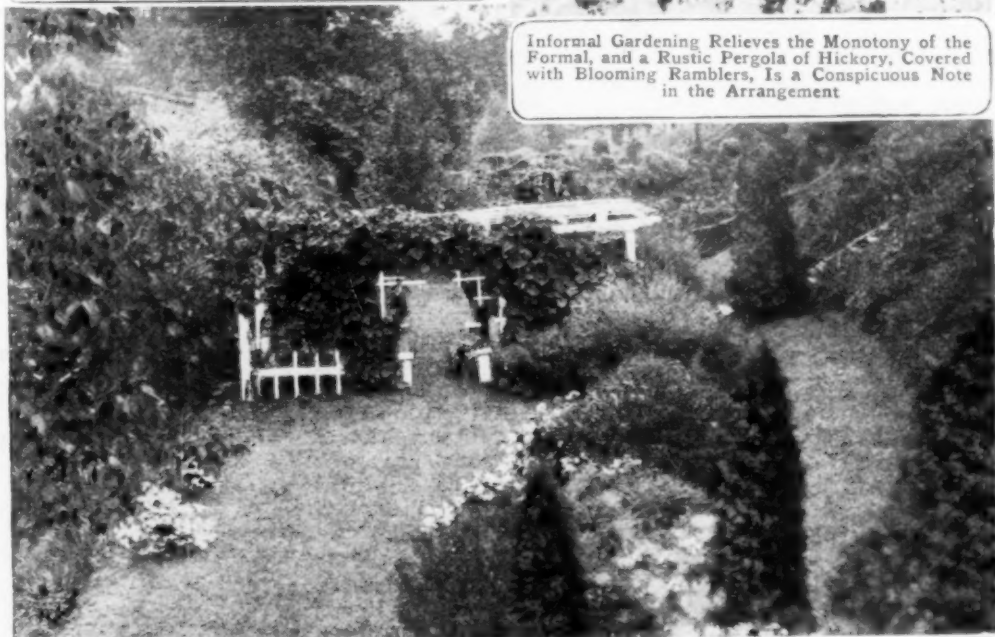
A View in the Clay Gully, Formerly Ugly, after Its Transformation into a Beauty Spot: Formal Gardens have Displaced the Original Tangle, and the Rock Fountain Was Once a Muddy Spring



General View across the Newly Made Sunken Garden, the Product of a Year's Work in an Unsightly Clay Gully: The Treatment of the Sloping Sides by Planting Creepers, to Prevent Erosion, Is a Practical Touch



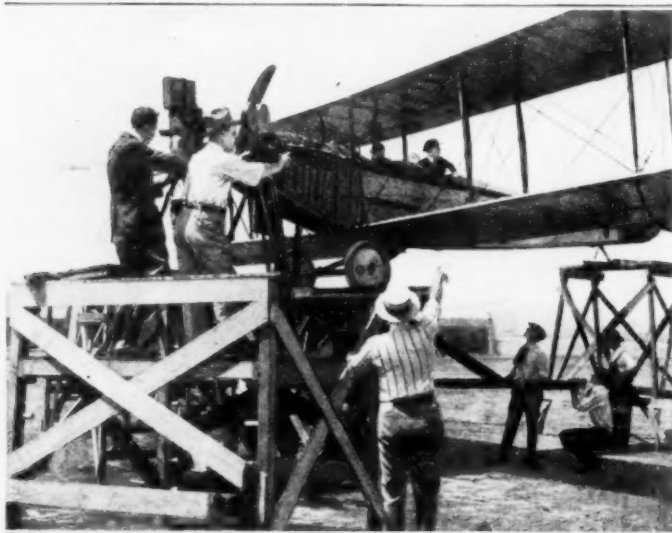
Informal Gardening Relieves the Monotony of the Formal, and a Rustic Pergola of Hickory, Covered with Blooming Ramblers, Is a Conspicuous Note in the Arrangement



Formal Masses of Foliage, Random Bits of Evergreen, and Frank Sweeps of Grassy Turf Make It Difficult to Imagine the Original Tangle of Weeds and Unsightly Scars of Clay. The Beauty of the Little Park, Which Measures 335 by 267 Feet, Is a Splendid Example of the Improvement That can be Accomplished by Neighborly Cooperation

PICTURE OF PLANE IN FLIGHT TAKEN WITHOUT DANGER

Hazardous feats are merely duties to motion-picture actors and camera men, but it does not follow that danger always



Filming an Airplane in Flight without Leaving the Ground: One of the Levers Used for Swaying the Machine can be Seen underneath the Wing at the Right in the Picture

attends the photographing of thrilling screen scenes. For example, when a western-coast director recently required a close-range front view of a flying airplane, containing a pilot and a passenger, he simply mounted a biplane on a pivoted platform, about 10 ft. high, placed cameras on a rigid scaffold in front of the machine, started the airplane motor, and, while assistants swayed the plane from side to side, filmed a realistic picture without risking the life of anybody concerned.

BRAKES AND SCUTCHES FLAX IN ONE OPERATION

Two operations ordinarily performed laboriously by hand in the cleaning of flax, braking the retted stalks and scutching the braked bark from the fiber, are successfully performed at one time by a new machine now used in Europe, at one-tenth the cost of the manual process. The brake consists of a series of 31 pairs of rollers, from which the flax passes directly to the scutcher. The machine is declared to produce 88 lb. of clean flax from 440 lb. of retted stalks in an hour, the resulting fiber and tow being of unusually good quality.

WATER ROBS AIR OF OXYGEN AND MINE LIGHTS SUFFER

A certain large copper mine in northern Michigan operates all its machinery by compressed air, which is obtained by turning a river into a 300-ft. shaft. The falling water carries an abundance of air with it, and then passes out through a tunnel, leaving the air in its chamber. The system is economical, but unfortunately it is found that the water absorbs about one-sixth of the oxygen from the air, reducing its content from the normal 21 per cent to 17½ per cent. This does not discommode the workers, because the human breathing apparatus automatically works enough faster to compensate for the depletion, though the miners do perspire rather more freely than usual. The effect on the candle and other flames used for

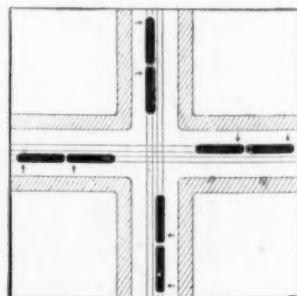
illumination, however, is quite serious. A candle burns four times as long as in the open air, but gives only one-fourth the light. Practically the same is true of acetylene flames. Even a match resists the effort to light it.

BALTIMORE STREET CARS RUN ON TWO-CAR-STOP PLAN

To expedite the passage of its cars through the shopping section the street-railway company of Baltimore, Md., has lately put into effect in this area what is

called the two-stop plan of operation. In the past, as in other cities, it has been the practice for each car to discharge and load its passengers only when in position at the crossing.

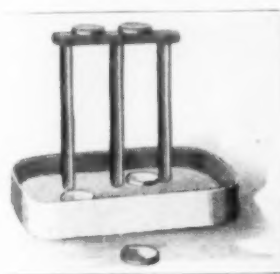
Moving off then, it permitted the following car to advance to the same spot. Under the new plan, however, the second car will



not wait for the first to move off, but will discharge and take on its load with the first. When the traffic officer blows his signal, the two cars will start simultaneously, and will cross the street intersection together. Signs on the poles and white arrows on the pavement will help the public to accustom itself to this new system.

NEW GAME PLAYED WITH DISKS AND TABLE OF ODD FORM

A recreational game of recent conception, characterized by the inventor as a "cross between horseshoes and marbles,"



is played with five papier-mâché disks, about 2½ in. in diameter, and a "table," 8 in. wide and 12 in. long. Around the edges of this table extends a "fence," 1¼ in. high; from the center line rise three rods, each 9 in. high, and all topped by a single crossbar. When the game is to be played, the table is placed upon the floor or lawn, and the players place themselves behind a line 15 ft. distant. In rotation, then, they toss the disks toward the table in an attempt to land all of them inside the fence or upon the bar.

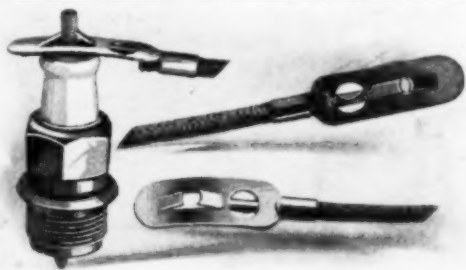
EARTH'S OIL IS DISTRIBUTED IN PORES, NOT POCKETS

References to "lakes" or "streams" of oil are frequently made by persons unfamiliar with petroleum geology, or by those who wish to mislead them. The fact is that a so-called "pool" of oil consists really of a mass of sand saturated with it, or an area of crystalline limestone or porous rock containing oil in its pores. No subterranean hollow filled with oil, such as the novice pictures, ever has been found, and the locations of existing dry wells clearly proves the absence of any channels connecting the pools.

ONE-PIECE CONNECTOR FITS ANY SIZE SPARK PLUG

An electrical connector made out of one piece of sheet metal, so shaped that it will fit any size of terminal screw in tight contact without a nut, is just being

put on the market by an Ohio concern. An H-shaped slot in the metal is pressed



Left: The New Connector on a Spark Plug. Right: Its Appearance When Removed from the Screw

down over the screw, the projecting edges bending up against the threads, where a slight turn tightens them. Curving the metal by pressing on the ends releases the edges for removal. The connector is intended particularly for spark plugs.

LARGE TOURIST TRADE MAKES ISLANDERS EXPERT BOATMEN

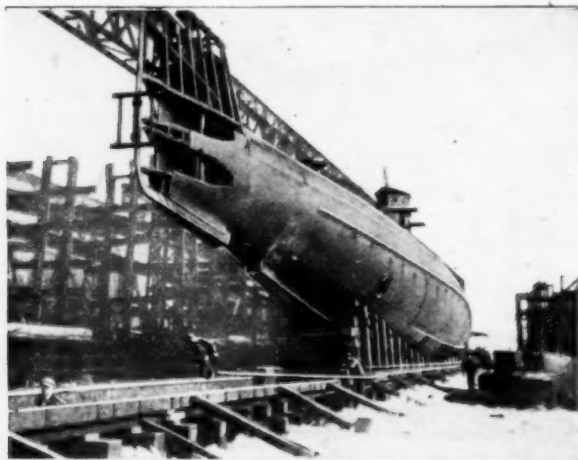
The prosperity of the picturesque island of Capri, in the Bay of Naples, Italy, depends mainly on the tourist trade; and most of the 30,000 foreigners who visit the spot each year are chiefly desirous of inspecting the sea-floored grottoes that pierce the cliffs of the coast. In consequence, most of the male inhabitants are expert oarsmen. In the accompanying photograph a group of them are being towed to work by a Neapolitan steam launch.



A Group of Boatmen are being Towed to One of the Grottoes Which the Tourists will Inspect

HUGE SUBMARINE RAILOADED CLEAR ACROSS SHIPYARD

Because of peculiar shipyard conditions, a huge U. S. submarine of the "S" type,



A United States Submarine, under Construction, being Rail-roaded across the Shipyards on Special Ways Preparatory to Its Launching

recently built at an eastern port, was put on the stocks some 200 ft. from the water. To prepare for its launching, special ways were laid across the yard, and a cradle constructed under the hull. Then, using the shipyard's overhead traveling crane as a tractor, the big steel ship was skidded along the well-greased ways at the rate of 10 ft. a minute. Cooling of the grease at the halfway point caused the only interruption.

CONCRETE PIPES REINFORCED WITH WORN-OUT WIRE ROPE

Interesting methods of manufacturing reinforced-concrete pipes have lately come into use in the mining districts of South Africa. Discarded wire ropes from a great accumulation are separated into their strands, and rewoven into a cylindrical mesh for the inside of the pipe molds. The centrifugal process is used, the molds being revolved until the concrete, made with crushed stone from the mines, is evenly distributed and the water separated out. Not over nine minutes is required to make six 4 or 6-in. pipes, 15 minutes for four 15 or 18-in. pipes, and 20 minutes for the 60-in. size. The finished pipes stand pressures up to from 210 to 350 lb. per square inch, according to size, and then fail only by becoming porous.

CHINESE TASTE FOR FOSSIL TEETH HINDERS SCIENTISTS

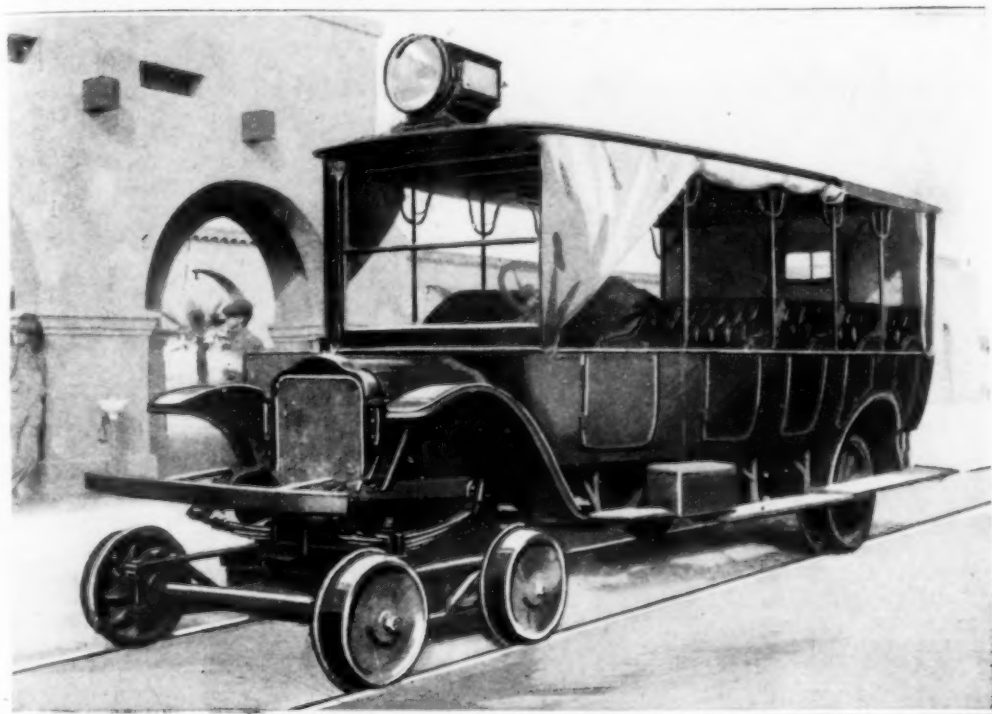
The search for Chinese fossils—so important because of the growing belief that the human race evolved from the animal upon the plains of central Asia—is hindered most, according to a member of the Chinese Geological Survey, by the native belief that fossil teeth have a definite medicinal value. As "dragons' teeth" they are carried in stock by every Chinese "drug store." Bought here by the ailing native, the teeth are crushed to a powder and swallowed, sometimes dry, sometimes in sour wine. The commercial value of the article is high, in consequence, and the scientists experience the greatest difficulty in learning from the native the locations of the fossil beds. It has been found necessary, in fact, to start a campaign of education with the object of teaching the Chinese that undamaged fossil skulls can be sold for more money to the foreign geologist than their shattered fragments will bring from the local dealer.

HAYRAKE USED TO CLEAN PUBLIC BATHING BEACH

Careless picnickers and bathers daily throw such a quantity of lunch boxes, and similar rubbish, upon the sands of a public beach on the California coast that the city has now equipped the caretaker with a farmer's hayrake. Mounted on this and driving a team of mules, he rides up and down the beach every Monday morning to harvest the week's accumulation. At least two wagons are always required subsequently for the final removal of the stuff.



This Hayrake was Bought by a California City for the Weekly Removal from the Beach of the Rubbish Left by Careless Picnickers



Formerly a Sight-Seeing Auto Bus, Now a Railroad Day Coach in Arizona, Equipped with a Freight-Car Truck in Front, Flanged-Steel Rims on the Rear Wheels, and a Regular Locomotive Headlight on Top

OLD SIGHT-SEEING AUTO IS NOW RAILROAD DAY COACH

On a railroad in Arizona, where the protection of passengers from cold and rain needs little consideration, a curious self-propelled day coach is running. Once it was a sight-seeing bus, traveling the highways with a 21-passenger body on a motor-truck chassis, and it is not greatly changed for its new duties. The entire front axle has been replaced by a four-wheel freight-car truck and bolster, and the rear wheels now have flanged steel rims, while mounted on the top, in front, is a 150-cp. locomotive headlight. This odd gasoline-driven unit is capable of 40 miles an hour.

TEST TWO ROOF VENTILATORS ON SAME BUILDING

Placed side by side on the roof of a building in a western city, two unusual types of ventilators are being tested in a practical way to determine which is the more efficient device. Both contrivances are intended to prevent down drafts. One is a stationary appliance, comprising an upright gooseneck pipe, about 12 ft. high,

while the other includes a pipe of approximately the same height, on top of



Practical Ventilator Test: Two Gooseneck Devices Are Visible, While between Them can be Seen One Equipped with a Revolving Hood

which is attached a revolving vane-equipped hood, designed to be turned by the wind.

NEW RAILROAD ACROSS THE ANDES IS MADE UP OF GRADES AND CURVES

For a short line, really little more than an important spur connecting the rich coffee lands east of the Andes with the trunk roads of the South American table lands, a new railroad now under construction in Bolivia is remarkable in many ways. The road, of 39.37-in. gauge, has its western terminus at the city of La Paz, which is 11,811 ft. above sea level. Only about 16 miles out, the line crosses the ridge of the Cordillera Mountains through a pass of 15,223-ft. altitude, making an average grade of four per cent for the entire distance.

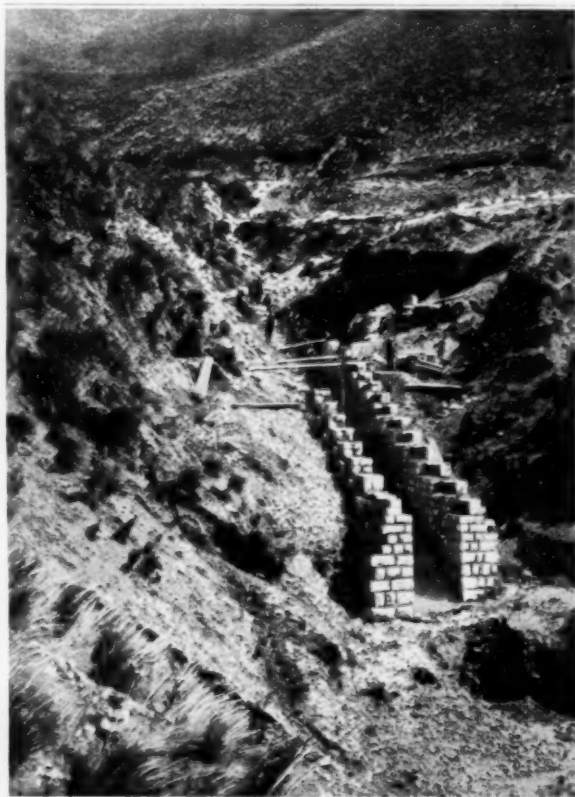
When the ridge is passed, the right of way proceeds to drop into the valley with still greater precipitousness. But in spite of the grade, the engineers have managed to escape from the system of switchbacks com-

monly used to solve such problems, and in a series of horseshoe curves laid out on

a radius of 196.86 ft., and so frequent that no stretch of track lies straight for more than $2\frac{1}{2}$ miles, a descent of 3,937 ft. is negotiated. At 62 miles a level of 3,609 ft. is reached, making a total drop of 11,614 ft., accomplished in less than 47 miles. The unusual height of the cuts, the formation of the slate rock through which they pass, and the great number of valleys and gorges, both deep and wide, that must be bridged, give the engineers a constant succession of interesting problems.

The new road will use locomotives built in the United States, but it is the intention eventually to electrify the whole project, as the water power immediately adjacent to the right of way is

ample for that purpose. Completion of the first 50 miles will accomplish much in the way of opening to commerce a region producing great quantities of cocoa, fruits, woods, and other valuable crops, besides the coffee for which it is already famous. The head of navigation on the Beni River is the goal of the engineers, establishing a rail-and-water route from Arica, on Chile's Pacific coast, to Para, Brazil, on the Atlantic.



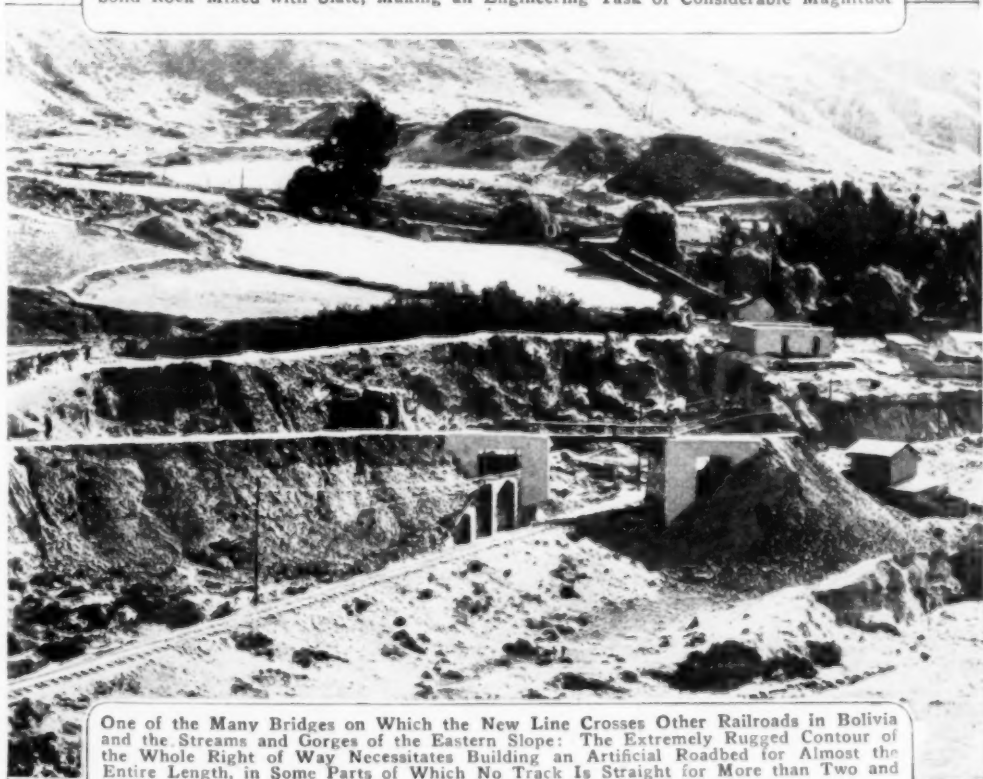
View in the Cordillera Mountains, Giving a Good Idea of the Rough Country Traversed and of the Type of Masonry Construction Employed for the Culverts and Retaining Walls



One of Many Houses Built at Intervals along the Surveyed Way of the New Road, as Living Quarters for the Construction Gangs Employed



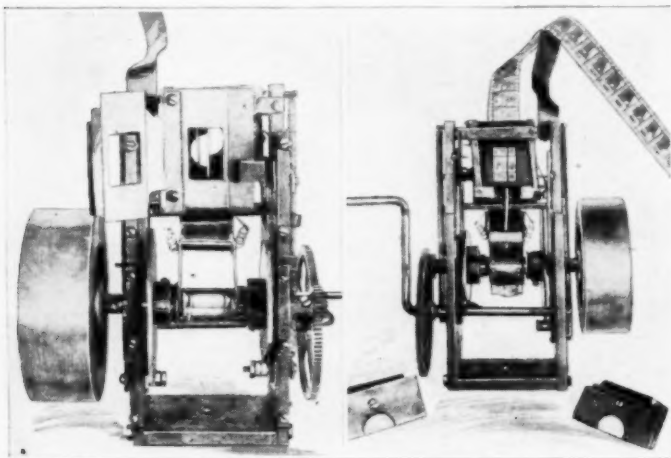
A Finished Roadbed of the New South American Railroad, Which Crosses the Cordillera Range of the Andes Mountains, from La Paz, Bolivia, to the Rich Coffee Lands of the Yungas District: This Section, a Few Miles Out of La Paz, is Cut and Filled in Practically Solid Rock Mixed with Slate, Making an Engineering Task of Considerable Magnitude



One of the Many Bridges on Which the New Line Crosses Other Railroads in Bolivia and the Streams and Gorges of the Eastern Slope: The Extremely Rugged Contour of the Whole Right of Way Necessitates Building an Artificial Roadbed for Almost the Entire Length, in Some Parts of Which No Track Is Straight for More than Two and a Half Miles

USES SPLIT LENS TO PROJECT MOVIES WITHOUT FLICKER

In ordinary motion-picture projection, "persistence of vision" is relied upon to bridge the gap between individual pictures, during which the shutter is closed.



Back and Front Views, Respectively, of the Projection-Machine Motion Head, Equipped with Two Half Lenses Which Move Alternately with the Film: The Shutter is Seen Dismounted at the Right. The Machine Has a Speed of Four Pictures a Second

The result is the well-known and objectionable "flicker." A Kansas inventor eradicates this fault by changing the whole system, keeping a practically constant picture on the screen without a dark interval. The film is moved continuously instead of intermittently, the projection

lens moving with it. The novel feature of the machine is the use of a lens split vertically into two halves, each functioning as a complete objective. The half lenses move alternately with the film, taking care of alternate pictures. For light, an alternating-current arc is used, with horizontal carbons, making two craters and virtually two sources of light, one for each half lens. A simple shutter dissolves each picture into the one following, by covering the returning half lens. A speed of but four pictures a second, instead of 16, gives good results with this system.

DOCK'S FIRE TOWER MOUNTS SWIVELING NOZZLE

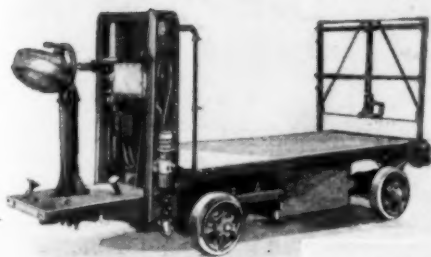


The Swiveling Nozzle on the Top of This Movable Fire-Fighting Tower is Connected to Any of the Fire Hydrants with Which the Docks are Equipped. The Nozzle is Swung Easily in Any Direction

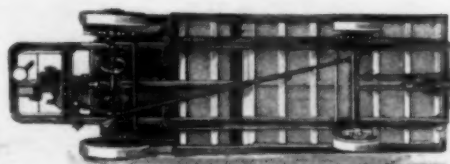
The wooden docks and warehouses at one ocean terminal are now protected against fire by a portable wooden tower, at the top of which is mounted a swiveling nozzle. This nozzle is about three feet long, and is so counterbalanced that it is easily swung in any direction. The tower mounting of the nozzle adds greatly to its effectiveness by enabling the stream to clear all ordinary obstructions. If, as has happened, however, the blaze is at a considerable distance, the tower is pulled by a freight-handling tractor from its central to a more advantageous position. A short length of hose then connects it with one of the numerous hydrants with which the docks are equipped.

WORKING PARTS OF NEW TRUCK REMOVABLE AS UNITS

An electrical truck for use on docks, in railroad terminals, etc., and now being manufactured in quantity by a British firm, is characterized by several interesting features, but chiefly by the fact that the working parts are assembled in complete units. The motor, the traction axle,



With the Driver's Seat in the Position Shown Here, the Brakes Are On and the Operating Circuit is Broken



One of the Trucks Turned on Its Side, to Show the Four Wheels, with All of Which Steering is Done

or the battery container, can each be removed and replaced, for example, without disturbing any other unit. A second feature is the standardization of parts, which allows a user to operate a large and varied fleet of these trucks with a minimum stock of spare parts. The saddle seat for the driver is noteworthy, too, in that it is so linked to the brakes and to the controller that,

when he seats himself, the shoes are released and the controller cut-off is brought into operating position. When the driver rises from his seat, the brakes are applied automatically, and the current is broken. Steering is done by means of all four wheels, finally, making for maneuverability on crowded platforms.

SMALL GRAIN DRIER NOW MADE FOR FARMER AND MILLER

Heretofore, though huge grain driers have been used at large elevators and warehouses, the farmer and small miller have found it difficult to dry satisfactorily their wheat, corn, buckwheat, and similar grains. But now an efficient machine of few parts and easily installed has been placed on the market for their use. It is a boxlike, cast-iron affair, in the bottom of which is a grate for a coal, wood, or cob fire. In the top is an iron cylinder, which is lined with helical strips, to stir



The New Electrical Truck is Characterized Chiefly by the Fact That the Motor, Battery Container, and Other Parts, Are Independently Removable Units. This Makes for Quick Repair and Minimum Loss of Operating Time

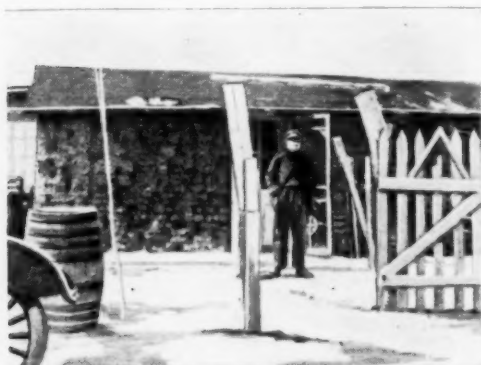
the contents, and mounted on a horizontal shaft. At one end of this shaft is a pulley which is connected by a belt to an engine of $\frac{1}{4}$ to $\frac{1}{2}$ hp. To operate the drier, the farmer lights a fire upon the grate, and pours the grain into the cylinder by means of a chute in the front of the machine. He then regulates the temperature to about 150° F., and the speed to about 20 r.p.m. At the end of the drying period, which may vary from 20 minutes to two hours, the grain is removed through a door beneath the filling chute. If installed according to directions, the drier can be used in the most combustible building without danger of fire.



The Grain Drier is Shown in Side, Three-Quarter, and Front Views. A Part of the Front has been Removed, at the Right, to Show the Interior of the Iron Cylinder. At the Left is Seen the Grate for the Fire of Coal, Wood, or Corncoals

FARMER'S SOD HOUSE HAS ALL MODERN IMPROVEMENTS

If any artificial dwelling is more primitive than a log cabin, it is a sod house. Many early farmers of the western plains



A Kansas Sod House, Built in the Early Days, but Now Modernized by Electric Light and Running Water

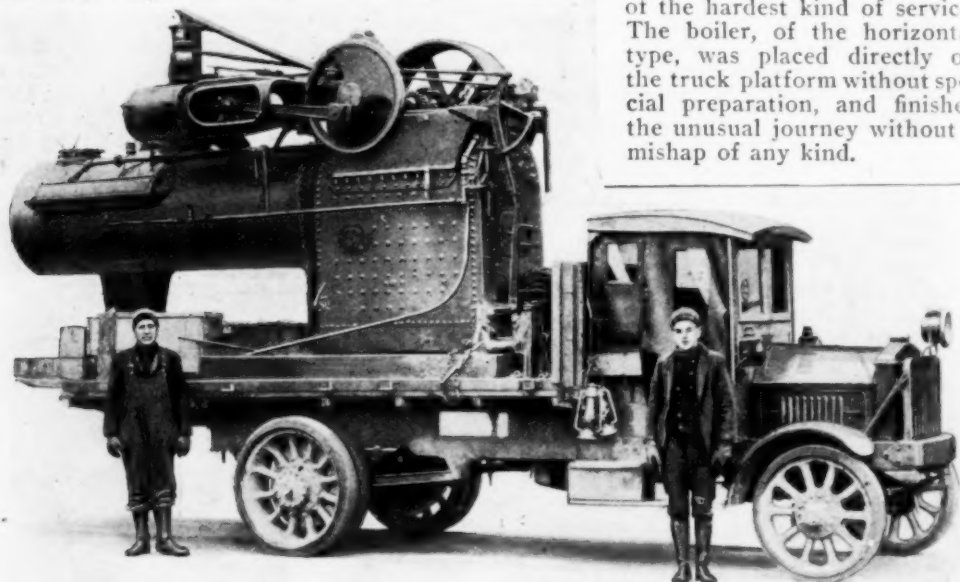
had no choice in the matter, however, and built their homes of the only available material. On one farm in northwestern Kansas the old "soddy" not only still stands, but the owner, now prosperous, continues to live in it. But he has fitted it with a small electric-light plant and provided running water and other modern conveniences.

HOLLAND-ENGLAND AIR LINE CROSSES FOUR FRONTIERS

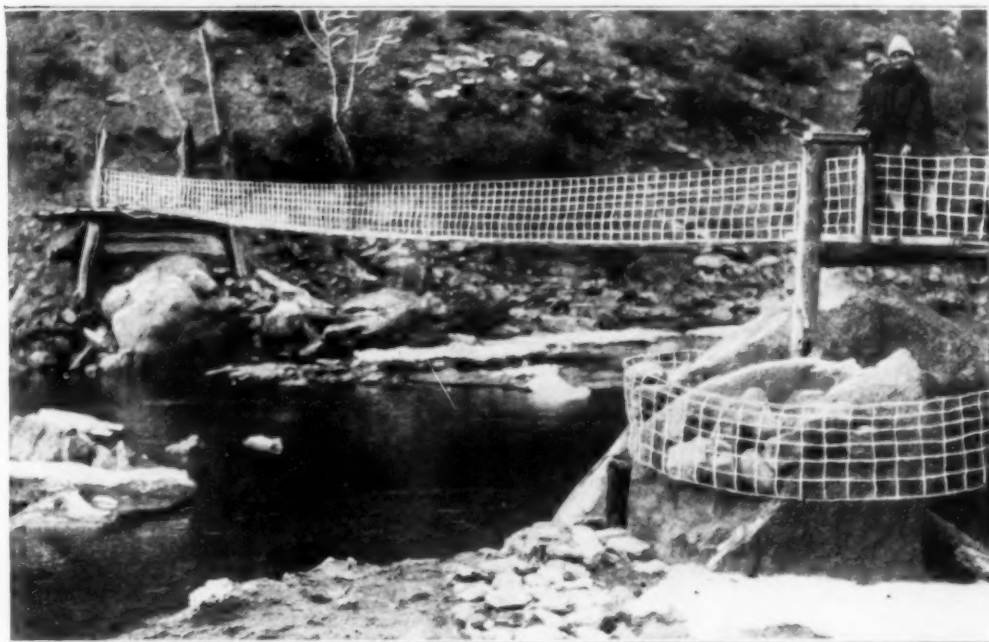
One circumstance, according to an American traveler who recently took the trip, makes peculiarly interesting the new commercial air route from Amsterdam, Holland, to London, England. Appreciated particularly by those who have been pestered for years by frontier and customs officials, it is that the airplanes cross without a stop four national boundaries. Instead of striking across the North Sea, and straight for London, that is, the route follows the coast for about 175 miles, or to Calais, where it turns sharply to the right, and crosses the Channel to London. To make this journey, the swift planes used require only two and a half hours, or less than one-sixth the time of a voyage by boat and train.

EIGHT-TON BOILER CARRIED SEVENTY MILES ON TRUCK

An engine boiler weighing 16,200 lb. is no ordinary load for a motor truck, without trailer assistance, even on city streets. Carrying such a burden over 70 miles of country road is something of a transportation feat, and the ease with which an Ohio hauling concern disposed of the job testifies to the reliability of the modern truck. The one used, far from being new, had already seen three years of the hardest kind of service. The boiler, of the horizontal type, was placed directly on the truck platform without special preparation, and finished the unusual journey without a mishap of any kind.



An Engine and Boiler Weighing 16,200 Pounds, Carried on an Ordinary Motor Truck over 70 Miles of Country Roads, without the Assistance of a Trailer or Any Special Preparation for the Long Trip: The Motor Truck had Already Seen Three Years of Hard Service



Ordinary Woven-Wire Fencing Was the Material Chiefly Used in the Construction of This Suspension Bridge across a Deep Trout Stream in Northern Colorado. Six-Inch Boards, Woven into the Horizontal Width of Wire, Serve as Cleats for the Floor. The Pier Posts are Braced by the Large Boulders Seen on Either Shore

SUSPENSION BRIDGE MADE OF WOVEN-WIRE FENCING

Woven-wire fencing was the material chiefly used by a Coloradoan in building a 50-ft. suspension bridge across a deep trout stream in the northern part of his state. He accomplished the construction practically without assistance. As piers, large boulders were rolled into position on either bank; and back of each were erected two heavy uprights with a horizontal crosspiece. Between these crosspieces was then stretched a width of fencing. This was drawn taut and securely anchored, after 6-in. boards had been woven into it laterally and at regular intervals. To these boards the floor was nailed. For additional strength, and as a handrail, a width of fencing was stretched vertically on each side, and tied to the horizontal span.

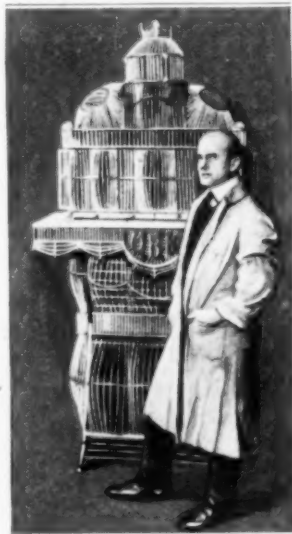
SWIMMING POOL BECOMES THEATER AUDITORIUM

A great outdoor swimming pool near New York City was drained recently and transformed for the evening, by the addition of seats and a stage, into a theater. The play was presented by amateurs from the city for the purpose of raising the mortgage on the Navy Club building.

ORNAMENTAL WICKER BIRDCAGE MEASURES SEVEN FEET TALL

An ornamental birdcage of perhaps unrivaled size was recently completed by an artisan of Chicago.

Rising to a height of seven feet, it consists of a stand, a tray, or top for the stand, and the cage itself. All these are made of wicker and veneered maple boards, and are finished in white enamel and gold. And just as the dimensions are unusual, the method of construction was remarkable. The builder evolved the plan without touching pencil to paper; and similarly, consulting nothing but his memory, wrought conception into reality.



KITE BALLOONS CONSPICUOUS IN FLEET MANEUVERS

Kite balloons played a more than ever conspicuous part in this year's maneuvers of the Atlantic fleet, off Guantanamo,



This Photograph, Snapped during the Cuban Maneuvers of the Atlantic Fleet, Pictures Preparations for the Ascent of a Kite Balloon

Cuba. And the basket of one of these balloons is the subject of the photograph on this page, snapped from the crow's nest of the mother vessel. One observer busies himself in the basket, while a second climbs upward from the deck. A parachute is provided for each officer; one is seen hanging from the basket.

PAN-AMERICAN TRADE SCHOOL TO OPEN IN PANAMA

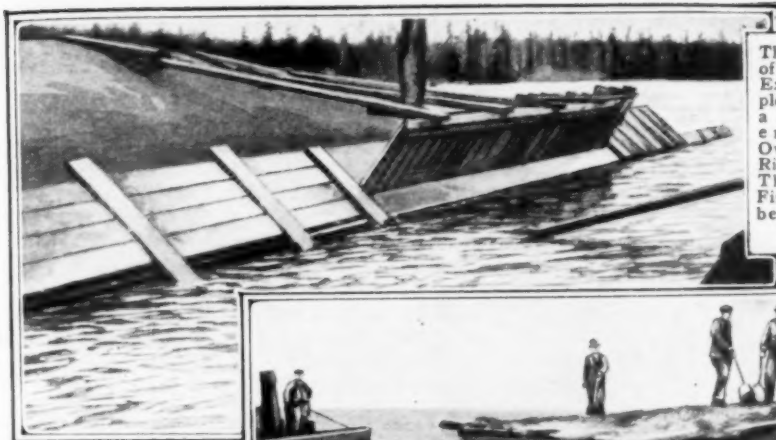
An institution to be known as the Pan-American College of Commerce will be opened in the Republic of Panama on the first day of the coming year. At this school business men of both Americas will be able to learn, in one of the two six-months' courses to be given yearly, every phase of Pan-American economic relationship.

COLOR PRINTING AND MOVIES GAIN BY WAR DISCOVERIES

Color photography, upon which color printing is dependent, has gradually developed in the past few years from a scientific curiosity to an everyday utility. To this art, however, as to many others, it remained for the scientific activities of war to contribute the most important refinement, speed of exposure, an indirect outcome of dye studies made in England and of the demand of aerial photographers for an emulsion highly sensitive to red. Color-sensitive emulsions of fine grain, permitting a direct half-tone negative, are now made, and the process also has been adapted to motion-picture projection in two colors, in which a remarkably lifelike effect is attained. The achievement of accurate registration on the screen has completed the practical application of the method, and a full-length dramatic subject in colors is now being made by an American producer. Early use of true color photography for newspaper and magazine illustrations is predicted as a result of the recent improvement in speed.

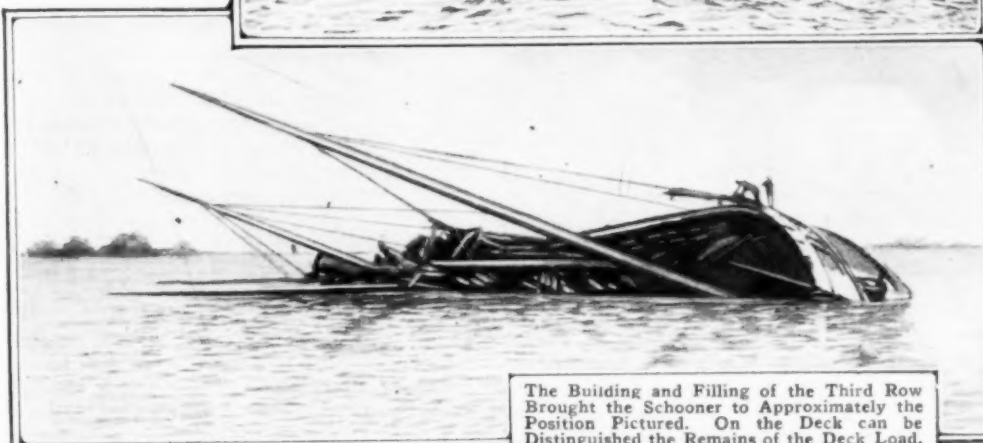
SALVAGE SHIP BY PILING GRAVEL ON EXPOSED SIDE

Piling gravel on the exposed side was the ingenious expedient used recently to right a big auxiliary schooner which had been overturned by a tide rip in Puget Sound, Wash. The wall of water had overwhelmed the vessel as it was putting out to sea, with hold and deck piled high with lumber. Unhindered, the craft would have recovered from the blow; but the Samson post gave way, and the lumber on deck went over the side. The chains held; and the drag of the lumber was able to hold the vessel on its side until it filled. In consequence, even after divers had cut the chains, the vessel failed to right itself. Accordingly, heavy cribs were spiked along the exposed side of the hull, and, after being filled with many tons of gravel, were planked over. This weight brought the masts a few degrees toward the vertical. So another row of cribs was built, filled, and covered. When a third row had been filled, ropes were passed under and over the hull, and to tugs and barges. At last, as these pulled at the now lopsided hull, it rolled back on even keel. Pumped dry, and with cribbing removed, the schooner was ready for service again. The cost of the odd salvaging operation was comparatively small.



The Unusual Expedient of Piling Gravel on the Exposed Side was Employed Recently to Right a Big Auxiliary Schooner Which had been Overturned by a Tide Rip in Puget Sound. In This Photograph the First Row of Cribs is being Spiked to the Wooden Hull

When the First Row of Cribs had been Filled with Many Tons of Gravel, the Ship was Seen to have Rolled a Few Degrees toward Normal. A Second Row was Constructed. Accordingly, as Pictured Here. The First Row has been Forced beneath the Surface



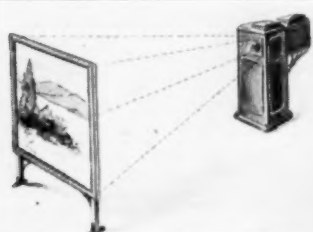
The Building and Filling of the Third Row Brought the Schooner to Approximately the Position Pictured. On the Deck can be Distinguished the Remains of the Deck Load, Which Shifted and So Held the Schooner on Its Side While It Filled



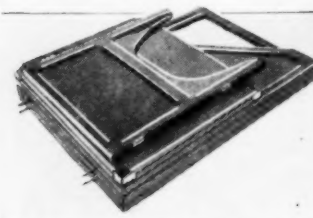
This Photograph, Taken from the Stern of a Tug, Shows One of the Lines Which was Passed around the Hull upon the Completion of the Cribbing and Filling. As Tugs and Power Barges Pulled at Many of These, Finally, the Hull Rolled Back on Even Keel. It was Found to be Practically Undamaged

AUTOMATIC SLIDE PROJECTOR SHOWS ENDLESS SERIES

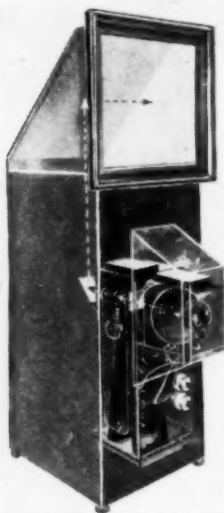
Lantern slides for advertising, lecture or amusement purposes may be projected in a continuous series, giving each picture



The Outfit as Used with a Separate Portable Screen for Lecture Work



Left: Collapsible Cabinet for the Projector, Folded for Traveling.
Right: The Advertising Projector Complete with Lamp and Screen. Slides are Carried in a Special Holder



10 seconds on the screen, by a compact automatic cabinet now on the market. Slides to the number of 24, 48, or 68, carried in a special holder, are shown in rotation by motor-driven mechanism, an incandescent lamp furnishing the light. The cabinet, a little more than 6 ft. high and less than 2 ft. square, finished as desired, may contain the screen, slides and all, or the screen portion may be suspended in a store window and the projector proper concealed in the window floor. For lecture work, a separate screen on a stand is provided.

WILL MAKE SCIENTIFIC STUDY OF COFFEE AND ITS EFFECT

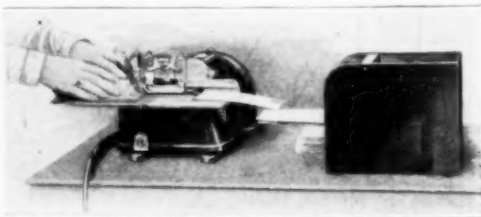
Coffee, from the green bean to the sugared cup, is to be made the subject of an exhaustive scientific study in a large eastern university laboratory for a whole year. The caffeine, volatile oils, tannic acid, and other components, present at all stages of preparation, will be measured, and the effect observed of various methods of cooking, and of treatment with cream, milk, etc., after cooking. The chief object of the research is to provide trustworthy material to refute the claims made by enemies of the beverage.

ARMY TO HAVE SMALL-ARMS RANGE 7,000 YARDS LONG

In the first months of America's participation in the World War it was found that the range tables for .30-caliber ammunition were incorrect at ranges beyond 1,200 or 1,400 yd. In explanation, the ordnance experts revealed that these data had been calculated theoretically, but had never been tested because of the lack of range facilities. That this may not be the case again, and because so much of the firing is now done at extreme ranges, the government has recently let a contract for the construction of a small-arms firing range at Aberdeen Proving Ground, Md. This range is to be 7,000 yd. long, with a pool of water 1,000 yd. long and 300 yd. wide at the target end. Down the middle of the range will run a narrow-gauge railway. A firing station will be established every 500 yd. along this track. It is thought that the first work at the new range will be the testing of the various types of long-range ammunition now being developed by the War Department in its search for the best cartridge for machine gun and rifle.

MOTOR-DRIVEN MACHINE OPENS 500 LETTERS A MINUTE

For use in the large business office there is now made a letter-opening machine which, though small and easily carried from desk to desk as required, is credited with the remarkable capacity of 500 letters a minute. This high speed is attained by the use of an electric motor, which drives the feed belt and so carries the letters, one at a time, past two revolving circular knives. These cut a very thin shaving from the exposed edge of the envelope. The letter is then propelled into a stacker, or receptacle.



This Motor-Driven Machine Opens Letters at the Rate of 500 a Minute. At the Right Is the Stacker

LARGEST HOTEL TO DOMINATE CHICAGO LAKE FRONT

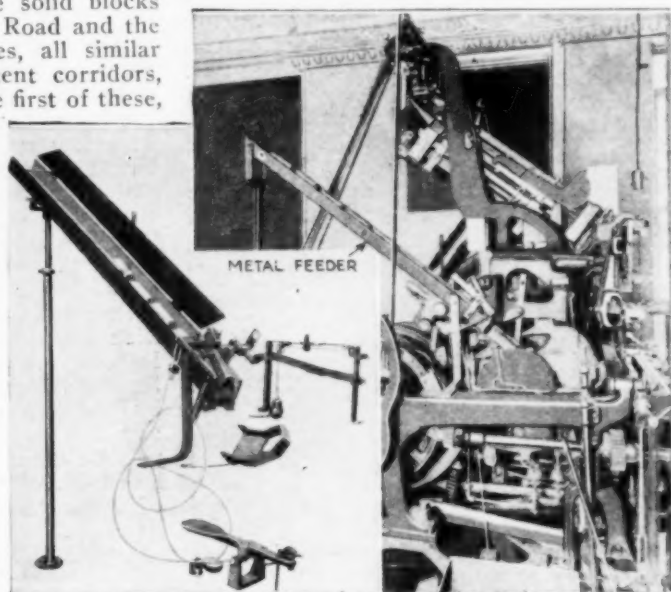
A \$15,000,000, 4,000-room hotel, by far the largest in the world, is soon to be built in Chicago, on three solid blocks included between Sheridan Road and the lake front. Five structures, all similar and connected by magnificent corridors, will compose the hotel. The first of these, already in existence, has 500 rooms, and in plan resembles a Greek cross. It is operated in the usual way. Its neighbor, however, will contain nothing but kitchenette apartments, 400 of them, with dumb-waiters running to a central kitchen for the added convenience of the cook. The next structure will be a bachelors' hall, perhaps the most luxurious of its kind. There will be a swimming pool for winter use, a gymnasium, a library, reading rooms, and all the other comforts of the city athletic club. The next building will be occupied entirely by four and six-room apartments, in which no "kitchenetting" will be permitted. The fifth and last unit will contain housekeeping apartments of from five to 12 rooms. And in addition to these five units, there will be built on the hotel grounds a summer theater, a bathing pavilion, and a small villa, finally, for the accommodation of those who insist on paying the highest price for everything.

WORK OUT DETAILS OF PLAN TO REWATER AFRICA

Audacious but wholly practical plans for the restoration of life-giving moisture to a large area of the African continent, now gradually drying up, have advanced to the stage of cost estimates and engineering details since their first mention in this magazine last October. More than 100,000 square miles of land is directly affected by the project, and the whole of South Africa, it is declared, would be benefited by the increased activity in evaporation and precipitation. The region includes the Kalahari Desert and part of Ovambo Land. Only two dams are necessary for the irrigation of this

NEW ATTACHMENT FEEDS METAL TO TYPESETTING MACHINE

A new attachment for the typesetting machine saves the operator many minutes



The Attachment is Seen in Rear of the Typesetting Machine, at the Right. In the View at the Left Are Seen the Trough and Rocker Arm

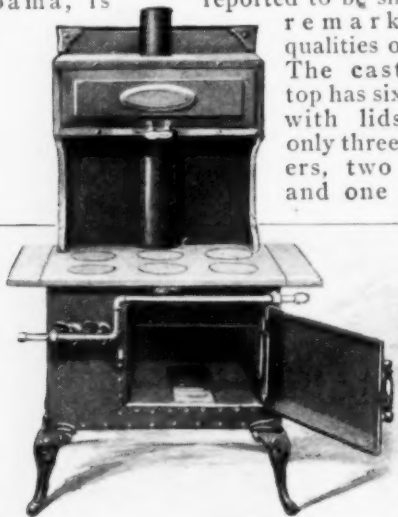
of valuable working time during the day. When it becomes necessary to replenish the melting pot, by the addition of one or more chunks, or "pigs," of lead, the operator of a machine so equipped does not rise from his seat. He simply depresses a pedal with his right foot. This action elevates the lower end of a rocker-arm release, and allows gravity to carry a pig into the pot.

huge area, one at the mouth of the Chobi River where it empties into the Zambezi above Victoria Falls, and the other a 40-ft. masonry wall in the gorge of the Kunene River about 150 miles from the west coast. The total cost of this improvement would not exceed, it is thought, \$1,200,000, and labor would be easily obtained, as the natives appreciate the menace of present conditions. Not only would new lakes and water table be created by impounding the river water, but other streams, long dry, undoubtedly would fill their banks again and restore the long-lost agricultural, floral, and faunal values of the region. The extension of waterway transportation would also add its value to the improvement.

QUICK-HEATING GAS RANGE RESEMBLES COAL STOVE

Closely resembling a coal range, and working in much the same way, a newly patented gas stove, manufactured in Alabama, is reported to be showing

remarkable qualities on test. The cast-iron top has six holes with lids, but only three burners, two large and one small.



New Gas-Cooking Range with Cast-Iron Top, Lidded Holes, and Only Three Burners, Resembling a Coal Stove

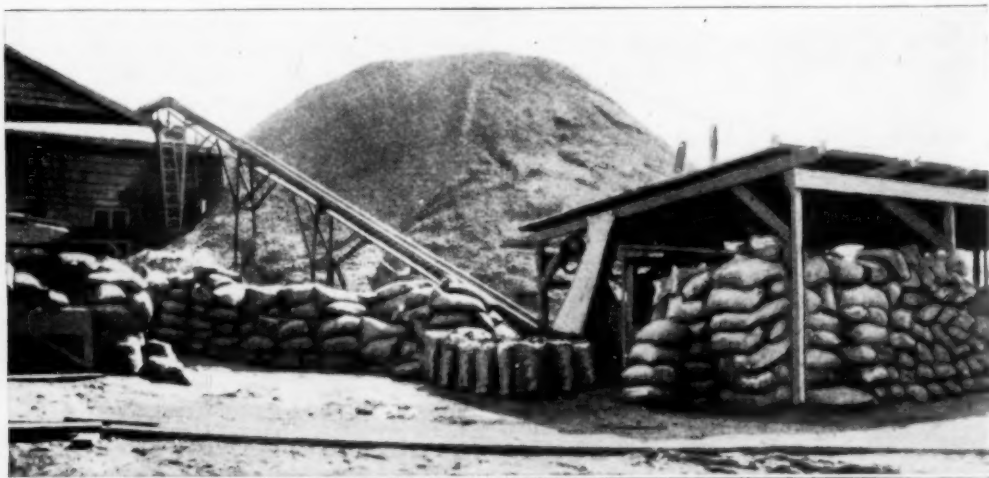
Using the large burners for six minutes to heat the oven, a pan of biscuits was baked in six more minutes, another pan in five, and a third in five after turning off one burner. The small burner alone will heat the top and cook a small meal. A 50-percent saving in gas is claimed.

CANAL TO LINK CALCUTTA AND RIVERS OF EAST BENGAL

A "grand trunk," locked canal, 22½ miles long, is soon to be built eastward from Calcutta, India, as a solution to an inland-traffic problem that is peculiar to this region. Between the city and the sea, 60 miles away, is the Sundarbans area, consisting of the labyrinthian deltas of the Hugli and other rivers. With the aid of a few short connecting canals, these streams are made to serve as a circuitous and meandering waterway to eastern Bengal. The chief objection to the route, however, is not its length, but the character of the streams. All bring down vast quantities of alluvial soil, and so choke themselves constantly with reefs and islands of silt. These are to be avoided by locating the new canal at the head of the Sundarbans, in an area at present unused by inland steamers. In this way the necessity for maintaining a fleet of dredgers will be eliminated, and the city will be linked directly with the main river system of eastern Bengal.

VALUABLE USES FOUND FOR APRICOT PITS

Typical of America's highly organized economic system is the use now being made in our western states of the once valueless apricot pit, or stone. When the fruit is dried in the summer, the pits are removed at the orchard and exposed to the sun. The dried pits are then loaded into motor trucks or railroad cars, and



The Volume of the Apricot-Pit Business is Suggested by the Size of the Cracked-Pit Pile at One Crushing Plant. The Meat from the Pits Yields a Valuable Acid; the Cracked Pits Themselves are Now being Used as a Road-Surfacing Material. When Worked In, the Pits are Found to Make a Smooth, Hard Surface Which does Not Get Muddy



At the A. E. F. University, at Beaune, France, Classes were Called to Order and Dismissed at the Sound of the Bugle Blown on Headquarters Tower. The Metal Megaphone and Its Frame are Seen Above

From the Tower Platform One could See All of the 500 Barracklike Buildings on the 600-Acre Campus. Scores of Them are Seen in the Background



The Tower Was Just a Few Yards from the Headquarters Building, and was Crowned with a Platform Large Enough to Accommodate a Score of People

The system here was probably unique in scholastic history, as they were given, not by bell and clock, but by a bugler who mounted for the purpose a tall wooden tower near the headquarters building. On top was a platform large enough to accommodate a score of people, giving them all a view of the 500 barracklike buildings ranged in military order on the 600-acre campus. In order that the notes of the bugle might

reach the classes in even the remotest parts of this large area, there was suspended on the tower platform, from a gallowslike framework, a huge metal megaphone.

shipped to a crushing plant, where they bring about \$40 a ton. Here the pits are cracked to permit the extraction of the meat, from which a valuable acid is derived. The volume of this business can be gauged by a glance at the photograph reproduced on the preceding page, showing the cracked pits that accumulated last season at one crusher. Formerly these pits would have been burned as waste; but no longer. Last year one of the larger coast cities purchased a considerable quantity, at \$1.75 a ton, which it used for road building. When worked in, the pits are found to make a smooth, clean surface.

reach the classes in even the remotest parts of this large area, there was suspended on the tower platform, from a gallowslike framework, a huge metal megaphone.

OLD SCHOONERS MADE OVER BECOME GOOD BARGES

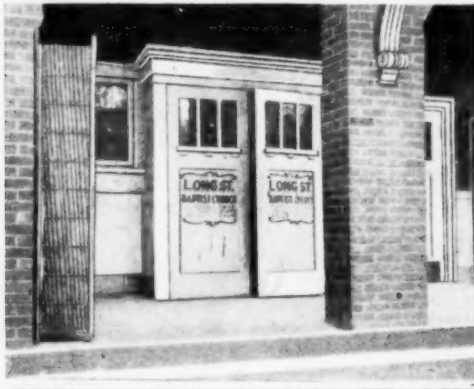
BUGLE ON TOWER WAS SCHOOL BELL FOR A. E. F. UNIVERSITY

As electric bells in the halls of American colleges and universities signal the end of recitation periods at the silent command of a master clock, many American youths will recall, this coming year, how, two years ago, such signals were given in the A. E. F. university at Beaune, France.

Disposal of large numbers of old schooners, to say nothing of an oversupply of new wood ships, has been a problem for the past few years. River and canal men, meanwhile, have been facing a shortage of barges. Putting these two facts together, eastern shipbuilders have now evolved a new form of schooner barge, made by removing the upper works and the below-deck cabins and bulkheads of the schooners. Such barges are capacious, and have the advantages of speed in towing and seaworthiness for coast work, and if lost from a sea tow can make port with a jury rig. In South America as well as the United States, rebuilt schooners for barge work already are at a premium.

HOUSE OF WORSHIP FORMERLY MOTION-PICTURE THEATER

In Columbus, Ohio, is a church building which is unique, it is believed, in that



Above: The Exterior of the Quondam Theater. Below: Ticket Booth, Now the Entrance to the Middle Aisle

it was formerly an ordinary motion-picture theater. It was acquired by the congregation when the manager of the then theater announced that business was poor, and that the place was for sale. To convert the building to its new use, only a few minor changes were made. The ticket booth was remodeled, in the first place, and became a wide entrance door, admitting to the middle aisle. In the interior, a rostrum was erected behind the orchestra pit, and panes of colored glass were placed in the few windows. The projecting machine was left in its fireproof booth to be used in illustrating lectures and sermons.

VLADIVOSTOK FIREMEN DEPEND ON SMALL WATER WAGONS

Only a step forward from the old-fashioned bucket brigade is the fire department of Vladivostok, Siberia, but what it lacks in modern equipment it makes up in zeal and action. The only property of the department that might be termed apparatus is a series of small water-tank wagons, each drawn by a pair of high-spirited Siberian horses, animals that seldom weigh over 1,200 lb., but are full of vigor. The function of the wagons is to race back and forth between the nearest well and the fire, pausing only while the firemen empty the tank into the flames by means of a small pump and hose. Usually the system proves quite effective, the large number of units used helping to overcome their individual inefficiency.

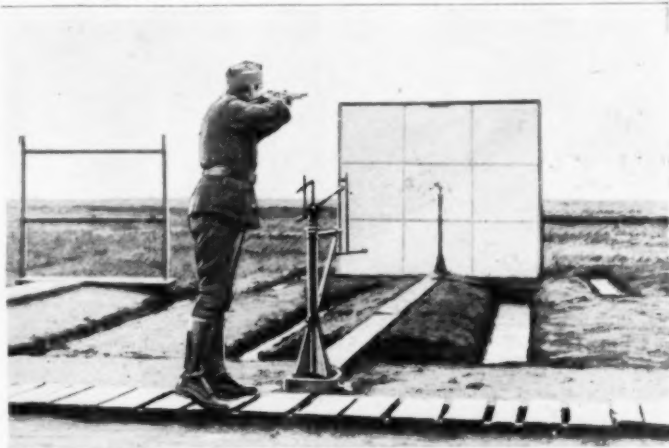


A Siberian Fire Fighter of Vladivostok, and the Station and Equipment of the City Fire Department: The "Engines" Are Merely Tank Wagons, from Which the Water is Drawn by Means of a Small Hand Pump

TARGET MECHANISM FOR AERIAL-GUNNERY SCHOOL

A labor-saving mechanism now the property of the U. S. Air Service is meant for the preliminary training of machine gunners and fighting observers in the aerial-gunnery schools. It consists, in part, of a miniature airplane mounted on a ball-and-socket joint at the top of a four-foot standard. This standard is placed in front of a paper background. The rest of the mechanism is a second standard placed on the firing platform, about 30 ft. distant, and provided with a hand lever. By means of this lever, the instructor gives the miniature airplane any desired position of climb, dive, advancement, or retirement. Then, with his small-bore rifle, the pupil shoots at the plane, assuming that it is in motion, and

making in consequence what he believes to be the proper allowances of deflection.



The Miniature Airplane on the Ball-and-Socket Joint at the Top of the Standard in the Background is Controlled by Means of the Lever Just in Front of the Pupil

The instructor checks each shot by means of the paper behind the target.

PAPER IN SHOES DETECTED BY SIMPLE TESTS

The average man, if told the shoes he was buying were of part paper, no matter what the price, would probably seek another shoe dealer. And yet, on the authority of shoemakers, more than half of the shoes sold today contain a percentage of paper. But like many other products, even "paper shoes" have improved, and the honest manufacturer of paper shoes has a real excuse for substituting paper for leather wherever he can. By so doing he is able to use a better quality of leather in the parts most exposed to wear. The shoes may lose their shape, but they will not wear out so quickly as if he had made them of all leather of an inferior quality while maintaining the same selling price.

But undoubtedly some manufacturers have taken advantage of the general use of paper in shoes to cheapen their product and swell profits. The two shoes shown herewith were sold for the same price, and both were represented to be high-grade. One of them, when torn apart, lived up to its reputation and proved to be a model of

good shoe construction. The other had a large percentage of paper in it. Part of the heel was paper, as were the box toe and counter. There was a thin layer of paper on top of the sole and the insole was of only half thickness backed with canvas. The substitution had been so cleverly done, however, that even a shoe expert might have been deceived.

Two simple tests will help in determining whether a shoe is all leather or not. One is to press the point of a penknife on the upper layers of the heel. If they are of paper the blade will readily sink in. The other consists in pressing down the counter or toe; if of paper, it will not recover its shape, but if leather, it will spring back again.



The Two Shoes in the Background have been Dissected to Show the Differences in Construction. At the Left Is the Part-Paper Shoe, at the Right, the All-Leather Article

AGAR MANUFACTURE NEW CALIFORNIA INDUSTRY

BY E. B. RICHARDSON

AN establishment for harvesting the vegetal products of the sea and converting them into valuable scientific and

ing of which is a long procedure, is very light and bulky. A pound, unless beaten into small pieces, will suffice to fill a gallon jar and is quite enough to last the ordinary user a year.

For many years Japan has produced most of the agar (called "kan-ten" in the native tongue) supply of the world, exporting hundreds of tons to European countries and the western hemisphere, and although the Japanese continue to employ primitive methods, beating the raw material with stones and heavy sticks and washing it with the hands, they have built up a highly profitable industry. The demand has increased with a rapidity far in excess of the facilities for production, however, and it has been charged that,

in order to meet the exigencies, the Japanese have lately resorted to wholesale adulterations.

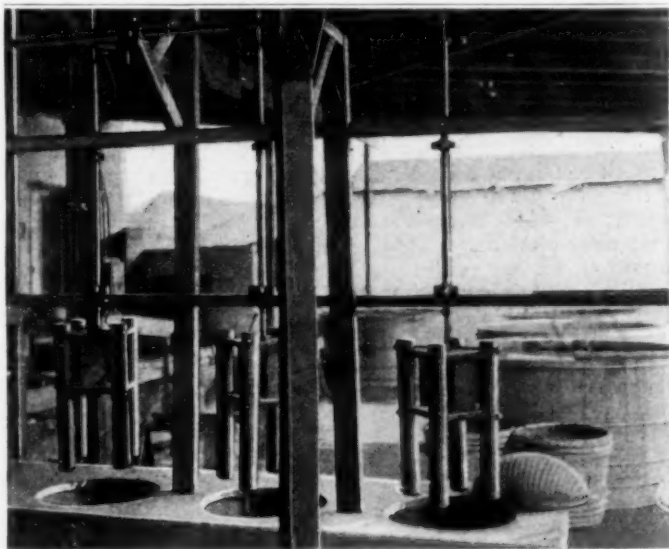
The harvesting of the seaweed is a slow, tedious task. There are less than a dozen species obtainable in the waters of Japan, where the fields have been mate-



The Raw Seaweed from the California Fields, Packed in Bales like Cotton, Ready to be Used in the Manufacture of Agar

culinary commodities has just been opened at Glendale, near Los Angeles. The plant will first turn its attention to the manufacture of agar by mechanical processes and has already installed much special machinery, worth more than \$40,000, in its up-to-date concrete building.

Agar is a product of seaweed having extraordinary food and medicinal value and varied scientific uses. As a preservative and solidifier in fruits and jellies, it is said to be unexcelled, and eaten with meats and cereals, is an efficient aid to digestion. Candy manufacturers use it extensively for the even, consistent body and the appearance of superior richness it gives to the highest-grade confections. It is considered indispensable in the modern chemical laboratory, being utilized chiefly as a medium for the culture of bacteria because of its unsusceptibility to changes of temperature. The finished substance, the mak-



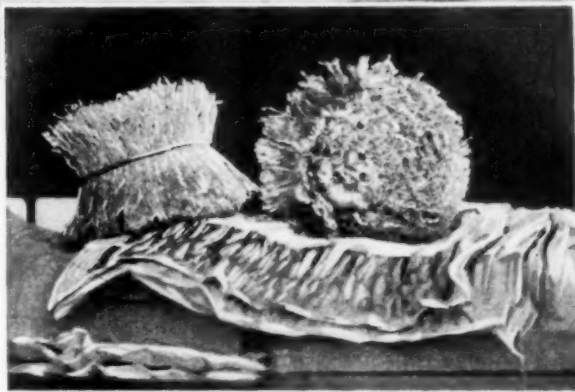
The Four-Hole Concrete Mortar, with Quadruple Motor-Driven Pestles, in Which the Raw Weed is Given a First Treatment of Beating and Stirring to Convert It into Pulp



The Drying Tables upon Which the Agar is Spread after Bleaching

rially depleted, as against almost twice that many flourishing in inexhaustible quantities in the shallow waters of the California coast. The plants resemble delicate moss and are ordinarily mistaken for such. They vary from a few inches to two feet in height. The leaves are threadlike and often interwoven like finest lace. Fresh from the ocean beds, they weigh almost three times as much as after drying. An experienced workman can gather about 200 lb., dried, in a day. Diving bells are used where the fields are below a depth of 20 ft. The pickers usually work in gangs of four or five men to a boat.

The California fields were discovered through the explorations of a Japanese agar expert, who manages the factory now beginning operations at Glendale, and which promises to render the hand method of manufacture obsolete. The raw weed can be converted into finished product in about 72 hours and the establishment is already turning out nearly a half ton per day, with a three-ton production as its ultimate goal. In addition to agar, vegetable isinglass is also being manufactured which has the appearance of the genuine mineral article and is said



The Finished Agar Is Snow-White, and besides Its Medicinal Value Is Useful in the Manufacture of Fruit Preserves, Jellies, and Candies

Here It is Allowed to Absorb the Direct Rays of the Sun Until Dry

to be equally useful. Photographic films are another possible product, and a number of by-products, including iodine and potash, will also be recovered.

Scarcely any handwork is

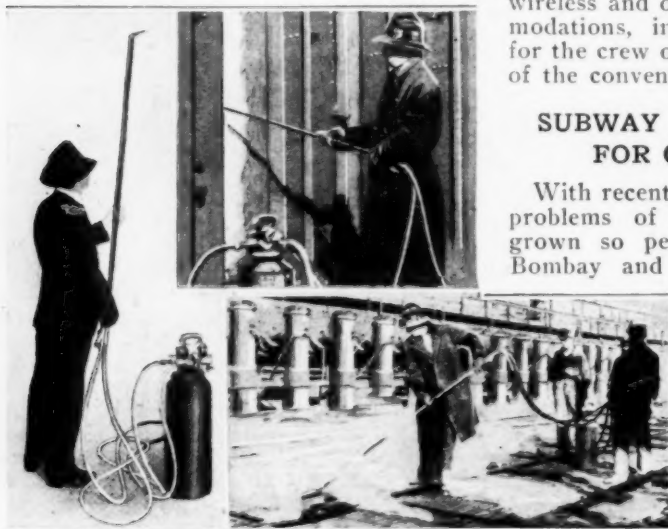
used in the new process, mechanical carriers conveying the material from one machine to another. As exemplifying the improved methods, four mortars, each having a circumference of approximately 65 in. and a depth of 14 in., are sunk in a solid block of concrete. Into these the raw weeds are thrown. Four long vertical rods, or pestles, 3 in. in diameter, and driven by motor power, fit into each mortar, stirring and beating the material into a pulp. From the mortars the pulp is transferred to a washing tank where all foreign substances are removed, and thence to a bleaching vat, after which it is sent through a powerful mechanical wringer and out upon the drying tables in the sunlight. After drying, it is boiled for several hours, submitted to a filtering process, and subsequently deposited in metal trays, where it solidifies in sheets resembling transparent wax. The sheets are then sent through a mechanical cutter that slices them into ribbons, 1 ft. in length and 2 in. wide. After a thorough

baking, for the purpose of equalizing and distributing the moisture, the material is refrigerated for 10 hours in a temperature -10° F. After freezing, the pieces are gradually warmed to outside atmospheric

temperature, taken from the containers and ironed into tissuelike strips by a machine made for that special purpose. Finally, they are sun-dried and bound into bundles, ready for the consumer.

TOOL FOR SPRAYING CEMENT MAKES REPAIR WORK EASY

Instead of being laboriously applied with a trowel, cement or mortar may be sprayed under pressure onto surfaces and into cracks, by means of a compressed-air



Left: The Cement Sprayer Complete. Right, Above: Repairing a Coke-Oven Leak. Below: Filling Joints with Cement in a Gas Plant

outfit now on the market. The mixture, which should not contain sand or coarse material, is put into a small tank through a special funnel and strainer. The head of the tank carries a pressure gauge and control valves, and the long-handled spraying nozzle is supplied with cement and compressed air by a double line of hose. The set is especially useful for repairing boiler settings, coke ovens, and similar installations where high temperature makes handwork difficult.

LARGEST AMERICAN DIRIGIBLE MAKES TRIAL FLIGHT

Because it is the first of a number to be built for the army and navy, officers from both arms recently watched with keenest interest the trial flight of America's largest dirigible, the navy "D-1." This test performance occurred at Akron, Ohio, and was so successful that the airship will soon be flown under its own

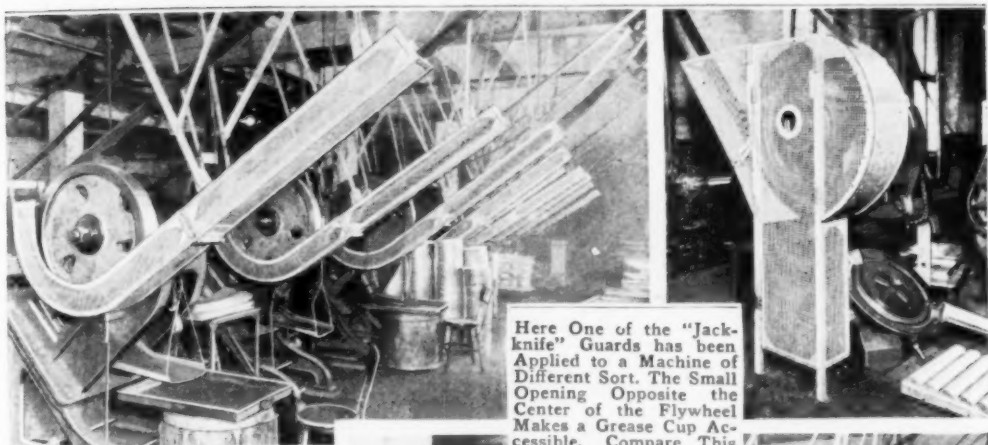
power to the eastern coast. The "D-1," like those to follow, measures 200 ft. long, and has a gas capacity of 180,000 cu. ft. The two propellers are each revolved by an engine of 125 hp. Fuel is carried sufficient for a 20-hour flight at 55 miles an hour. In the big car there are also the wireless and other apparatus, and accommodations, including sleeping quarters, for the crew of six. In design the ship is of the conventional nonrigid type.

SUBWAY SYSTEMS PLANNED FOR CITIES OF INDIA

With recent increases in population the problems of local transportation have grown so perplexing for the cities of Bombay and Calcutta, India, that the administrations of both places are now contemplating the development of subway systems. This underground work at Bombay would involve, chiefly, the construction of a five-mile tunnel beneath Bombay harbor, which now separates the parent city and several large suburbs. Similarly, a tunnel beneath the Hugli River would have to be a vital part of any subsurface system in Calcutta. In this second city the project has received the approval of engineers, who report that the soil is suitable for subsurface work of this sort.

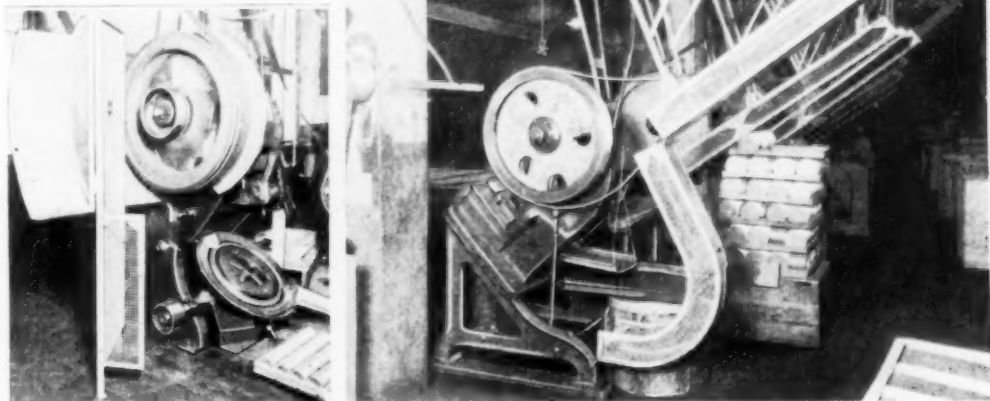
PLANT PROTECTION INSTITUTE ORGANIZED TO FIGHT PESTS

The Plant Protection Institute is the name of a body formed recently for the purpose of waging relentless war on the pests that afflict field and orchard crops, shade trees, and ornamental plants. This it will do by supporting and directing scientific research, by fostering coöperation between investigators and manufacturers, and by disseminating information about the control of plant insects and diseases. The members are all scientific experts or manufacturers of the insecticides, fungicides, apparatus, etc., used in this work of extermination.



The Guards are Used, Above, on a Row of Punch Presses. Compare This with the Picture at the Lower Right

Here One of the "Jackknife" Guards has been Applied to a Machine of Different Sort. The Small Opening Opposite the Center of the Flywheel Makes a Grease Cup Accessible. Compare This with the Picture at the Lower Left



The "Jackknife" Guards of Both Types have been Turned Back in the Two Lower Photographs to Show How the Moving Parts are Quickly Made Accessible for Repair and Adjustment Although the Guards cannot be Removed Entirely from the Machines

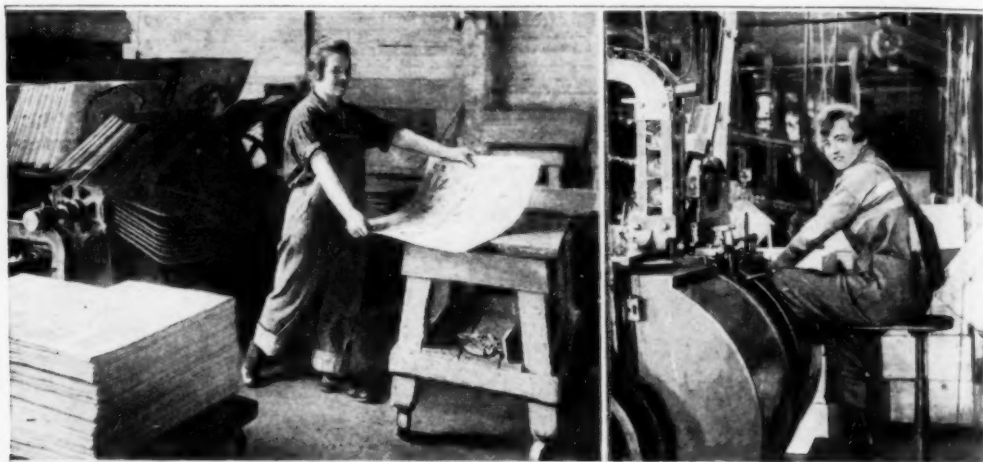
"JACKKNIFE" GUARDS INCLOSE DANGEROUS MECHANISMS

In placing protective guards, or cages, about exposed belt pulleys, flywheels, gears, etc., many a factory manager has found that, if removable, these guards are usually stacked away in some corner by the workmen; if fixed, they are usually made the excuse for failure to repair, adjust, or clean the inclosed part. From this dilemma one firm has extricated itself, however, by hinging the guards so that one part is movable and the other fixed. As placed about a belt and pulley, for example, one of these "jackknife" guards consists of a fixed, straight trough for the belt, and a movable, J-shaped trough for the pulley. It is evident that, though the guard cannot be removed entirely, the pulley is accessible at all times.

SHOE LEATHER MAY GIVE WAY TO NEW-PROCESS RUBBER

Rubber vulcanized with sulphur dioxide and hydrogen sulphide, a new process developed by an English chemist, is declared a likely substitute for leather in the manufacture of the finest shoes. A remarkable range of texture and color is possible with the new rubber, without the use of heat or pressure. Shoemaking with this material would be much simpler than with leather, inasmuch as the complicated machinery for shaping, stitching, buffing, etc., of leather shoes would not be needed.

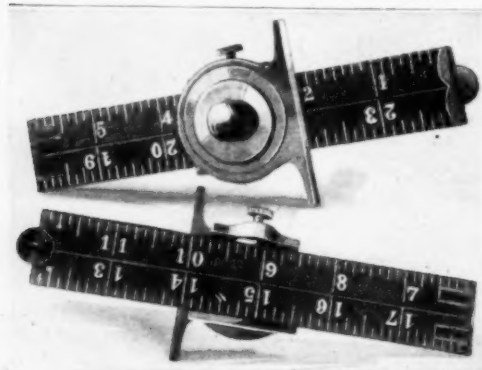
Ⓐ radio station with a working radius of 1,600 miles, by far the largest in the state, has recently been erected on the coast of Maine by a fisheries company, for communication with its steam trawlers.



These Two Girls Are Typical in Their Successful Handling of Jobs Once Thought to Be beyond Their Strength and Skill. The Operative at the Left Runs an Embossing Press, and Makes All Repairs without Assistance. The Other Earns \$60 Weekly at the High-Speed Die Press

ATTACHMENT MAKES FOLDING RULE VERSATILE TOOL

Clamped to the carpenter's folded rule, a little metal attachment now being introduced transforms it into a try square, scratch gauge, or bevel protractor, as desired. There are two setscrew adjustments, one for setting the attachment at the proper graduation on the rule, the other for setting the straight edge at the desired angle. To remove the attachment



The Front and Rear Views of the Attachment Show How It Is Applied and Adjusted. In This Position It Makes the Rule a Try Square

from the rule the workman simply gives a few backward turns to the first setscrew.

As a result of recent revision, plans for the huge airship hangar being built by the U. S. Navy at Lakehurst, N. J., for the reception of the "R-38," now call for a structure exactly 1,000 ft. long. This will make the hangar by far the largest in the world.

WOMEN WORKERS PROVE MAN'S SUPERIORITY A FALLACY

Though, even before the World War, women were employed in 295 of the 303 American trades and occupations listed by the U. S. census, she was generally considered unfit for expert and muscle-trying work with heavy and intricate machinery. The war changed this. Here-with are pictured two girls of Portland, Ore., who are typical in their successful handling of tasks once thought to be beyond their strength and skill. One, a technical-school graduate, operates a manifold color embossing press, making all repairs without assistance. Her salary equals that of the plant's best male mechanic. The other is a woman of 24 years who works eight hours a day at a high-speed die press. Employed on the piece-work basis, she earns an average of \$60 weekly.

HUGE NETS AND POISON GAS DESTROY BELUGA WHALES

The beluga, or white whale, was recently the object of a vigorous campaign of extermination waged by the fishermen of Brittany under the direction of the French Oceanographic Society. Features of the operations were the placing of two long nets, or traps, one of them 1,100 yd. long, and the use of 4,000 tubes of poison gas. The beluga had become a pest not only because of the great number which had thus invaded French coastal waters to rob the fishers of their harvest, but because of the unusual size of the individuals, some measuring 18 to 20 feet.

PICTURES OF YACHT RACES CABLED TO LONDON PAPER

As a result of the first long-distance test of a new photograph-transmitting process owned by a big London daily, several photographs of the recent international yacht races off Sandy Hook appeared in that newspaper three days after they were taken. Of the principle and detailed operation little is revealed at this time. It is known, however, that each photograph was placed in a desklike cabinet containing selenium resistance cells. Subsequently there was taken from this cabinet a lengthy typewritten message resembling a code cable. This was carried to the New York cable office, and transmitted like an ordinary commercial message. Received in London, this cable-gram was transformed by a second machine into a series of holes in a long tape. This perforated strip was placed in a third machine, finally, with an undeveloped plate. After an operation here, and a producing bath, the plate was seen as the negative of the photograph taken 3,000 miles away, and just a few hours before. Though imperfect, these negatives were faithful enough to show that the process was sound in principle.

LEATHER-GOODS DEALER MAKES AUTOMOBILE FROM STOCK

An ingenious display appeared in the window of a leather-goods shop in Berlin, Germany, in the first days of the current



WIDE WORLD PHOTO

This Attractive Display Appeared in the Window of a Leather-Goods Shop in Berlin, Germany, in the First Days of the Current Motor-Touring Season. Each Part Was an Article of Stock from the Shelves

motor-touring season, as an announcement that there the motorist could equip himself with luggage of all descriptions. Appropriately enough, the display took the form of an "automobile" assembled from the varied stock on the shelves. Thus, the wheels were band boxes and drum cases; the engine hood was a long trunk with curved top. As other parts, appeared lunch boxes, valises, golf bags, and numerous smaller accessories.



CLEVER CAMOUFLAGE PROTECTED PACIFIC FREIGHTER

PERMISSION having been received from the owners, it at last becomes possible to publish this photograph of the steamship "Isanti." This steel freighter, built during the war in a Pacific-coast shipyard, was distinguished during the months of peril for one of the most effective coatings of camouflage ever applied in an American drydock. Seen a mile or two away, the vessel looked like nothing more than a near-by mass of provision boxes, broken boards, and other refuse ejected from some ship's galley.

AUTOMOBILE BUSESSE OPERATE FROM OWN UNION DEPOT

Several companies maintaining stage lines in and around a west-coast city, have united to build what is said to be

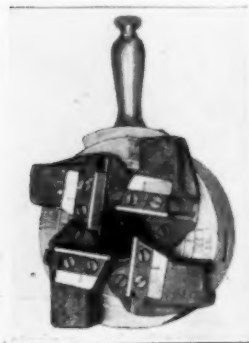


This is Believed to Be the First "Union Depot" Maintained by a Number of Auto-Stage Companies. Waiting Rooms and Ticket Offices Are at the Left in the Picture Above; at the Right Is the Exit for the Outbound Busses

the world's first auto-bus "Union Depot." The single-story structure has a street frontage of several hundred feet, and is divided quite like a railroad station, into waiting rooms, ticket offices, and "train shed." Seated in the waiting room, the traveler rises when his bus is called, and boards his car.

CHASERS ON FACE OF NEW SCREW-CUTTING DIE HEAD

A new style of automatic screw-cutting die head, applicable to many makes of screw machines and turret lathes, differs in design from others of this type in that the chasers, or separate cutters, are supported on the face



sizes of bolts and pipe, both right and left-hand, within its entire range.

of the head. This makes access to the chasers easy when they must be removed for grinding, or to change from one diameter to another. The head is adjusted to size by means of a single screw, and as is evident from the illustration, is graduated for all

AMERICAN NATURALISTS SAVE FLAMINGO FROM EXTINCTION

The recent passage of a law giving complete protection throughout the Bahama Islands to the flamingo is a matter of de-

served satisfaction to the American naturalists who recently trailed this, the most beautiful of the larger birds, to its last stand. Having found that the reason for the near extinction of this scarlet species was the ruthless hunting of the native sponge fishermen, the expedition penetrated, in canvas boats and by wading, far into the dismal salt swamps of Andros Island, 125 miles east of Miami, Fla. This attempt to find a colony of survivors was successful; after several days of hardship, the naturalists were able to "shoot" hun-

dreds of the timorous birds with the motion-picture camera. Their subsequent report to the colonial governor was, of course, made the basis of the new protective law.

PIONEER REPEATS JOURNEY OF 1852 IN AIRPLANE

Man's progress during the last half century in his battle for mastery of the elements; America's phenomenal development of its vast Northwest during the same period—both were dramatically epitomized a few weeks ago when an airplane landed at Spokane, Wash., and there stepped from the forward cockpit a passenger 90 years of age. The plane had flown from Lewiston, Idaho, in 80 minutes. The historical significance of the thing lay in the fact that Ezra Meeker, the passenger, made this identical journey by prairie schooner and in six days' time when blazing the Oregon Trail 68 years ago. His lumbering vehicle was pulled at the rate of two miles an hour by a team of oxen.

¶An unusual fate was visited upon 1,000 Nevada horses recently, when they were shipped to San Francisco and chopped up to make food for chickens. The animals, small in size and untamed, could not be used by the Indians who gathered them up, and were sold to net about \$10 apiece.

DAMMING A RIVER WITH DRY WEED

BY WILLIAM H. HAMBY

ONE OF the swiftest and strongest of rivers, the Colorado, has been successfully dammed with dry arrow weed. At Hanlon Heading, below Yuma, Ariz., where the water is taken from the river into the Alamo Canal, which waters that little empire, the Imperial Valley, there is an eternal battle with silt. So swift is the Colo-



Making Bales of Arrow Weed, Cut from the River Itself, to be Used in Building the Peculiar Dam



Building the Dam: The Bales of Arrow Weed are Picked Up by Tackle and Run Out over the River on a Cable

rado, that at times it carries nearly three per cent of silt. In Volcano Lake alone, it deposits 506,000 cu. yd. of silt a day. In spite of all the dredges, the bottom of the canal is slowly raised with this silt every year, and the waters of the river must be correspondingly raised to make it flow into the intake.

For this purpose a weir—a temporary dam—is built across the river every year, a little below the intake, to raise the water sufficiently. The summer flood, the crest of the year's flood, which occurs almost to a day on June 24, every year, always washes this out. If it did not, the dam would have to be blown out with dynamite to prevent overflowing the

levees. Immediately after the flow recedes, the weir must be rebuilt, for from then on is the time when water must not fail the hundred-million-dollar crops of the valley for a single day.

Hitherto this temporary dam has been built by laying a railroad track across the river and dumping carload after carload of rocks. But this was a laborious and expensive procedure, several hundred thousand dollars being spent each year for this work.

Last year the engineer in charge conceived the idea of damming the river with dry weeds. Arrow weed grows in little forests along the river. These weeds were cut and baled. The bales were then run out on a cable over the river. While suspended in the air over the place at which it was to be dropped, a small cable was fastened to the little end of the bale, and then made secure to a dolphin a short distance upstream. The bale was lowered, and the pressure of the swift water, acting against the upstream pull of the cable, drove the weeds instantly to



Left: Sinking the Bale in the River, by Attaching It to a Cable and Allowing the Current to Carry It to the Bottom. Right: The Nearly Completed Dam of Arrow Weed, Holding Back the Swift Colorado River

the bottom, where at once the silt began to fill them, pile upon, and bury them.

Three layers of the bales across the river served to dam it completely. It was

dry enough for one to walk across the stream below, the entire flow being diverted into the huge irrigation canal above.

RAILROAD CRANE IN LUMBERYARD MOVES PILES

A lumber-stacking machine able to do the work of 20 men or more, and now in use in one large lumberyard, is, in reality, nothing more than a crane of the railroad type, which can be moved over the rails to any part of the yard. From the hook at the end of the crane block, there hangs, however, a rectangular steel platform. From the ends of this, are suspended, in turn, two stirrups of heavy chain. Use of the machine requires that all lumber be arranged by hand into piles measuring about 4 ft. wide and 5 ft. high. Each pile

is raised from the ground, or from the pile beneath, by two thick blocks. To move a pile, the crane operator simply drops the platform upon it, gives his assistants a moment in which to slip the stirrups underneath, and then hoists away. These assistants ride from pile to pile, or from pile to freight car, upon the steel platform, and so

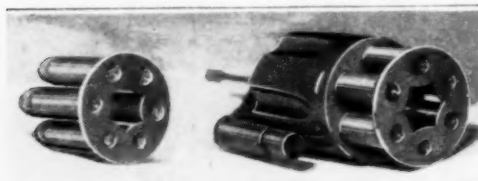


One of the Standardized Piles of Lumber is being Loaded upon the Freight Car in the Foreground by the Stacking Machine. This Is Simply a Railroad Crane from Which is Suspended a Rectangular Platform with Two Stirrups of Chain

expedite the work still further. With a little practice, too, they are able to adjust the stirrups both on securing and relinquishing the load without descending from the platform.

NEW CLIP HOLDS COMPLETE LOAD FOR REVOLVER

During the war army men became familiar with the three-cartridge clip used with the service revolver. And now, for civilian use, there has been patented a



Two of the New Cartridge Clips are Shown. At the Right, One is Inserted Halfway into the Cylinder of a Six-Shot Revolver

clip which is somewhat similar, but holds all the cartridges—five, six, or seven—required to fill the cylinder. These are fixed rigidly to the clip by brazing, soldering, or electric welding. Use of this new

clip not only reduces loading time to a small fraction of that required for inserting individual cartridges, but makes for convenience, also, in carrying extra ammunition.

NATIVES OF GUAM STUPEFY FISH WITH BAGS OF FRUIT

An effective though unsportsmanlike method of catching fish is employed by the natives of Guam, smallest possession of the United States. Visiting a certain tree in the evening, they secure quantities of the fruit. This they pound into a paste, inclose in a bag, and keep overnight. At low tide next morning the bags are carried to reefs near by, and sunk in deep holes. Soon the fish appear on the surface, some of them lifeless, others struggling, with bellies up. In this condition they are easily scooped into the boats.



Five Different Types of Architecture Appear in the 85-Foot Façade of the Extraordinary Palace, Inspired by Oriental Pictures, and Laboriously Constructed by the Poor French Postman Portrayed in the Insert

STRANGE PALACE BUILT BY POOR POSTMAN

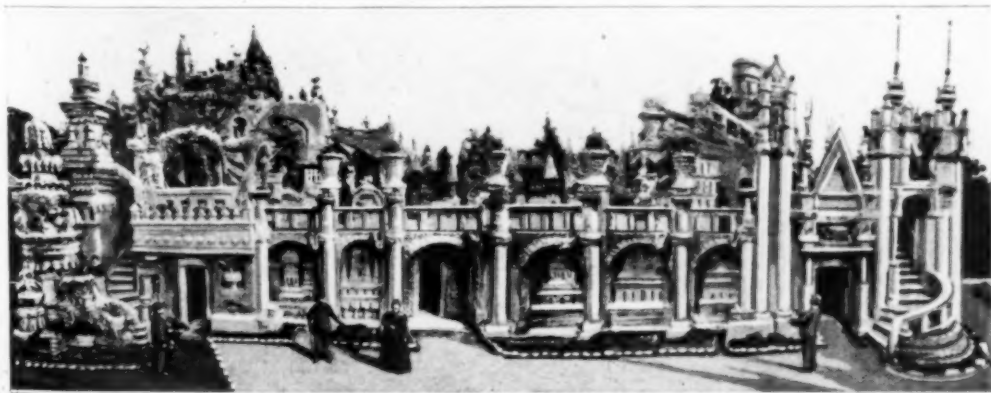
BY FRANCIS DICKIE

THIRTY-FIVE years ago, Ferdinand Cheval, a poor postman in the village of Hauterives, France, found a book of Oriental tales illustrated with photos of palaces and mosques. For weeks afterward he was haunted by these pictures till at last he decided to build a palace for himself. He owned a square white house and a good-sized plot of ground. Near the house he began piling up varicolored stones of different size which he wheeled in a barrow after his day's work of delivering the mail was done. Sometimes he went as far away as six miles to get some particularly bright stones. Then he bought a few bags of cement. For months he had been watching bricklayers and masons at work, had received a few pointers from some of them, and read up on the subject. In the spring of 1879, Cheval began work

on his dream palace. He kept a diary of progress and counted the number of hours he worked. Just recently the palace was finished when Cheval reached the age of 84 years. According to his calculation he has spent 9,000 working days upon it, averaging seven and a half hours a day, a total of 67,500 hours.

The palace is a conglomeration of structures of varied styles taken from the old Oriental book, and also from other pictures the builder saw as he went along. It is roughly rectangular in shape, its east and west façades being 85 ft. long, the southern and northern 45 feet.

In one façade are included no less than five widely varying types of architecture: a mosque; a Swiss chalet; a feudal castle; a square Algerian house, and a curiously shaped tower. The whole is adorned with rude sculptures of eagles, ostriches,



Another View of the Strange Edifice, the Building of Which Occupied Its Owner for 9,000 Working Days, and Which was Not Completed Until He Was 84 Years Old: Native Stone and Cement Are the Materials Used

and giants. The Swiss chalet is made entirely of small sea shells; the feudal castle, of blood-red stones.

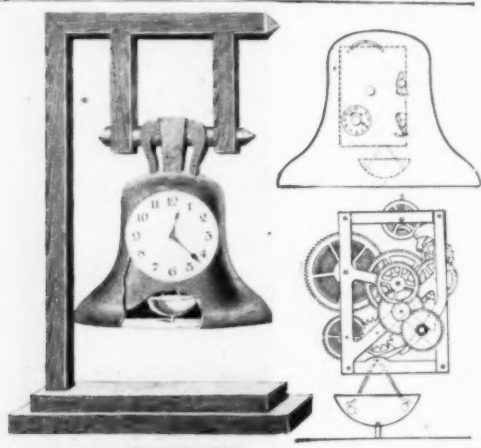
In addition to the millions of stones of various sizes and colors gathered by the man alone, no less than 4,000 bags of cement and lime were required to complete the building. These Cheval paid for partly out of his small savings as a postman, and partly from money he re-

ceived from tourists, who began to come in great numbers when the story of his palace began to get noised abroad.

But though he spent nearly 40 years in erecting the palace, the builder still lives in a little square house behind it. Recently, in one of the larger rooms, he built two huge tombs intended for himself and his wife, but the authorities prohibited use of the place as a burial ground.

WOODEN "LIBERTY BELLS" ARE HOLDERS FOR CLOCKS

Though the early-morning jangle of the alarm clock probably suggests anything



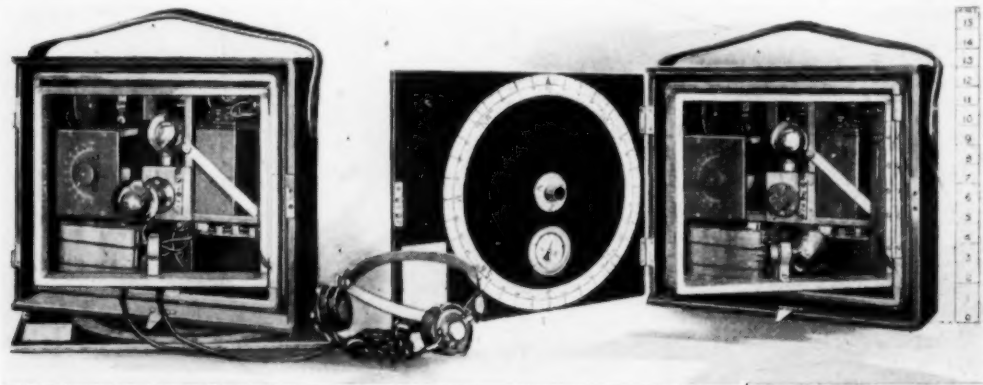
The Holder has been Cut Away at the Left, to Show the Bell. At the Right Are Explanatory Drawings

but "liberty" to the mind of a tired slumberer, the famous American "Liberty Bell" is, nevertheless, the motif of a clock stand soon to be put on the market. The

stand is made of wood in mission style, and consists of a base with an upright and horizontal arm. The bell-shaped holder which hangs from this horizontal arm is also made of wood, and will hold any ordinary alarm clock, or a parlor clock if desired. The bell, inverted, is fixed to the base of the holder.

SMALL RADIO-RECEIVING SET HAS DIRECTION FINDER

Recent demonstration in England of a complete wireless-receiving set, including the antenna, packed in a portable case only 13 in. high, 14 in. wide, and 5 in. deep, and weighing but 20 lb., affords a good example of the progress made in designing such apparatus. The hinged front, removed, is used as a pivot base for the box, and carries a compass card for direction finding. A hinged reaction coil, vacuum-tube detector and amplifier, tuning condenser, transformers, and storage and dry batteries, are all contained inside the closed receiving coil that encircles the case. The set can receive wave lengths between 2,000 and 15,000 meters, continuous or spark, and the direction is found by turning the box on its pivot until the signals are at a minimum.



Left: The Radio-Receiving Outfit Set Up for Use, with the Removed Front Board Acting as a Pivot Base. Right: The Front Board Serving as a Door, with Pivot and Compass Card Visible, and the Hinged Reaction Coil Turned at an Angle. The Scale Shows the Size



A Lifeboat That is Run into and Out of the Water at an English Seaside Resort, by Means of a Tractor: A Rigid 40-Foot Spar Connects the Tractor with the Wheeled Cradle of the Boat So That Pushing and Pulling Are Equally Effective

LAUNCH AND BEACH LIFEBOAT WITH AID OF TRACTOR

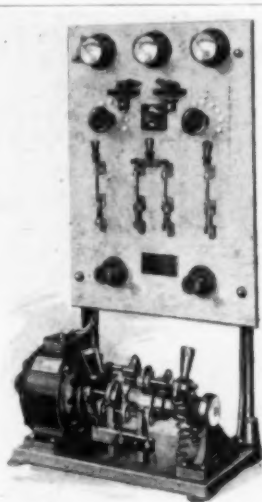
Not content with its many achievements ashore, the gasoline tractor, of agricultural fame, now has entered the marine field, at least in England. At Hunstanton, where the beach happens to be suited to its activities, a machine of the endless-tread type is being used to great advantage for running a lifeboat into and out of the sea. Instead of a cable, a 40-ft. spar is used as a coupling between the tractor and the wheeled cradle that carries the boat, so that pushing is as effective as pulling. Soft sand and shallow water are readily negotiated by the tractor's broad treads.

RUSSIA USES OLD UPHOLSTERY FOR WEARING APPAREL

One of the most illuminating commentaries on the plight to which a farcical "self-government" has brought the masses of Russia is contained in a recent report to the American Red Cross that the furniture seen today in southern Russia is bare of upholstery. For, the report makes clear, the fabric is warming, and so must be used for clothing. Some unfortunates, with no furniture to denude, wear burlap bags padded with newspapers. The recent appearance in one district of dresses of striped, green plush was explained when it was found that every yard of the material had been ripped from the seats of railway coaches. Similarly, in another town, a vogue for green vests and shirts resulted from the spoliation of the pool and billiard tables.

STORAGE-BATTERY CHARGER HAS MOTOR RECTIFIER

The use of a patented motor rectifier in place of the usual mercury-arc apparatus is the feature of a storage-battery charger now on the market. The motor rectifier consists of a $\frac{1}{8}$ -hp. motor of special type, with an extension shaft upon which are mounted three collector rings and two special commutators. These absorb the alternating current from a transformer, and convert it into a direct current to two separately controlled circuits. An unusually high efficiency is claimed for this mechanism because the current supplied is said to eliminate excessive "gassing" in the batteries, and so create a more rapid conversion of the active materials.

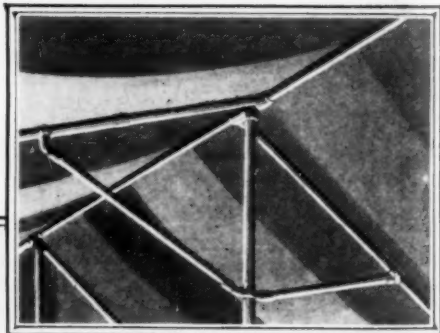


⌚ Mechanical cleaning of 100,000 cement sacks recently yielded a Wisconsin road-building contractor 200 extra barrels of cement, besides reducing freight charges on returned sacks.

CIVIC FEATURES THAT PROMOTE THE COMFORT



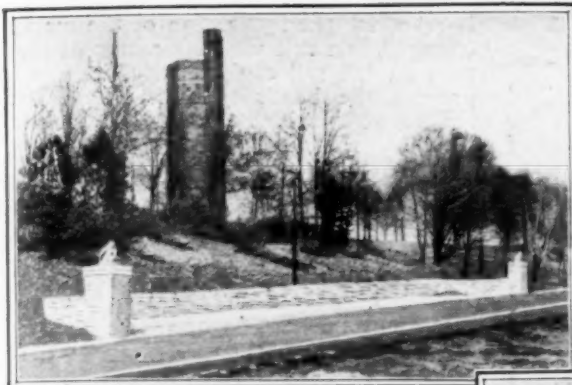
When the Rats in a City Dump at Cincinnati, Ohio, Became So Numerous That the Public Health was Endangered, the Community was Roused to Devote an Afternoon to Their Extermination. After 15 Policemen had Established Fire Lines, and the Fire Department had Prepared to Prevent Spread of the Blaze, a Match was Touched to the Kerosene Which had been Poured over the Rubbish. Rodents Escaping from the Flames were Clubbed to Death by 200 Men and Boys



The Canvas Awnings Which have been Placed over the Benches along the Bay Shore at Catalina Island, California, Are Unusual in That Each can be Collapsed like an Umbrella. This Enables the Occupants to Enjoy the Sunlight as Much or as Little as Desired. The Awning Supports are Shown in Detail Above



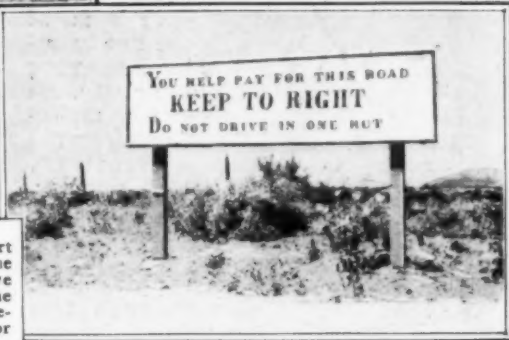
AND ENJOYMENT OF VISITORS AND RESIDENTS



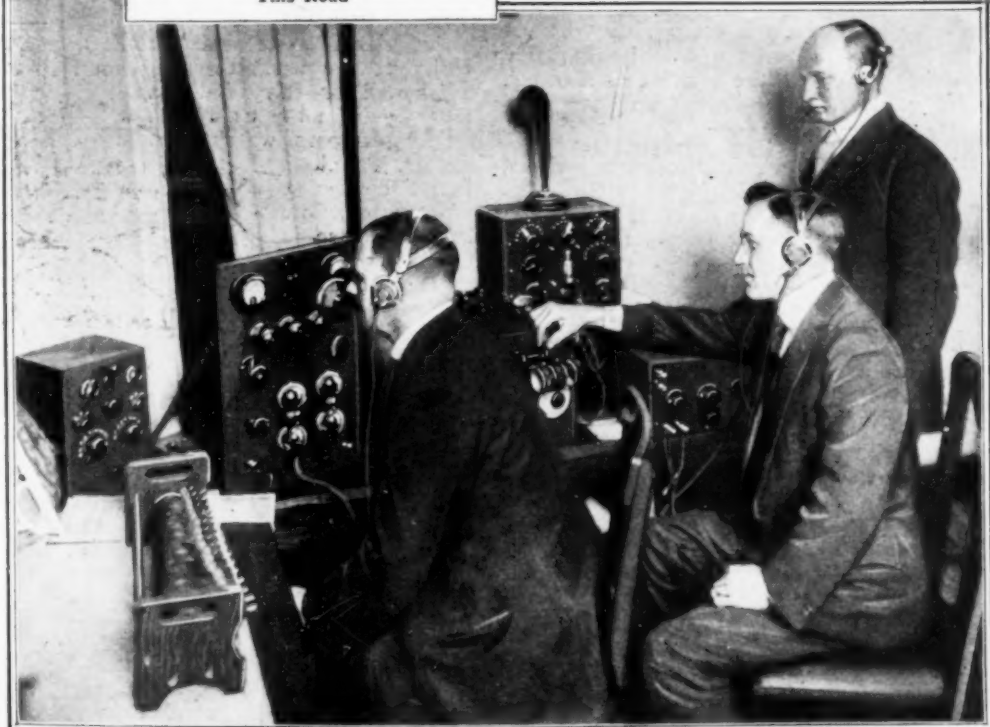
On This "Sidetrack," Built into the Hill beside a Narrow but Much Used Highway in Cincinnati, Ohio, the Motorist can Replace a Tire or Clean a Spark Plug without Interrupting Traffic or Exposing Himself to the Danger of a Collision



This Signpost near Reno, Nevada, Compels the Motorist to Keep to the Right, Warns Him to "Go Slow," and Advises Him That He Is on the Lincoln Highway



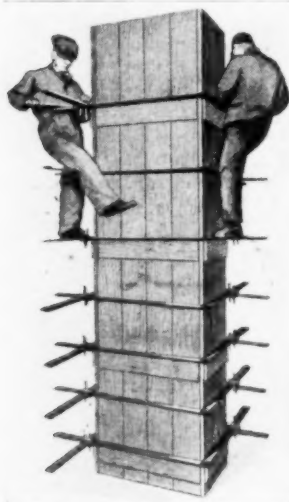
In Wording This Signboard on a Desert Road outside Tucson, Arizona, the Wise Highway Commissioners have Strengthened Their Appeal That the Motorist "Keep to the Right" by Reminding Him That "You Help Pay for This Road"



A Plan for the Use of the Wireless Telephone in the Pursuit of Escaped Lawbreakers is Now Engaging the Attention of the Police Department of Buffalo, New York. This Photograph Shows the Chief, at the Left, as He Explains the New System to Amateurs throughout the Western Part of the State

METAL CLAMPS EXPEDITE CONCRETE-COLUMN WORK

Clamps made of metal, and so destined for long life, are now manufactured for

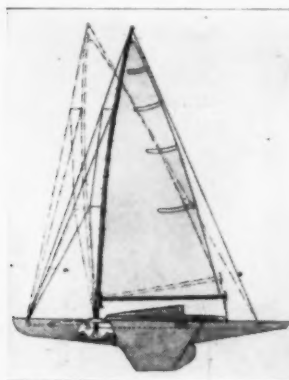


the purpose of holding together the wooden forms used in the construction of concrete columns. Two pivoted strips, or arms, compose each of the two members forming the clamp. As can be understood from the illustration, each clamp is adjusted to size and held in place by slipping bolts through the

proper holes in the free ends of the pivoted strips. Because of their strength and rigidity half of these clamps may be removed from a form a few hours after pouring for use in the construction of the next column.

CATBOAT MAST ADJUSTABLE ON PIVOT MOUNTING

A pivot mounting for the mast of sailing craft of the catboat type is a recent



and interesting invention of a Swedish designer. The pivot, or swivel, is a modified ball-and-socket joint interposed where the mast intersects the deck; that is, the mast passes through the ball. In the hold, the butt end slides

back and forth on a longitudinal guideway, which thus limits the motion of the mast to a fore-and-aft plane. The stays, which stretch to the top of the mast, pass, through pulleys, to a winch. As the winch

is revolved, the inclination of the mast is changed. In this way the center of pressure on the sail can be varied at will to prevent the boat's lying heavily on its rudder when sailing close to the wind.

AMERICAN JUMPERS LEARN TO NAVIGATE PARACHUTES

Experiments with the "navigation" of the type-A parachute recently adopted by the U. S. Army Air Service have shown that oscillation can be overcome by using the body as in a swing. The parachute can be "side-slipped" at will, also, thus giving the jumper considerable latitude in his choice of landing places. This second maneuver is accomplished by pulling down on the proper set of cords. In connection with this experimental work it is interesting to note, too, the answer to a query recently put to 42 jumpers. All but two agreed that during the first seconds of the drop they experienced the sensation, not of falling, but of continuing with the airplane.

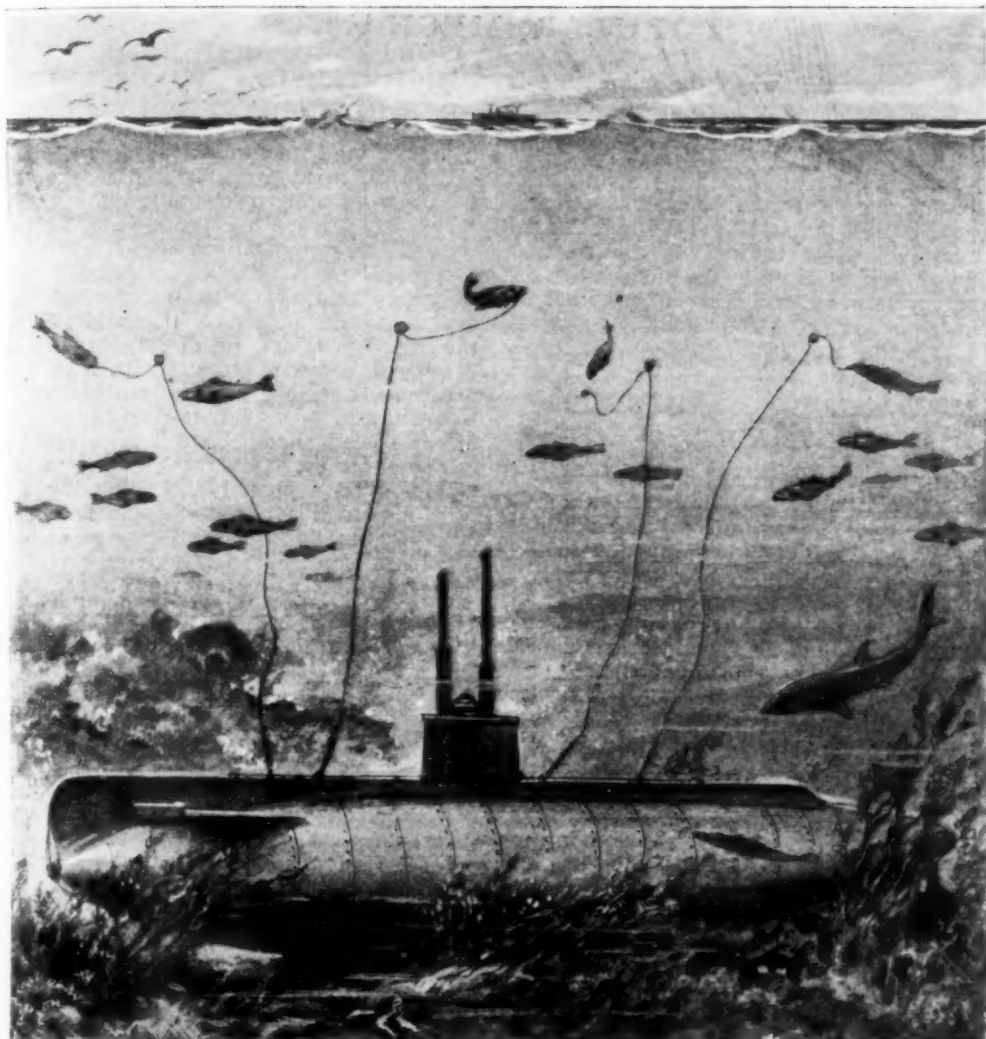
ALARM-CLOCK WRIST WATCH HAMMERS WEARER'S ARM

An alarm clock which strikes, not a bell, but the wrist of the person to be awakened or reminded, has recently been invented by an ingenious watch-

maker. The clock is, of course, a wrist watch. One half the case is circular; the other half is extended to inclose the striking apparatus. This consists of two blunt hammers, one on either end of a rocking bar, which receives a reciprocating motion, and so thrusts the hammers alternately from the case, as the alarm mechanism is released. This release is timed by setting a third hand at the desired hour and minute on the dial. Another adjustment varies the force of the hammer blows.



[The efficient production and use of oxygen are the aims of research now being conducted at the Harvard Engineering School. The scientists hope, in particular, to put the designing and construction of producing plants on a sound engineering basis.



Upside-Down Fishing from the Deck of a Submerged U-Boat: Floats Carry the Baited Hooks Upward, the End of Each Line being Attached to a Spiral Spring on the Deck, to "Play" the Fish, Which cannot be Removed Until the Submarine Comes to the Surface

INVERTED ANGLING FROM SUBMARINES

BY JOHN EDWIN HOGG

FISHING with inverted lines from the decks of American submarines is the newest pastime among members of their crews operating in the Pacific Ocean from the Los Angeles submarine base. The boats make frequent practice trips between Los Angeles and Santa Catalina Island. The water in this area averages about 90 ft. in depth, and is one of the finest fishing grounds of the Pacific coast. Frequently the boats dive to the bottom, and lie there with their motors shut off while practicing submarine signaling, torpedo-tube routine, and the like.

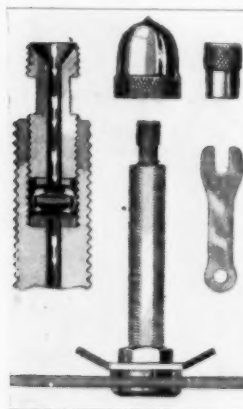
The upside-down fishing is done in a very simple manner. Prior to making a dive the men arrange their lines on the deck rails of the submarine. The hooks are baited, and are strung out on the decks to be carried upward when the boat dives by a float attached near the hook. Since any fish that takes the bait cannot be removed until the boat comes to the surface, the lines are fastened to the deck rail by coil springs. This practically eliminates the chance of losing the fish by its breaking the line, or tearing the hook out of its mouth. Thus the baited hooks

"dangle upward" when the submarine is resting on the sea bottom—then along comes a fish, swallows the bait, and snags himself.

This method of submarine fishing was given a try-out recently by an electrician aboard the submarine "H-5." He baited four lines prior to making a dive, and when the boat came to the surface he had three yellowtail, weighing 24, 28, and 32 lb. respectively. A fourth fish had taken the bait, but got away.

NEW VALVE FOR AUTO TIRES PREVENTS AIR LEAKAGE

Only a puncture or defective rubber can cause the escape of air from auto-



tire inner tubes equipped with a new form of valve. In place of a spring-actuated valve rod, a threaded metal plug is screwed down solidly onto a packing ring by means of a small wrench, making a tight joint that locks the air in the tire. A slight movement of the wrench opens the valve. A cap

screwed onto the protruding end of the plug acts as a lock-nut, and an ornamental dust cap is then screwed on the stem of the valve.

COLLAPSIBLE BUCKET HAS FUNNEL IN BOTTOM

The touring motorist will be spared many a search for liquid container and funnel, if he habitually carries under the rear seat a newly introduced accessory which is a combination of both. The bucket is collapsible, and is made of water-



proof fabric, double-sewed and tightly cemented. In the bottom it tapers to

a short length of hose of the same material, which is inserted into the filling ports of radiator and gasoline tank. With the funnel folded, and its end snapped to the rim, the bucket, of two-gallon capacity, can be used as a simple container.

HIGH-TENSION WIRES USED FOR INTERPLANT TELEPHONE

One American power company with stations at many points along the eastern coast is now able to eliminate the expense of leasing private telephone lines, for interplant communication, as a result of the recent perfection, after several years of experiment, of a system for talking over high-tension wires. The principle of the wired wireless, or directed radio, is employed, it is known, and with it an apparatus for tuning out the power-circuit frequency. At the first long-distance test of the system, held between two stations in New Jersey, conversation was maintained over a live 11,000-volt, 60-cycle transmission line 12 miles long. This distance was really 21 miles, however, as between transmitting and receiving sets, attached to the 2,300-volt busses at each station, were an underground cable and the windings of the two power transformers.

OIL-DELIVERY FIXTURE IS LIKE DRINKING FOUNTAIN

For delivering oil to the oilcans of the engineers in charge, there are now being



installed in many American pumping and similar stations small fixtures that resemble superficially the ordinary public drinking fountain. By means of the four bolts in its base one of these can be secured to the upper deck of a big engine, or in any other location convenient for the attending oilers. Piped to the spot from the filtering system of the plant, the oil is drawn off through faucets of the self-closing type. Over each is an etched plate showing the kind of oil.

❏ Catalogs containing the numbers and description of the thousands of photographs made by the Signal Corps to illustrate the war-time activities of the American Army, have now been supplied to all public libraries. Instructions for ordering are included, as it is felt that many will desire to take advantage of the present low prices of these invaluable pictorial records.

PORTABLE COTTAGE ASSEMBLED WITHOUT NAILS OR SCREWS

The "lawn cottage," as the newest portable dwelling is named by its manufacturers, is a structure of wood, canvas, and screening, and is chiefly interesting for the ease with which it can be put up and taken down. One hour is sufficient for the first operation, and 30 minutes for the second. Thus, to assemble the cottage, the floor is simply laid without foundation on a level piece of ground, the screened wall panels are hooked to the edges of the floor, and the rafters are fixed to the top rails with bolts and wingnuts. The canvas roof is then fastened to these top rails by means of swivel buttons. The inside

walls are furnished with sliding curtains for use when privacy is desired; the outside with similar but heavier curtains which are drawn in the event of storm or cold weather. The lawn cottage can be

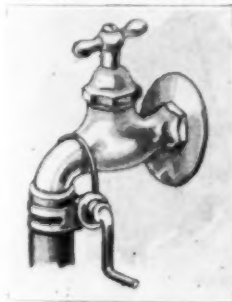


The Storm Curtain has been Withdrawn from the Front Wall of the Lawn Cottage to Show Two of the Screened Panels Which Form the Walls. The Structure can be Erected in an Hour

had in a number of sizes, one having space for two cots, another for four.

CLAMP ATTACHMENT CONNECTS HOSE TO ORDINARY FAUCET

A clamp attachment of recent invention permits the garden hose to be joined in an instant to the ordinary faucet in kitchen sink or bathroom, and so provides every householder with his own fire-fighting equipment. As hung from the horizontal portion of the faucet by a loop of wire, the attachment consists of a second loop encircling hose end and faucet mouth, and a small hand crank by means of which the two are clamped together tightly.



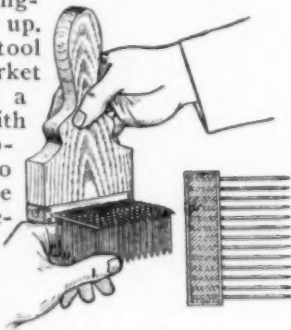
SCREW PROPELLER IMPROVED BY ADDING FIXED BLADES

Auxiliary fixed blades of calculated design, mounted close to the revolving blades of an ordinary screw propeller, have been found by a British motorboat authority greatly to improve its action. The fixed blades divert into useful channels much of the energy commonly lost in propeller slip, particularly at the higher

speeds, making feasible the use of smaller propellers. It is asserted that improvement of 67 to 86 per cent is attained in the efficiency of high-speed propellers, and that a saving of 10 to 20 per cent in the necessary engine power is possible, allowing for a reduction of both weight and fuel.

SIMPLE HAND TOOL ARRANGES NAILS WITH HEADS UP

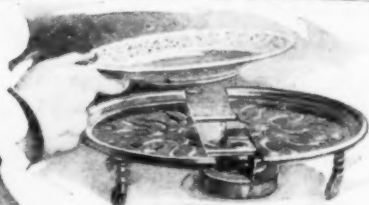
In crafts that call for rapid driving of nails, as in box making, much time is wasted getting the nails from the container and arranging them heads up. A patented tool now on the market is made like a small rake, with long, sharp-pointed teeth so spaced that the nails hang between them by the heads. When this is thrust into the container and shaken, it brings up its load of nails in position to be grasped by the worker's left hand, ready for driving, and saves his fingers from possible injury by the points.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



The Purchaser's Name and Address are Woven into the Fabric of Umbrellas Now Sold by One Firm. The Threads Are Visible Only on the Inside, and cannot be Plucked Out



The Alcohol Lamp beneath This Extensible Table Tray will Keep Warm the Contents of a Dish or Platter of Any Ordinary Size



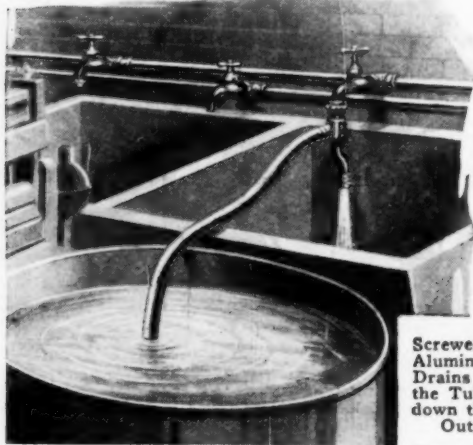
This Decorative Parlor Lamp Contains in Its Base a Complete Phonograph. The Turntable is Revolved by a Small Electric Motor, and will Hold a Record of Any Size. The Phonograph can be Operated without Switching On the Light, and Vice Versa



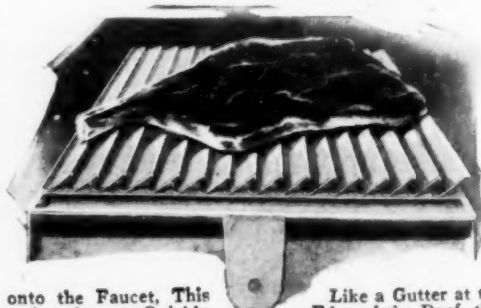
This New, Practically Unbreakable Jar Holds a Gallon of Liquid, or, as the Neck Opening Is Four Inches Wide, It can be Packed with Fried Chicken, Ice Cream, or Other Solid Food



These Collapsible Containers are Made of Duck over Frames of Heavy Wire, and are Used for Mailing Laundry or for Carrying the Tourist's Excess Clothing



Screwed onto the Faucet, This Aluminum Attachment Quickly Drains the Washtub. To Refill the Tub, the Water is Diverted down the Hose by Plugging the Outlet of the Attachment



Like a Gutter at the Edge of the Roof, the Trough Catches the Juices as They Run down the Inclined Surface of This New Meat Grill

INTENDED FOR THE HOME AND ITS MEMBERS



Placed in This Ornamental Wire Frame, the Glass Pie Pan can be Carried Directly from the Oven to the Table

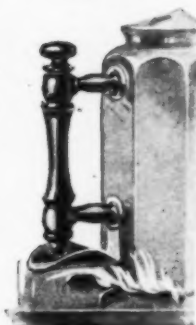


Pottery Bottles Made by an Indian Tribe of Mexico are Now being Sold in the Northern States for Cooling Drinking Water



Each Member of the Family Knows Where to Hang His Towel When the Bathroom is Equipped with These New Clip Holders. An Identifying Card is Slipped into Each, as Seen in the Detail View at the Left

This Watch, of British Manufacture, Contains a Miniature Gong Alarm. It can be Used on the Bedside Table, Too, Thanks to Its Luminous Face and Easel Back



When the Protector has been Attached to the Handle, One can Grasp the Percolator without Scorching the Fingers



A Wicker Refreshment Stand Adds to the Summertime Lure of the Shady Front Porch. The Top is Partitioned into Compartments for Cracked Ice, Pitchers, and a Dozen Tumblers

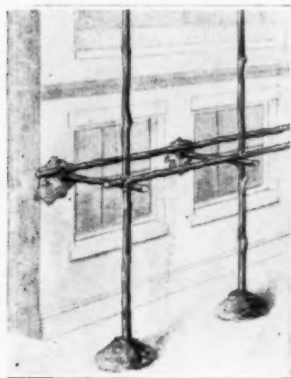
The Newest Collar Button Never Digs into the Neck Because It Is Not a Button at All—Simply a Flat Piece of Metal Cut to the Shape Shown



The Self-Adjusting Sun Shade Is the Feature of This Reclining Chair for Use on the Lawn, Beach, or Steamer Deck. As the Back of the Chair is Brought to Vertical, the Shade Rolls Itself to Smaller Length

FRENCH HOUSEBUILDERS ERECT SCAFFOLDING WITHOUT NAILS

One of the curious practices first to catch the eye of the American house-



building contractor who visits Paris and other French cities, is that his professional brothers of this frugal race erect all their scaffolding without the use of a nail or the subsequent loss of a single stick. These economies are made possible by the fact that French houses are usually of stone or brick. One end of each crosspiece is laid, accordingly, in a niche or hole in the wall. The other end is not nailed, but is simply tied to the upright. This is always a long straight pole, the lower end of which the workmen secure to the smooth slab sidewalk by means of a little mound of cement.

ELECTRIC GAS-STOVE LIGHTER OPERATED BY PUSH BUTTON

Yesterday regarded as a common convenience, the match is today unnecessary in modern kitchens. Among its latest rivals as a lighter of gas stoves is an electrical device, comprising a pointed rod, set in a handle, and a plug-equipped cord for attaching the appliance to a lamp socket. By depressing a push button on the handle, a spark capable of igniting gas is produced at the free end of the rod.



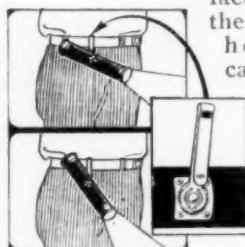
Three reinforced-concrete tanks, 37 ft. in diameter and holding 125,000 gal., in a western Pennsylvania city, have not only proved successful as containers of heavy fuel oil for almost two years, but one of them was recently used for light transformer oil, with wholly satisfactory results.

AIRDROME SITES LOCATED FOR CROSS-CANADA ROUTE

Airmen will soon be able to fly across Canada from coast to coast with the assurance that a well-kept emergency airdrome will be seen every fiftieth mile. Many of these landing-field sites have already been located, in fact, as a result of the recent survey of the route from Winnipeg to the eastern end of Lake Superior by a member of the Canadian Air Board Staff. He placed all of them close to the line of a transcontinental railroad.

BELT CLIP FOR FLASHLIGHT SWIVELS AND LOCKS

A flashlight of the cylindrical type, now being turned out by an American manufacturer, will appeal to the motorist, farmer, householder, and camper because it is provided with a clip, or hook, which slips over the user's belt. Accordingly, both his hands are free for the task to be done. The clip



differs from others of its kind, attached to flashlights in the past, in that it is mounted on a swivel near the center of gravity of the electric torch, and can be locked at any desired angle. In this adjustability it resembles the autoist's windshield spotlight.

SELF-ENVELOPING WRITING PAPER IS IMPROVED

Correspondence paper with edges perforated and gummed so that the sheet can be folded, sealed, and mailed without an envelope has had a limited vogue for a number of years. Recently, however, an American inventor has patented an interesting improvement for the sheet of this type. It consists of a rectangular aperture



with edges likewise perforated and gummed, and in such a position that, when the sheet is folded, there is displayed the name and address, previously

written in an indicated division of the page. In addition, provision is made for folding the sheet twice, with an envelope of ordinary size as the result.

TIMBER FROM DEAD TREES GOOD AS THAT FROM LIVE

The prejudice held by certain builders against the use of lumber from fire or insect-killed trees has been proved groundless by recent experiments of the Forest Products Laboratory. Here it has been found that lumber cut from sound dead trees is in no way distinguishable from any other, except that it may be partly seasoned. If the wood has not been injured subsequently by decay or further insect attack, this "dead" lumber is the equal of "live" of the same grade for all structural purposes.

AIR CUSHION FOR WATER PIPE IMPROVED BY CORK FILLING

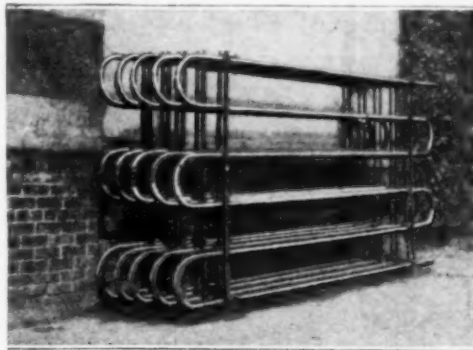
Air cushions for the prevention of water hammer in piping systems are entirely effective until the air gradually is forced out of them by repeated impact of the water, when they become practically useless. An Illinois inventor has applied for patent on an improvement consisting of a cork filling for each air chamber. With this modification, it is asserted that the air is permanently retained.

There is also greater latitude in the design and location of the cushion chambers, which may be placed at any convenient angle. The cork-filled cushions are made for pumps and hydraulic rams as well as for interior-piping systems.

BENT PIPE IS WATER HEATER FOR USE WITH BONFIRE

One building contractor, knowing that hot water is frequently needed in the course of a midwinter construction job, has devised a heating coil for use with an open fire. Properly, it is not a coil, but five long lengths of pipe, each bent back and forth five times, and all connected by short curved pieces. The five lengths

are kept in alinement by a number of steel uprights and crosspieces which are clamped to them. In use, the supply hose is connected to one end of the first pipe,



This Racklike Apparatus Is Composed of Five Long Pipes Bent Back and Forth and Connected. It Serves as a Water Heater for Use with a Bonfire

and the delivery hose to an end of the fifth. The rack is then set over the bonfire that is usually burning near a cold-weather job.

CELL TESTER MADE FOR MORE EFFICIENT BATTERY SERVICE

For the service station is now made an accurate cell tester that can be used with a battery of any make. It consists of two steel bars, or prods, about six inches long, and three inches apart at the contact points. They are connected, at the top, by an insulated grip, and below, by a rust-proof nickel-chromium resistance of .1 ohm, and by a voltmeter with a two-volt scale.

The meter is of the moving-coil type, and is of rugged construction.



Great scarcity of fuel oil in the Far East has made it necessary to convert for coal use a number of oil-burning freight ships now plying the Pacific, and a dozen vessels in one line are now making the change. Fortunately several of them are equipped to do the work at sea, about 24 hours' labor being required to install the coal grates.

OILS FLANGES OF CAR WHEELS AUTOMATICALLY ON CURVES

Lubrication with crude petroleum greatly reduces the wear on car-wheel flanges caused by track curves, and by a

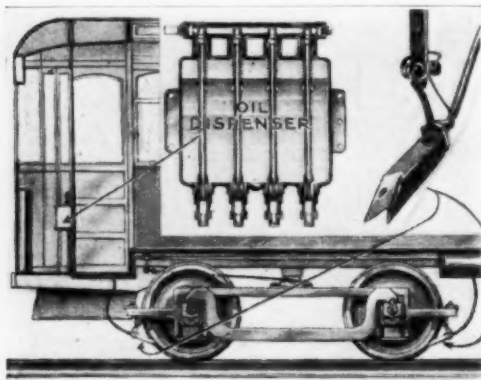
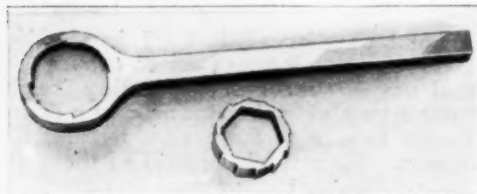


Diagram Showing the Wheel-Flange Oiler on a Car, and, Above, Details of Oil Tank and Wheel Shoe

recently patented system now in use on a western traction line, this is accomplished without waste of oil. A cast-iron distributing shoe, which spreads a thin film of oil on the flange, is connected by pipe to the petroleum tank, located in any convenient place. Pressure from the air-brake system is used to force the oil feed, by means of a simple arrangement of plungers. The air valve is operated by a lever connected to the truck, opening automatically while traversing each curve. About one quart of oil a day is used for each four-wheel truck.

SIMPLE RATCHET WRENCH HAS REMOVABLE SOCKET PIECE

Tightening or loosening nuts in inaccessible corners, where the wrench can make but a short turn, is greatly simplified by the use of a new tool. The handle is merely a metal bar formed at one end into a ring with four internal ratchet teeth. Into this opening fits a metal piece with 12 external ratchet teeth, and a



A Simple Ratchet Wrench with Interchangeable Socket Pieces to Fit Hexagonal or Square Nuts

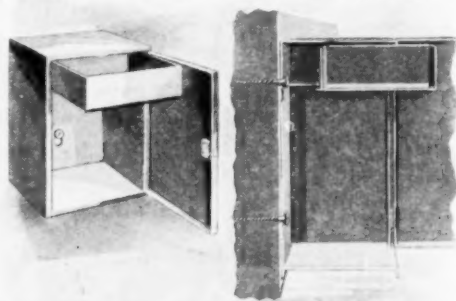
square or hexagonal hole in the center for the nut. One of these socket pieces is selected to suit the work in hand, placed on the nut to be turned, and the handle slipped over it in the most convenient position.

CONCRETE SHIP JUST BUILT IS EAST COAST'S LARGEST

The Atlantic coast's largest contribution so far to the art of concrete ship construction is the steamer "Dinsmore," recently launched at a Florida shipyard. The new vessel is 435 ft. long, 54 ft. beam, and 36 ft. deep, with a 5-in. slab bottom and 4-in. sides on heavy reinforced-concrete frames. Its dead-weight tonnage is 7,500, and its oil-burning water-tube boilers and triple-expansion engines are rated at 2,800 hp. Light burnt-clay aggregate and finely ground cement were used for the concrete. The ship was launched sideways.

SMALL SAFE FOR HOME USE LOCKS ONTO ANY WALL

For home use, a small steel safe that locks immovably onto any wall, instead of having to be built in, is highly convenient. One of that type is now manufactured of

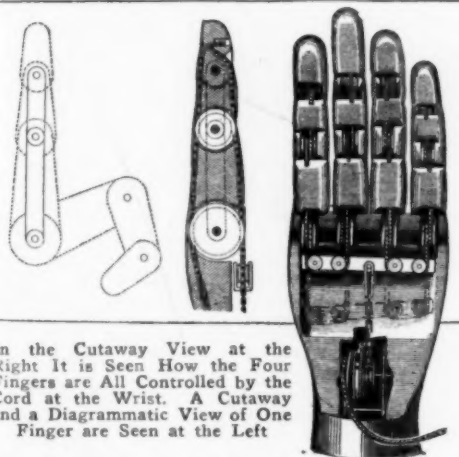


Left: The Wall Safe Open, Revealing the Drawer. Right: Cross Section, Showing How the Drawer Flange Locks the Back Plate to the Wall Screw

heavy sheet steel, measuring 14 in. high, 10 in. wide, and 7 in. deep, with a small drawer at the top. Two screws with buttonlike caps are put into the wall, and holes in the back plate of the safe are then set over the screws. The safe drops down so that the screws enter slots, and is locked in this position by a steel flange on the back of the drawer, which extends under the cap of the upper screw and prevents raising the safe. The door covers the whole front, and has a reliable lock.

FINGERS OF AUTOMATIC HAND FUNCTION INDEPENDENTLY

An automatic hand now finding favor in France is quite lifelike in that each of the four fingers exerts its gripping power independently of the others, although all are controlled by a single cord. This is stretched to the cripple's upper arm or shoulder. The action is achieved by a system of short cords and pulleys, concealed in the fingers, and terminating in a single crossbar hidden in the palm. When this crossbar is pulled toward the wrist by the cord mentioned above, the fingers wrap themselves about the tool handle or other article to be apprehended, accommodating themselves meanwhile to the contours of the object. To release them, the cord is simply pulled again.



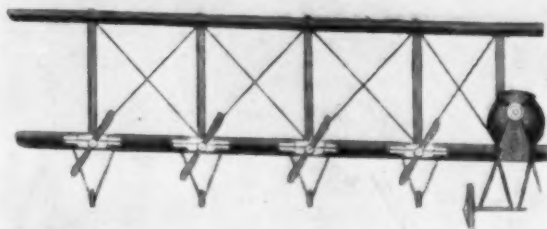
In the Cutaway View at the Right It is Seen How the Four Fingers are All Controlled by the Cord at the Wrist. A Cutaway and a Diagrammatic View of One Finger are Seen at the Left

Though the hand weighs only $\frac{3}{4}$ lb., it will carry weights of 25 lb. or more.

AIRPLANE TO HAVE ENGINES ALONG AND WITHIN WINGS

The recent introduction in Germany, and the investigation in England, of the thick, high-lift airplane wing focuses consideration upon a curious British invention that a decade ago would have been the subject of ridicule. The inventor places the propelling engines in the interior of the wings, in fact, and so approaches the ideal airplane structure by discarding the parasitic resistance of engine nacelles, supports, and fixtures. The engines are of the horizontally opposed type, and are carried by the spars. And in the high-lift wing, as a point of interest,

the spars are usually of cantilever construction, and so should lend themselves easily to this use. If the aircraft is a biplane, finally, the inventor carries his idea to its logical end by placing the fuel tanks

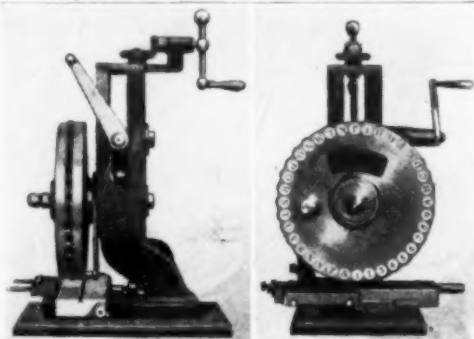


In the "Transparent" View of the Lower Wing are Seen the Engines, Each Turning a Propeller. The Fuel is Carried in Tanks Placed Similarly within the Upper Wing

within the upper wings. The feed pipes are brought down to the engines through the hollow interplane struts.

MACHINE STAMPS CHARACTERS UPON SOFTENED METAL

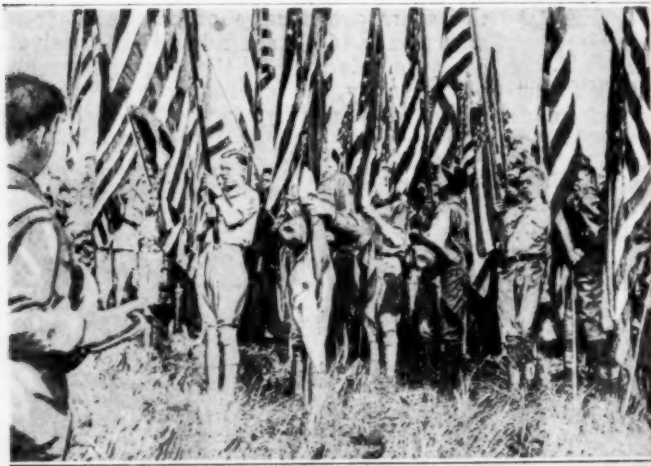
The work of stamping letters, numerals, and other characters upon heat-softened metal and similar substances can now be done quickly and precisely by means of a new machine. Essentially, this consists of two parallel disks which hold the stamping dies between their circumferences, and are mounted on a horizontal shaft. To force down this shaft and so stamp the metal, placed beneath the disks, the operator turns a hand crank. A second crank, at the top of the machine, is used to regulate the descent of the shaft, and consequently the depth of the impressions made. Provision is made for a



The Metal Stamping Machine in Side and Front View: The Article to be Stamped is Placed beneath the Disks

certain flexibility in this action, in order that the die may not break when an area of unsoftened metal is encountered.

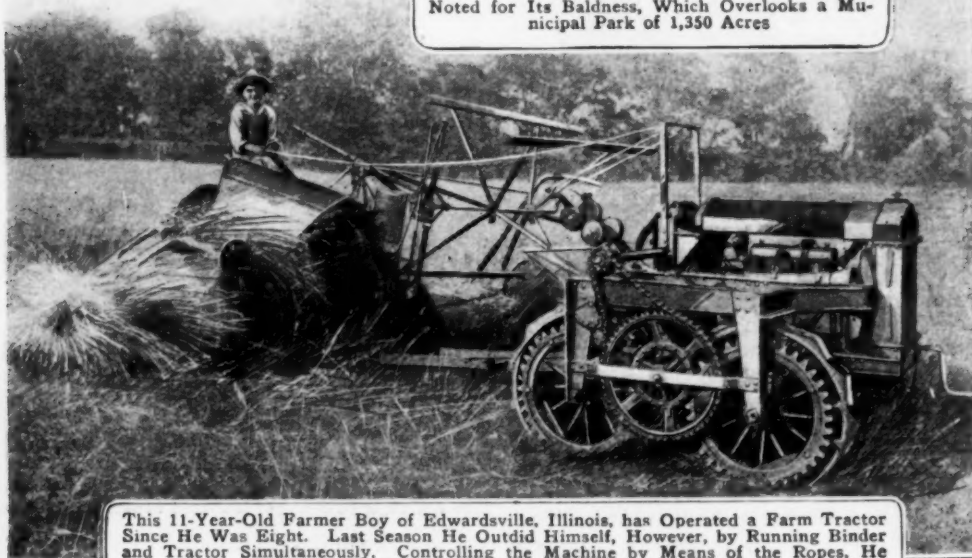
CHILDREN'S PICTURE-STORY DEPARTMENT



Massed behind Their Flags, Stand the Boy Scouts of Kansas City, Missouri, on the Occasion of the Dedication of a Maple Grove to the Memory of Theodore Roosevelt. Exactly 60 Trees Compose the Grove, as Each of the 60 Troops Brought and Planted Its Own Seedling. The Nurture and Protection of This Tree will Be the Future Duty of the Troop



Above Is a More Comprehensive View of the Ceremony Attending the Dedication of the Memorial Grove. The Location Is a Hilltop, Previously Noted for Its Baldness, Which Overlooks a Municipal Park of 1,350 Acres



This 11-Year-Old Farmer Boy of Edwardsville, Illinois, has Operated a Farm Tractor Since He Was Eight. Last Season He Outdid Himself, However, by Running Binder and Tractor Simultaneously. Controlling the Machine by Means of the Ropes, He Drives It around the Field without Dismounting

OF MODERN ACTIVITIES AND INTERESTS

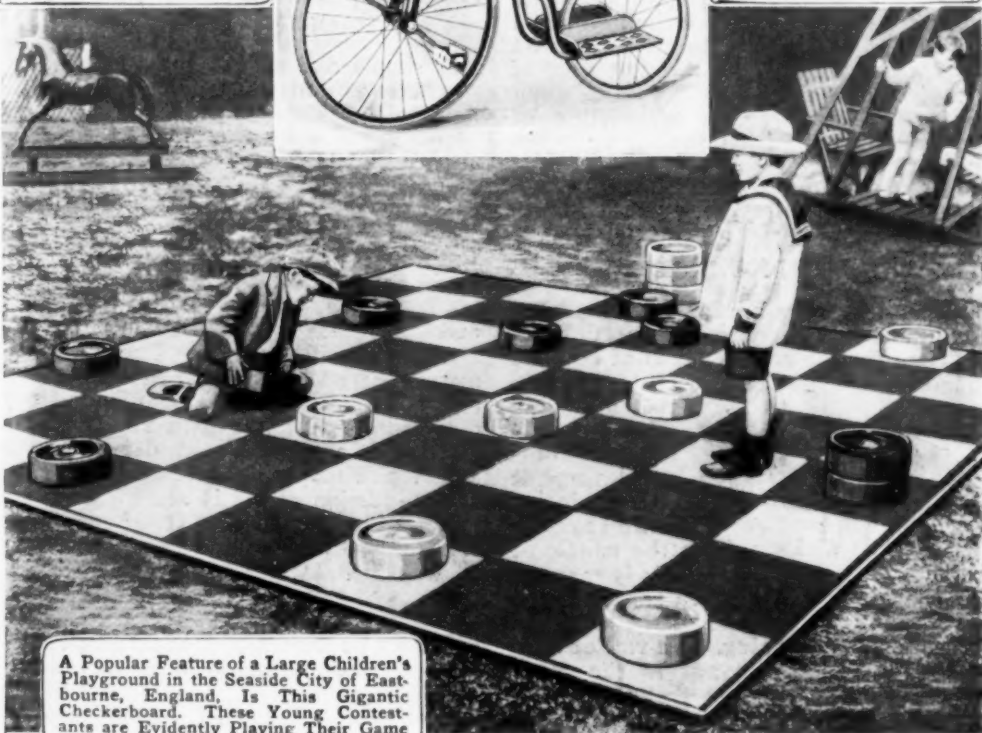


COPYRIGHT, PATHE BEWS

Though No Larger than a Toy, This Miniature Endless-Tread Tractor Contains a $\frac{1}{4}$ -Horsepower Engine, Weighs 55 Pounds, and, as Demonstrated in the Photograph, can Haul Four Men of Ordinary Size



The Bicycle at the Left has been Designed for the Boy Who Is Not Old Enough to Own a "Bike" of Standard Size. The Treads in Rear can be Swung Down to Serve as a Supporting Stand

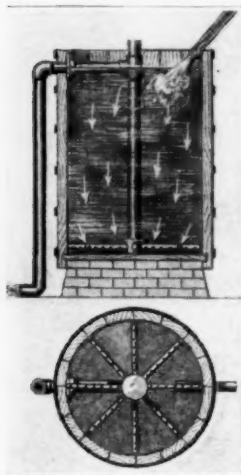


A Popular Feature of a Large Children's Playground in the Seaside City of Eastbourne, England, Is This Gigantic Checkerboard. These Young Contestants are Evidently Playing Their Game in Happy Disregard of the Rules

COPYRIGHT, KEYSTONE VIEW CO.

ATTACHMENT FOR CISTERNS REMOVES STALE WATER

An objection to the old-time cistern, used to retain rain water from the roof, was that sediment and stale water sank to

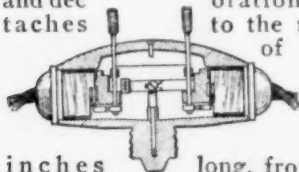


the bottom, and there remained, undisturbed by occasional replenishments of the supply. But this fault can now be corrected, those who still use cisterns will be interested to know, by the installation of a simple circulating apparatus of recent invention. This consists in principle of a U-shaped pipe, inverted. One arm of the "U" extends vertically downward to the bot-

tom of the cistern, where it branches out into eight radial pipes with many intake holes. Obviously, when a rainstorm raises the water level higher than the horizontal mid-section of the "U," the stale water on the bottom will rise in the first arm of the pipe, and then escape to the drain down the second. The mid-section of the pipe is provided with an air outlet, to prevent complete emptying of the cistern by a siphoning action.

TWO-WAY CONNECTOR SOCKETS SWITCHED ON INDEPENDENTLY

Because in only a very few dwellings the number of electrical connections is sufficient for the requirements of comfort and decoration, interest attaches to the recent invention



of a double-ended socket. In outward form it resembles a tube several inches long, from the middle of which projects the plug. This is screwed into the socket in baseboard or wall in the usual way. At each end of the tube is a socket for a similar plug. The real novelty of the connector lies not in the form, however, but in the fact that the circuit to each of the end sockets can be opened or closed independently. This is done by means of two projecting spindles.

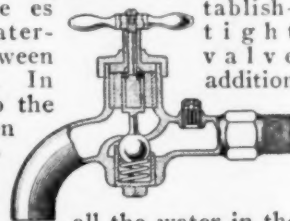
CROSS-CHANNEL AIR TRAFFIC SWELLS TO BIGGEST VOLUME

Exactly 100 airplanes engaged in cross-Channel mail, package, and passenger transportation arrived at or departed from the London Terminal Aerodrome, just south of the metropolis, during a seven-days' period recently ended. At Cricklewood Air Port near by, the figure for the same period was 22, all of these being big Handley-Pages on the London-Paris or the London-Brussels service. This weekly traffic record is noteworthy because at the terminal airdrome the number had never before reached three figures; but it is even more significant to those with faith in aviation, as an indication that the aircraft industry is soon to "hit its stride." The combined traffic at the two fields can be tabulated as follows for Monday and Tuesday, typical of the other weekdays:

Date	Number	From	To	Passengers
Monday	7	London	Paris	19
	1	"	Amsterdam	3
	1	"	Brussels	1
	9	Paris	London	12
Tuesday	7	London	Paris	16
	5	Paris	London	2
	1	Brussels	"	1

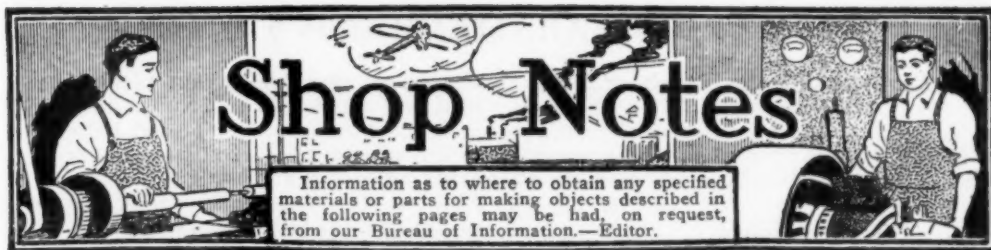
NEW WATER FAUCET REQUIRES NO PACKING OR GASKETS

A simple and durable water faucet of recent invention requires no packing or gaskets for the establishment of a water-tight connection between and valve seat. In addition it admits air to the water pipes when the waste outlet in the cellar is opened, and so permits



all the water in the system to drain promptly. The valve is a metal sphere which is held against a horizontal, circular opening by the pressure of a coil spring. When the faucet handle is turned, a vertical rod depresses the sphere and so permits the flow of water. The admission of air is accomplished by means of a secondary valve, of somewhat similar type as, and immediately in rear of, the first. Its action is automatic.

⚡ Action of ultraviolet rays on the human skin may be neutralized, according to experiments conducted by a French scientist, by a process involving the use of the complementary group of infrared rays at the same time, making it possible to protect X-ray operators against burns.



A Half-Ton Traveling Crane

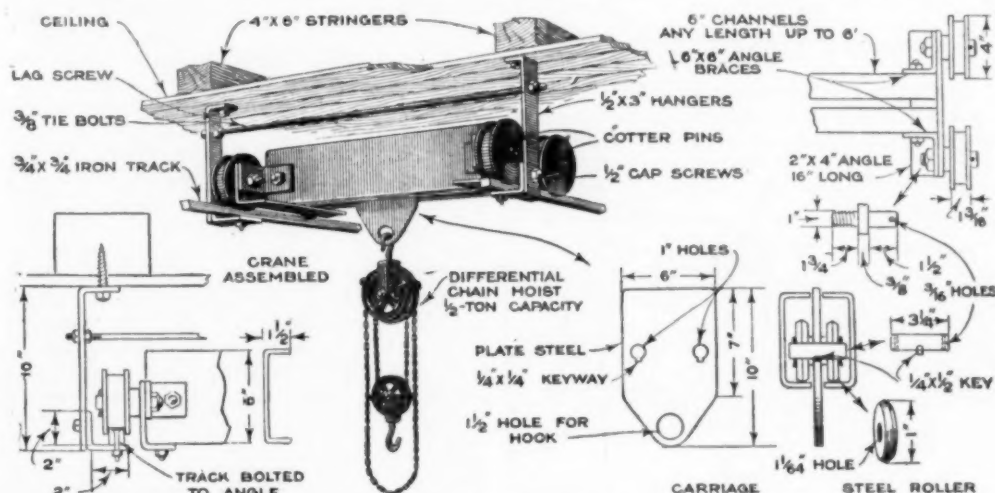
By J. V. ROMIG

THERE are many places where a small traveling crane can be used to advantage, such as small ice-making plants, shipping rooms, storage warehouses, etc., but where the cost of such an aid is a very big factor; to such places, the crane illustrated will prove a boon, as the various parts required in the assembly are usually to be found in the shop.

First, plan the exact location of the track; its length, width, and height from the floor; with these dimensions at hand, proceed to lay out the design of the various pieces. The dimensions shown in the drawing are suitable for a crane up to 6-ft. span. The channels which form the bridge are placed with their webs out, and the flanges about $\frac{3}{4}$ in. apart. The endpieces are of 4 by 2-in. angle iron, with 1-in. holes drilled in the 4-in. flange for the trolley-wheel pins. These endpieces are fastened to the channel irons by braces made from 6 by 6-in. angle iron, 3 in. wide, one leg of the brace being bolted to the channel iron, while the other is clamped to the endpiece by the nut of the trolley pin. The trolley wheels, car-

riage rolls, trolley pins, and roll pins are turned from cold-rolled steel to the dimensions shown, the roll pins having a small feather key in the center which fits a keyway in the carriage plate. The carriage plate is made of $\frac{1}{2}$ -in. boiler plate, drilled for the roll pins and for the hoist hook.

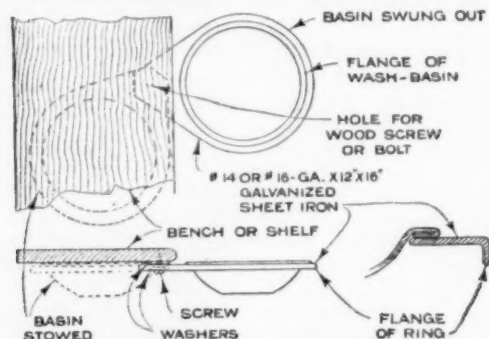
When the crane has been assembled, measure the gauge of the trolley wheels, and put up stringers corresponding to this measurement, to carry the tracks. The track members are made up of $\frac{3}{4}$ -in. square machine steel, bolted to pieces of 2-in. angle iron, which in turn are bolted to the $\frac{1}{2}$ by 3-in. hangers. These hangers are fastened to the stringers by lag screws or bolts, and are braced as shown, by $\frac{3}{8}$ -in. tie bolts; the hangers should be spaced about 3 ft. apart. The crane is completed by the addition of a $\frac{1}{2}$ -ton hoist. By seeing that the track is level, and the trolley wheels and carriage rolls oiled at frequent intervals, a light-running crane will be the result, which will more than repay the labor of building it, by the saving effected in handling costs.



A Light-Running Crane, Which will Add Greatly to the Ease of Handling Materials in a Small Shop, is Easily Constructed of Available Materials

A Lavatory for the Bench or Boat

The lack of space in a small shop or on a boat need not prevent having a permanent lavatory or folding washbasin, which

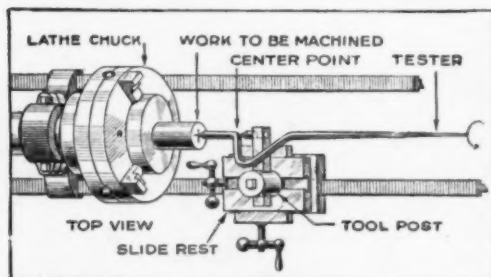


In a Small Shop or Boat a Permanent Mounting for a Washbasin will Provide at Least a Part of the Convenience to be Had in More Luxurious Quarters

can be built at small cost. It should be placed under some convenient shelf, locker, or bench, which is about as high as a common washbowl would be from the floor, and a little wider than a common enamel basin. A piece of galvanized sheet iron forms a ring which supports a common washbasin. The iron ring should have a flange bent downward all around the edge, for greater strength, and should have a hole drilled in the projecting portion at one side, through which a $\frac{1}{4}$ -in. bolt or wood screw extends up into the bench or shelf. When not in use, the basin can thus be swung around out of sight. Such an arrangement has been found very satisfactory on small steamboats.

Indicator for Chucking Lathe Work

A tester, to determine whether a piece to be turned or machined in a lathe is chucked accurately, is shown in the drawing. An old lathe tool is drilled, and a center pin is driven into one end, as

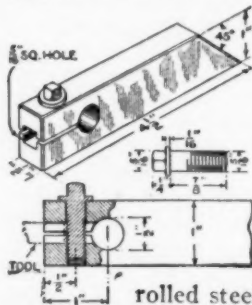


A Simple Testing Tool That Shows Whether Work Held in a Lathe Chuck has been Accurately Centered or Not

shown. A steel rod, about 15 in. long, is filed or turned to a tapering point at one end, the other end of the rod being provided with a point similar to that of a lathe center; a right-angle bend is made about 2 in. from the center-pointed end of the rod. A punch mark is made at the shoulder and a center hole is made to take the center point on the lathe tool; the rod is then bent as shown. To use this tester, the tool is set in the tool post, after the piece to be machined has been placed in the chuck. The point of the tester is set in the center hole of the work and the center in the tool post is placed in the center hole provided at the shoulder of the tester, as shown in the drawing. When the lathe spindle turns, the end of the tester will remain motionless if the work is properly chucked, but if the chucking is not true, it can be detected by the movement of the pointed end.—G. A. Luers, Washington, D. C.

Tool Holder Saves High-Speed Steel

On account of the cost of high-speed steel, all possible means are resorted to to save it, and a single tool bit is employed until it is too small for further use. One of the most effective means of getting the utmost service from a tool bit is afforded by the holder shown in the drawing. This holder is made, according to the dimensions given, from cold-rolled steel, and is designed to take a $\frac{5}{16}$ -in. bit. After the $\frac{1}{2}$ -in. hole has been drilled, the square hole is formed by drilling, first with a $\frac{3}{8}$ -in. drill and then filing; afterward, the tool is slitted, as shown, through the center of the square hole. A $\frac{1}{4}$ -in. hole is drilled and tapped to take the setscrew which is made, to the dimensions given in the drawing, from cold-rolled steel, whereupon both the holder and setscrew should be casehardened. In use, the tool bit is inserted into the square hole where it is rigidly held by compression when the setscrew is drawn up. Tool bits as short as $\frac{5}{8}$ in. can be satisfactorily used with this holder.



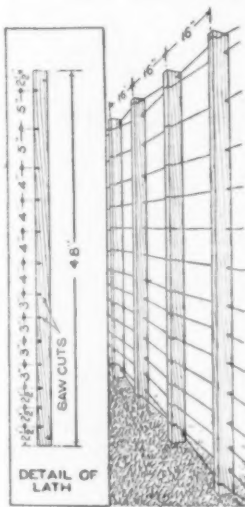
Hot valve handles wrapped with rope permit manipulation without burning the hands.

Template Aids in Hanging Doors

Fabricated ships and standardized automobiles are possible only because patterns, or templates, are used which allow the parts to be finished without any fitting before they are assembled. The same idea can be adapted to hanging doors and windows. Take a waste strip and cut it to the length of the opening, less the amount of clearance desired at the bottom. Then take the hinge butts and sink an impression of them in the strip at the points where they are to be installed. By jamming this strip tightly against the top of the opening, exact locations for the hinges are obtained; by holding the strip even with the bottom of the door or window to be fitted, the hinges are similarly located.

A Low-Cost Poultry Fence

A suitable fence for poultry, that possesses the advantage of being nonsagging, can be made from plasterer's lath and No. 19 gauge galvanized wire.



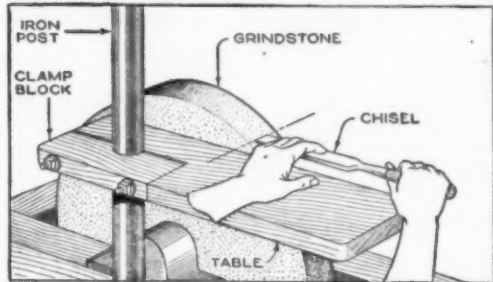
A pattern lath should first be cut, to insure that all are made alike. To do this, a common 48-in. lath is marked off, as shown in the cut. The two notches near the ends, on the same side, are for the selvage wires; those on the opposite edge for the intermediate wires. At each of the points shown, the lath should be sawed about one-third through. For 100 ft. of fence, about 75 such laths will

be required, and they may be notched in lots of several at a time by using the pattern as a guide for the saw.

Two posts, 100 ft. apart, should be set in the ground, and 15 wires strung between them, spaced to correspond with the pattern. These should be left somewhat slack, and the laths put in place, 16 in. apart, with the slots in adjacent ones on opposite sides of the fence. When all the laths are in place, the wires should be stretched taut, and fastened to the intermediate posts with staples.

Table for Grinding Edge Tools

The foreman of a woodworking shop found it necessary to install some device



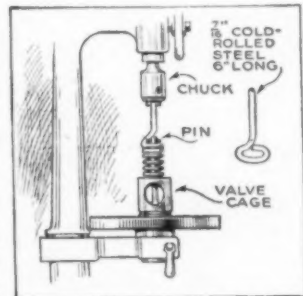
A Table Set near the Grindstone in the Workshop
Forms a Guide for Correct Grinding
of Edge Tools

to assist his less skilled workmen in grinding chisels and other edge tools to the correct angle. For this purpose he fitted the device illustrated to one of the steel columns in his shop, and the results have been very satisfactory. The grindstone is mounted permanently near the column, and a table is clamped to the column at just the proper position to give the correct angle to the tools. The chisel is held by the two hands, as shown in the sketch. The hand which holds the blade rests on the table, and the other steadies the tool by a grip of the handle. As the tool itself does not rest on a rigid surface, it can be shifted from left to right as necessary, to avoid nicks in the edge. As the workman always has a table to use as a guide, if the tool is parallel to it, the grinding angle will be correct.—M. E. Duggan, Kenosha, Wisconsin.

Removing Spring from Valve Cage

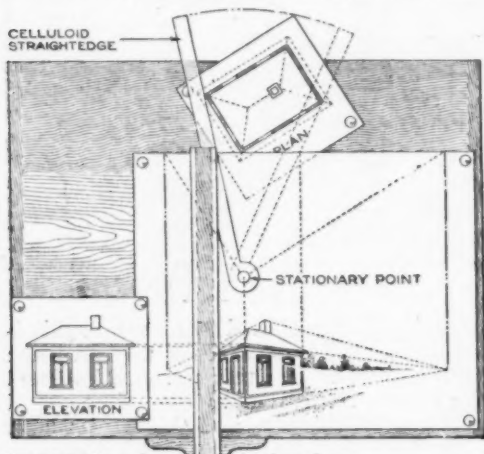
An easy method of removing the springs from automobile valve cages is shown in the illustration.

A piece of $\frac{7}{16}$ -in. cold-rolled steel is bent as shown; the shank is clamped in the drill-press chuck, and the ring is placed over the disk on the end of the spring. The chuck is then fed down, when the cotter pin may be easily removed.—S. Vierengel, West Palm Beach, Florida.



Swinging Rule an Aid in Perspective Drawing

A time and labor-saving rule, or straight-edge, for projecting perspective drawings, is made from a strip of transparent celluloid,



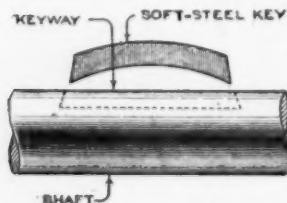
Draftsmen Who have Made Perspective Drawings by the Time-Honored but Tedious Method Commonly Used will Appreciate the Merit of a Swinging Perspective Rule

loid, or cardboard, as shown in the drawing. The stationary point is located as indicated, and on a line with the edge of the rule; the device is held to the drawing board, at the proper position, by a thumb-tack inserted at the stationary point.

To transfer any point on the plan onto the perspective, all that is necessary is to swing the rule until its working edge touches the desired point, and to hold it there while the T-square is moved until it intersects the working edge of the swinging rule, as indicated. — Henry Simon, Laguna Beach, Calif.

Inserting a Tight Key or Feather

In some machines it is necessary to use a key that is inserted in the plain part of the shaft, away from the end, and to have the key, or feather, fixed in place. Such a key can be made by the following method:



Cut the keyway as usual, but undercut the ends, as shown in the sketch. Make a soft-steel key of exactly the same size and shape as the keyway, including the beveled ends. The key will, of course, be too long to insert. Bend

it, as shown, until it can be dropped or tapped into the keyway, and straighten it out in place with a few sharp hammer blows. If properly made, the key will hold very firmly.

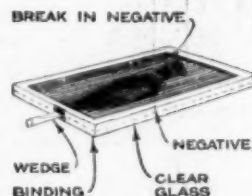
It is necessary to allow a little material for finishing up the key after it has been hammered home. Do not try this plan for a very short key, as the bend will not straighten out properly. — Howard Greene, New York, N. Y.

Sweeping Chimney with a Small Tree

When a chimney or smokestack becomes so fouled with soot that its efficiency is impaired, it can be easily swept out with a small fir or spruce tree. If the chimney has a clean-out door at the bottom, a rope can be lowered from the top until the end can be drawn through the opening; the tree is tied to the middle of the rope and pulled up and down until the flue has been cleaned. In case there is no opening at the bottom, a stone, or other weight heavy enough to drag the tree to the bottom, can be tied to the tree. A good, strong rope should always be used, and the tree securely fastened so as to prevent its becoming caught in the chimney. — J. A. Stevens, East Boothbay, Me.

To Prevent Iridescent Marks on Negatives

When using a broken negative that has been bound on a piece of glass with gummed tape, iridescent marks are often the cause of a lot of trouble, especially if the negative is used in the enlarging camera, when making a transparency for reproduction. It has been found that these marks can be easily eliminated by proper treatment. Scrape about $\frac{1}{8}$ in. of the binding from the edge, and trim a match stick to a wedge; the thin edge is



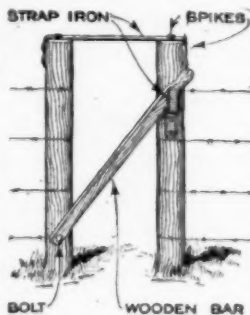
inserted between the negative and the glass, to just the depth of the binding strip. Then trim the wood flush with the edge. This treatment allows air to enter between the negative and glass and disperses the iridescent marks. Sometimes it is necessary to do this on two or more sides, depending upon the size of the plate, and the number and position of the marks. — Wm. Underwood, Tunnel Hill, Ill.

Blasting with Gasoline Vapor

That gasoline vapor can be used for dislodging an obstruction in an underground sewer pipe was discovered in an emergency that would otherwise have necessitated exploring underground in about 15 ft. of frozen earth. A single-cylinder, 5-hp. gasoline engine was connected to the rear wheel of a motor truck by a belt, both rear wheels being jacked off the ground. The exhaust from the engine was piped into a manhole, and the opening made air-tight by stuffing it with old burlap, cement, stones, and wood. The truck was then started and the gas engine was operated as a pump for some minutes, so that a mixture of gasoline and air was pumped into the sewer. The timer was arranged so that the engine would fire when the exhaust port was open. After pumping the inflammable vapor into the sewer for about 15 minutes the mixture was fired and the obstruction was blown out without damage to the sewer.

Narrow Gate Useful on Farm

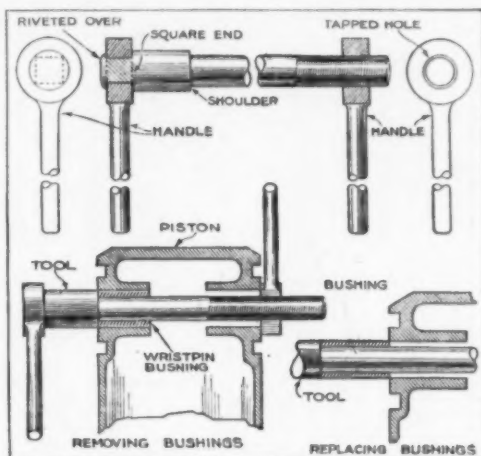
There are places, in fences and corrals, about every farm, where a gate would save much time and many steps. If two posts are set a little more than a foot apart, the average man can slip through sideways easily, but cows and other stock cannot pass. These posts will not require other bracing than a piece of strap iron or timber spiked across the top. Such a gate is often most useful at the corner of a fence, or where a fence joins a building. If placed in the middle of a barbed-wire fence, the wire can be first stretched across the opening, and after it has been secured to the posts with staples, it can be cut in the center and the ends wrapped around the posts. Where small stock is kept, a single bar, placed diagonally across the opening and pivoted at the bottom, will keep the animals from passing; a strap-iron hook supports the upper end of the bar.



Hardened paint and varnish can be removed from paintbrushes with vinegar.

Tool for Handling Wristpin Bushings

An easily made and effective tool for inserting or extracting piston wristpin



An Easily Made and Effective Tool for Inserting and Extracting Piston Wristpin Bushings: This Tool Does the Work of an Arbor Press without the Expense

bushings is shown in the drawing. This tool is made from a piece of steel rod which is turned to form a threaded shaft having a shoulder and a square end for a handle which is attached to the end of the tool by riveting the end after the handle has been put in place. The threaded end of the tool screws into a threaded collar which is welded to a handle, as indicated.

To remove a bushing, the tool is placed through the piston, and the collar is screwed up, forcing the bushing to the center of the piston and out of the boss. To insert a bushing, it is slipped over the tool, and the end is run through the piston; when the threaded collar is turned up, the new bushing is forced into the boss until it clears the outside of the piston.

Tightening Wooden Spokes

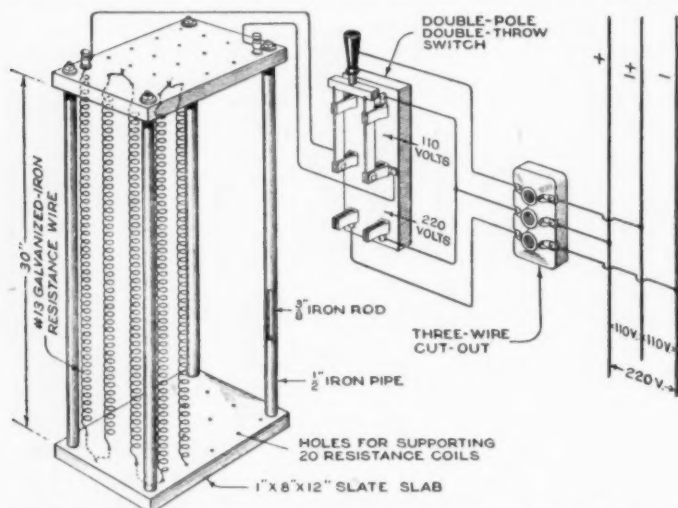
Loose spokes and felloes of wooden wheels can be permanently tightened without shrinking the tires. Soak the entire wheel in water until the wood is swollen and the spokes and rims are tight. After this has been done, immerse the wheel, either wholly, or a section at a time, into boiling linseed oil. The oil will drive the water out of the pores and take its place, and, on drying, the oil will remain in the wood. This process will require about $\frac{1}{2}$ gal. of oil for a set of small-size automobile wheels.

Variable Electric Heater for Three-Wire Circuit

By ELMER A. CRANE

A CHARACTERISTIC feature of electric heaters is that they are highly efficient, that is, nearly all of the electrical

used to hold the slabs together. Each resistance coil is supported by passing its free ends through holes in the slabs, and connecting the ends together,



An Electric Heater Designed for Use on a Three-Wire 110-220-Volt Circuit: In Mild Weather It can be Connected into the 110-Volt Circuit, and in Severe Weather Twice the Heat is Developed by Switching It to the 220-Volt Circuit

energy which goes into the heater reappears as heat. A homemade heater, arranged for operation on a 110-220-volt, three-wire circuit, is described in this article.

The drawing shows the constructional details of this heater. The slate slabs are drilled as shown, for the accommodation of the resistance coils; iron tie-rods and pipe spacers at each corner of the slabs are

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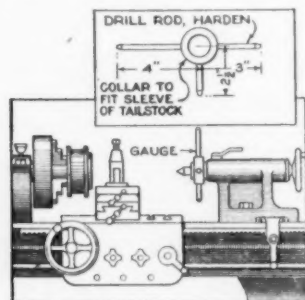
used to hold the slabs together. Each resistance coil is supported by passing its free ends through holes in the slabs, and connecting the ends together, as indicated, all of the coils being connected in series. Approximately 1,000 ft., or 25 lb., of No. 13 gauge galvanized-iron wire will be required for the resistance coils. The coils are connected to the source of current by suitable binding posts mounted on the upper slab, as shown.

In mild weather, the heater may be connected into the 110-volt circuit by throwing the double-pole, double-throw switch to the upper position, as in the drawing, and in severe weather, it can be connected into the 220-volt circuit by throwing the switch to the lower position; the heat developed in the latter case is twice that when connected with the 110-volt circuit. As suggested in the drawing, the apparatus is protected against overload by a three-wire cut out.

Such a heater was used with excellent results in a warehouse room 12 by 13 by 20 ft., having two windows and a glazed door, maintaining a comfortable temperature even during severe weather.

Gauge for Setting Lathe Tool

A handy gauge to be used on the lathe tailstock for setting the tools, is shown



held to very close limits. As shown, it consists of a steel ring, ground to a fit on the tailstock sleeve, with holes drilled

radially around the circumference, into which are driven the rods used as gauges.

The length of these rods will, of course, depend upon the job; in use, the tool is run in until it just touches the rod for the particular size required, and the cut will reduce the piece to the proper size.

Cutting Reinforcements in Concrete Structures

Reinforcing in concrete beams, walls, etc., should never be cut if it is possible to avoid it. The reinforcement is inserted in the concrete for the purpose of giving the concrete the necessary tensile strength, and, while there is usually an ample factor of safety used in computing the amount of reinforcing necessary, it is best, when it is necessary to cut through a beam or wall, to have the work super-

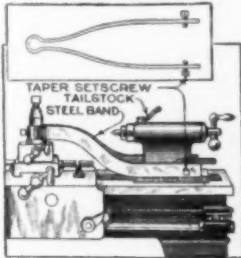
vised by a competent construction engineer, so that the structure may not be weakened beyond the safety mark. Of course, this does not apply to inserts set in the concrete for the purpose of bolting up hangers for line and countershafting, or where the concrete is used as a fire-proof coating for solid steel I-beams.

Hanging Wallpaper over Grease Spot

Everyone who has tried it knows that wallpaper hung over an uncovered grease spot will absorb the grease and show an ugly stain, and paperhangers are often put to considerable trouble and expense by the necessity of sizing such spots before they can be papered. A simple dodge, in such cases, is to paste over the spot a piece of ordinary butcher's paper, at least twice the size of the spot to be covered.

Power Feed for Drilling in Lathe

An attachment which does away with the necessity of feeding a drill by hand, when drilling in the lathe, is made from a piece of $1\frac{1}{4}$ by $\frac{1}{4}$ -in. cold-rolled steel. The steel is bent as shown in the drawing, to fit around the toolpost, to which it is clamped by a setscrew; the two ends are brought down and fastened to the tailstock setscrews.



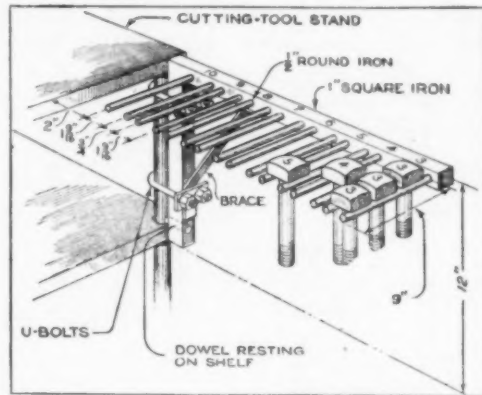
In use, a tool holder is placed in the toolpost, and the toolpost tightened, the attachment is then secured in position, and the center run in to meet the drill; the carriage feed does the rest.

Restoring Crossed Threads

After the crossed threads of an important part of a machine have been re-threaded to function properly, they are quite likely to turn hard and have a tendency to jump back and recross. Both of these handicaps can be overcome with a little valve-grinding compound. Apply the compound to the female threads and turn the threads into one another in the same fashion as in valve grinding: a back-and-forth turning, with a little gain on the forward motion at each turn. The compound should be thoroughly removed after the threads work properly.

Rack Keeps Planer Bolts in Order

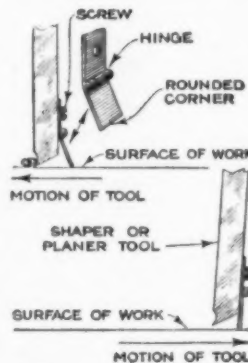
The rack shown in the drawing for holding the T-bolts used on planers, and



A Rack for Holding Planer Bolts Eliminates the Usual Search through a Box of Unsorted Bolts for One of the Proper Length

other metal-working machines, will meet with the approval of every operator who has fumbled around in a box of unsorted bolts in search for one of a certain length. Nearly all shops are now equipped with metal tool stands to which the rack in the drawing is attached with U-bolts, as shown; a small dowel at the lower end of the rack bears against the shelf of the tool stand and prevents slipping. The $\frac{1}{2}$ -in. holes, in the L-shaped rack arm, are carefully drilled; this will permit the round iron pegs, which are usually over-size, to be driven in tight. The size of each bolt is stamped on the head with a steel numbering die, and also on the rack, so that bolts of a certain length are easily located.—H. L. Ruark, Hillyard, Wash.

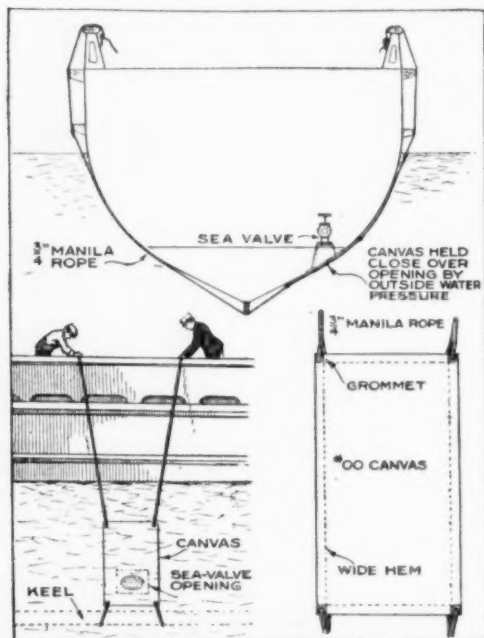
Tool Lifter for Planer or Shaper



An easily made attachment which will lift the shaper or planer tool on the back stroke, thus preventing undue wear on the cutting edge, is shown in the sketch. A common butt hinge, preferably a brass one, is attached to the back of the tool as shown; the height is adjusted so that the tool will be raised about $\frac{1}{4}$ in.—R. H. Kasper, Philadelphia, Pa.

How to Repair or Replace Sea Valve without Docking the Vessel

Often it is necessary to make repairs on the valve in the bottom of vessels, known as the sea valve, which is located



A Method of Blanking Off a Sea-Valve Opening to Obviate the Necessity of Docking the Vessel, as Shown in the Illustration

below the water line, and when a drydock or marine railway is not available, this is not easy to accomplish. The following article describes a method that has proved very successful in a number of emergencies.

The necessary materials to do the job are an 8 by 4-ft. piece of heavy canvas, No. 0, or better still 00, with a wide hem worked all around the edges and a large grommet in each corner. In each grommet is spliced a piece of about $\frac{3}{4}$ -in. diameter Manila rope, long enough to suit the girth of the vessel with enough end to make fast on deck, as indicated in the top diagram. The sea valve in most cases is located in the fire or engine room of the vessel, usually amidships. Therefore it is necessary to get the canvas under the bottom, working aft from the bow, as there are less obstructions at this end. Four men should do this easily, two to each side of the vessel. Work the ropes under the keel to the location of the sea-chest opening, taking care that the opening in the hull is as near as possible to the center of the canvas.

When satisfied that the canvas is directly over the sea-chest opening, the valve can be tested, and if no more water comes in than what would naturally be in the body of the valve it will be safe to remove the valve, and make the necessary repairs; for safety's sake a blank flange can be placed on the opening while the valve is off.

Of course, the size of the ship and depth of draft will govern to a great extent the size of the canvas to be used, but in all cases be sure that the canvas is stout enough for the depth of water in which it is to be used.

For small vessels, such as tugs and inland steamers, it can be worked to quite good advantage, and has been successfully carried out at sea, on larger ships.

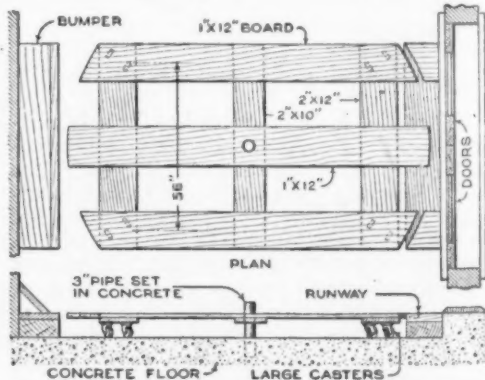
Should the keel and bottom be rough and cause difficulty in passing the canvas along the bottom, it is well to use some small weights on the canvas keeping it clear of the bottom until abreast of the sea-chest opening, when the form lines can be hauled tight and made fast at the rail.

Turntable for Light Car

The illustration shows a readily made turntable for the private garage, which, although it cannot be recommended for the very heavy car, has proved a great convenience with the lighter vehicles.

In the center of the concrete floor of the garage a piece of 3-in. pipe is imbedded firmly in the concrete. A rectangular frame, of a size appropriate to the wheelbase of the car, is constructed as shown; two heavy casters are placed in each corner, directly under the wheels of the car.

It has been found that with a cement floor of ordinary smoothness, it is pos-

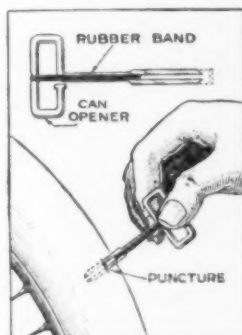


The Automobile Owner Who Tires of Backing His Car into the Garage may Find Relief in an Easily Constructed Turntable

sible for a woman of moderate strength to turn the car around without undue exertion. The floor under the frame can easily be cleaned by washing with a hose. If some scrap lumber and pipe is available, the only expense which need be incurred is that of purchasing the casters.—A. Svenson, Okmulgee, Okla.

Tin-Can Key for Tire Repairs

An efficient tool for repairing small punctures in single-tube bicycle tires is made from an ordinary tin-can key. The square end of the key is filed off as shown by the dotted lines, and a notch is filed



in the top, as indicated. The slotted ends are filed to a long, sharp point. In use, several rubber bands are placed in the slot and stretched over the key, as shown; the rubber bands are coated with rubber cement and the tool is inserted into the puncture. After the bands have

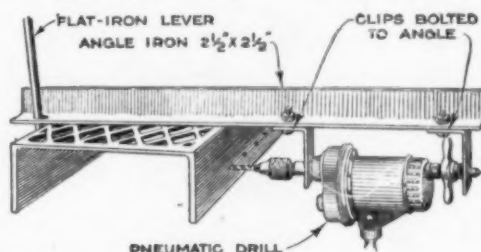
been released from the top of the tool, it is withdrawn, leaving the bands in the puncture; sufficient time is allowed for the rubber cement to harden and the projecting ends of the rubber bands are cut off flush with the outside of the tire.—Paul M. Reidhaar, Connersville, Ind.

Auxiliary Petcock Aids in Cleaning Gasoline-Feed Pipe

To obtain gasoline for cleaning a tube to be patched, for cleaning the hands, or removing grease from the car or clothing, the usual practice is to dip something into the gas tank, generally a handkerchief or ball of waste. The result of this is frequently a mysterious stoppage of the motor caused by a bit of lint or dirt clogging the gasoline-feed pipe and cutting off the fuel supply. As a result considerable time is spent in locating the trouble and remedying it. An easy means of avoiding this is to substitute a tee for the usual ell underneath the tank, an auxiliary petcock being attached to one end, without drilling or tapping. This arrangement makes it possible to insert a wire into the feed pipe to dislodge obstructions without removing the pipe, by disconnecting the carburetor connection.

Simple Rig Helps Overhead Drilling

Having a large number of holes to drill in some gratings that were suspended at



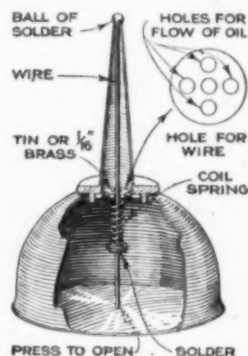
A Simple Rig, for Drilling Holes in Overhead Gratings, That Is Much More Effective than the Usual Type of Hook-and-Board "Old Man"

a distance above the floor, the workman on the job found that the regular hook-and-board "old man" method was too slow. The work was greatly facilitated by using the rig shown in the drawing, in which the pneumatic drill used was held in an angle-iron holder. A hole is provided at the outer end of the angle-iron arm through which a lever is inserted as shown, for exerting pressure on the drill point against the metal being drilled.—Edward N. Snowden, Boothbay Harbor, Maine.

A Nonspillable Oilcan

Any oilcan of standard make can be made nonspillable by using materials to be found around the average shop.

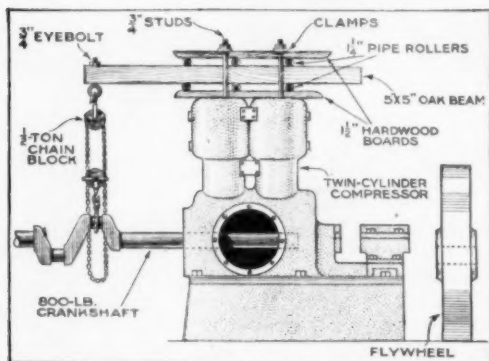
As shown in the drawing, a piece of light sheet tin or brass is cut to fit inside the screwed end of the spout; five holes are drilled in this, the center hole being $\frac{3}{32}$ in. in diameter. This is then soldered into place in the screw recess. A piece of $\frac{3}{32}$ -in. brass wire has a ball of solder attached to the end so that it will close up the opening in the spout, and the wire is cut so that it will just touch the bottom of the can when the ball rests on the opening. The wire is slipped through the spout and the center hole in the disk, a small coil spring placed on the wire as shown, and a washer soldered to the wire to keep a slight tension on the spring.



An oilcan of this description cannot spill its contents, and the bottom will never lose its spring.—Andrew Crowe, S. Manchester, Conn.

Rig for Handling Heavy Crankshafts

When repairing heavy machinery in the field, far from the overhead crane of the

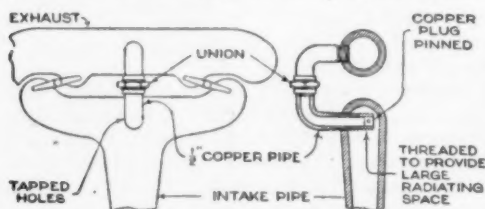


An Easy Method of Removing a Heavy Crankshaft, by Means of a Beam Running on Pipe Rollers

shop, the mechanic must depend upon his ingenuity to handle heavy parts, such as crankshafts and flywheels. The drawing shows a rigging that was used for overhauling a heavy vertical compressor in a refrigerating plant. Four long studs were screwed into stud holes on top of the compressor, as shown, and an oak timber, with an eyebolt at one end, was clamped between rollers in the manner indicated. While the beam is held down securely, the pipe rollers make lateral movement of the beam possible. Thus, when the shaft was lifted from its bearings, the beam was moved out, and the heavy forging lowered to the floor.

"Hot-Spot" for Auto Intake

Intake manifolds on many automobile engines supply an inadequate amount of heat to make up for the cooling effect caused by the passage of the vaporized gasoline on its way to the engine cylinder.



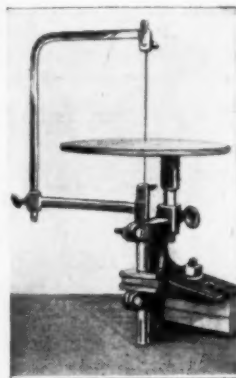
Automobile "Hot-Spot," Which Conducts Heat from the Exhaust to the Inlet Manifold, Improves Vaporization with Consequent Fuel Economy

ders. To offset this loss, one motorist used a short length of copper pipe to make a "hot-spot" inside the inlet manifold, as shown in the drawing. Holes, to take the copper pipe were drilled and tapped in both manifolds, the pipe being cut in half to take a union, as indicated. The inlet end of the copper pipe was plugged with a copper plug which was held in place with a pin; the threaded end of this piece was screwed well inside the inlet manifold, the threads providing additional radiation surface. The installation of this device provided better vaporization, with a resultant economy in fuel, and a smoother-running motor.

Jig-Saw Attachment for the Lathe

The jig-saw attachment shown in the engraving was designed for use on a lathe of English manufacture having a flat-topped slide rest with several inverted T-slots. It is held in place on the lathe with a single T-head bolt.

The main casting is of brass, and the split bearings for the vertically actuated spindle consequently require no bushings; the casting that supports the table is iron. The table is 3-ply hardwood and is adjustable for height, so that more of the saw edge can be used than is ordinarily possible, thus making the blades give longer service. A jewelers' saw forms the saw frame; the wooden handle was removed and all but about $\frac{3}{4}$ in. of the tang was cut off. This was filed flat and fitted into a slot of corresponding size at the upper end of the spindle and attached with rivets, as indicated in the illustration.



The attachment is driven by a small faceplate held in the chuck; this faceplate has a driving pin mounted $\frac{1}{2}$ in. off center which engages the slotted crosshead attached to the spindle. Incidentally, this faceplate engages the flat-face surface of the crosshead, thus keeping the saw frame in alignment and obviating the necessity for other means of preserving alignment.

For cutting small shapes from sheet metal such a saw is very convenient and operates at fairly high speed without

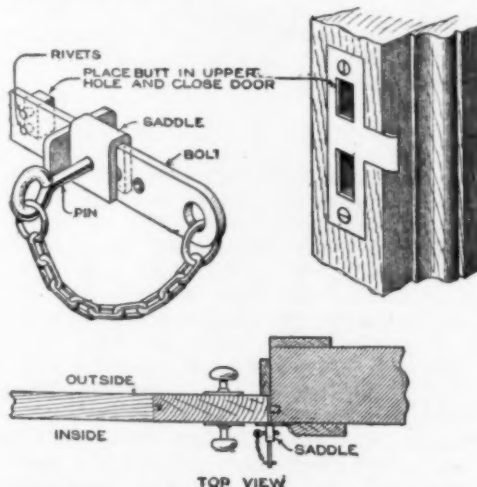
breakage of blades. For sawing metal, use jewelers' saws, which may be had in various degrees of fineness; for wood, use regular scroll-saw blades, except for extremely fine work, in which case use the fine metal-cutting blades.—Harry F. Lowe, Washington, D. C.

A Stout Point for a Furrowing Pole

A substantial metal point for the useful furrowing pole can be made by inserting the end of the pole into an old knife-guard tooth from a mowing machine, and bolting it fast; this permits the pole to be easily thrust into any kind of soil.

A Bolt to Fit Any Door

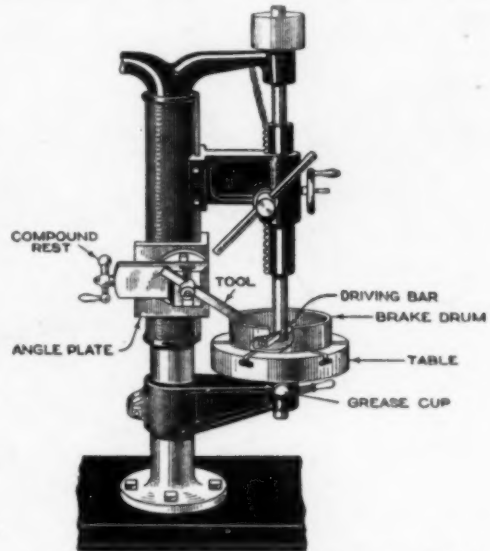
A variation of the many arrangements for preventing a lock from being picked or forced, is shown in the drawing. This device is made in two pieces, from $\frac{1}{8}$ -in. flat iron. The bolt, $3\frac{3}{8}$ in. long, is provided with a number of $\frac{3}{16}$ -in. holes which are spaced $\frac{1}{16}$ in. apart. At one end of the bolt, a metal block, or butt, is attached with rivets, as indicated. The saddle is cut from a piece of flat stock, and bent as shown, with a hole at the center which lines up with the holes in the bolt. In use, the butt is placed in the upper hole of the latch plate, and the door is closed; the saddle is then pushed up against the door and held in place by a pin, inserted through the saddle and the hole in the bolt nearest the door. The pin may be attached to the bolt with a short piece of chain for convenience.—Henri Marcelle, Honolulu, H. T.



An Auxiliary to the Common Door Lock, Which Prevents the Door from being Opened without Its being Forced or Broken In

Turning Brake Drums in the Drill Press

A small automobile shop, having a number of brake drums to be faced, and



By Rigging the Drill Press as a Boring Mill, a Rush Job of Turning Brake Drums was Turned Out in a Very Satisfactory Manner

having no lathe large enough to swing them, solved the problem as shown in the drawing. A groove was cut in the arm supporting the drill-press table, and a grease cup fitted to provide for lubricating the table arbor. The clamp on the latter was loosened so that the arbor was an easy-running fit, and a brake drum clamped centrally on the table.

The drill spindle was run down to the drum, and a flat bar of steel slipped through the spindle slot, engaging with two of the bolts clamping the drum. On the vertical table slide, a small angle plate was fastened, and on the plate, a compound rest was mounted in the proper position to feed across the work. By feeding the tool across the work by hand, while running this drill press at its slowest speed, the job was turned out in very good time considering the handicap.

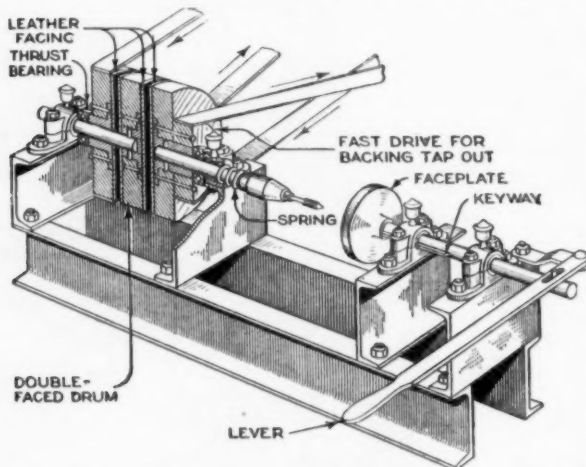
Wire in Plastic Stove Lining

When putting a plastic lining in a stove, first insert a piece of poultry netting; this has the same effect as the reinforcing material used in reinforced concrete. The wire makes the insertion of the lining easier and also prolongs its life by preventing cracks.—Edward M. Brickett, Lynn, Mass.

A Tapping Machine for Light Work

The drawing shows a small power-tapping machine built up of 4-in. channel iron, with cast-iron bearings and a shaft about $\frac{5}{8}$ in. in diameter.

In order to obtain the forward and re-



A Power-Operated Tapping Machine Which can be Built at Insignificant Expense, for Speeding Up the Tapping of Drilled Holes: It Is Practically Automatic

verse drive required for power tapping, a simple friction clutch is used; this consists of a double leather-faced pulley, or drum, rigidly attached to the center of the shaft. Loose, leather-faced pulleys on each side bear against the drum and, as pressure brings the faces of the separate pulleys against the faces of the drum, forward and reverse movements are obtained. Both pulleys are belted to the countershaft, one of the belts being crossed. The reverse pulley should be somewhat smaller than that on the countershaft so that the tap will be backed out

of the hole at high speed. The end of the shaft is tapered and provided with a chuck, behind which a fairly stiff spring is placed, as shown, to keep the faces of the reverse pulley and drum in contact and cause the machine to run backward when not actually engaged in tapping.

On the opposite end of the machine, a keyed shaft is supported on bearings in which it slides back and forth, the key preventing rotation; a lever, which is pivoted to the channel-iron support as indicated, is provided for moving the shaft. A faceplate, or fixture, for holding the work is attached to the inner end of this shaft.

The action of the machine is practically automatic. The work is placed in the fixture and by a movement of the lever is brought against the tap; the pressure against the tap brings the faces of the forward-drive pulley and drum together and the tap is fed into the hole so long as pressure against the tap is maintained. As soon as pressure on the lever is released the spring automatically brings the faces of the reverse-drive pulley and drum together, and the tap is backed out at high speed. For lubricating the freely revolving forward and reverse-drive pulleys, a hole may be drilled through the center of the shaft with holes at right angles for each pulley; a grease cup screwed into the end of the shaft provides the lubricant. While not absolutely essential, the efficiency of the machine can be greatly increased by the installation of ball thrust bearings, as shown in the drawing.—H. H. Parker, Oakland, Calif.

Airplane Protected from Tampering

In making airplane flights that cover a period of days, or even weeks, it is often necessary for the pilot to leave the craft unguarded and at the mercy of vandals or curio seekers, who remove anything portable, and often seriously damage or totally cripple it. Live stock rubbing against the control wires and directive surfaces may also do considerable damage. One airman, after a few experiences of this character, decided it was time to prevent unauthorized persons from tampering with his machine. He bought a small alarm clock, a 6-volt induction coil, three dry cells, a switch, and a few feet

of copper wire; a disk-contact switch was made and attached to the back of the clock in such a manner that when the clock was running, it would rotate the switch so that the circuit was opened and closed at one-minute intervals for 24 hours. The dry cells were wired to the coil, and the high-tension cable from the coil was grounded to some metal fitting of the plane. A small box attached inside the fuselage of the craft contained the apparatus and weighed about $7\frac{1}{2}$ lb. complete. A secret, insulated switch, that could be turned on or off by the pilot, controlled the current. The results obtained with this arrangement were decidedly satisfactory, as anyone touching

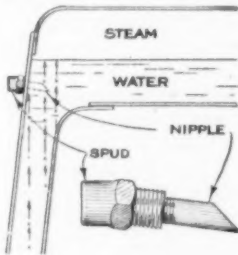
any metal part of the machine—and it is almost impossible to avoid doing so—receives a severe but not dangerous shock.

Covering Holes in Plaster

For covering holes in the walls and ceilings of a room, such as stovepipe holes and spots from which the plaster has fallen, in preparation for paperhanging, it is not necessary to use plaster. A piece of muslin, or cheesecloth, is pasted over the hole, so that there is a margin of at least 6 in. on all sides; this is allowed to dry overnight, and the paper is applied over the patch in the usual manner. If the area to be patched is not too large, such spots can only be discerned on close inspection.

Steadying the Water in a Locomotive Gauge Glass

On a locomotive-type boiler with a sloping back head, where the bottom water-gauge "spud" is screwed in flush with the inside of the sheet, trouble is frequently experienced with the water jumping in the glass. One method of preventing this is shown in the sketch. A brass nipple was screwed into the "spud," as shown, having the end beveled, and extending 3 or 4 in. into the water space. The vapor bubbles rising through the water are not permitted to enter the gauge glass, and a steady water level is secured.



—J. R. Minter, Washington, Ind.

Testing Block for Spark Plugs

It is necessary in auto-repair shops, and convenient in the home garage, to have some means whereby spark plugs may be tested. Most shops have means for testing, but in many cases they are unhandy and never ready for immediate use. The device described in this article will be found always at hand and ready for use, yet entirely out of the way. A block of dry, hard wood, or fiber, is used for the base, as shown in Fig. 1; this block is provided with a round hole at the center, which is flanked on each side by a square hole, cut out with a chisel. Underneath each of these square openings, sheet-brass tongues are fastened with washers

and screws, for the attachment of leads from an induction coil, in the manner

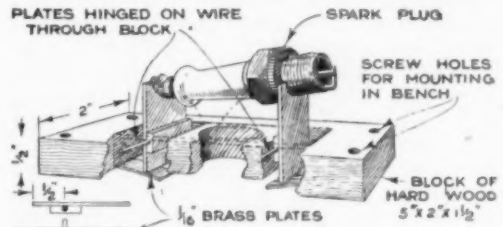


Fig. 1—TOP VIEW

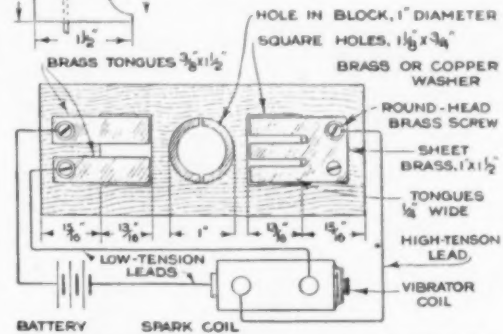


Fig. 2—BOTTOM VIEW AND DIAGRAM OF CONNECTIONS

A Convenient and Ever-Ready Testing Block for Spark Plugs, That Finds a Place of Usefulness in the Auto-Repair Shop as Well as in the Private Garage

shown in Fig. 2. Two brass plates, made according to the dimensions in Fig. 1, have a small piece of thicker metal attached to them, which is drilled so that a piece of wire can be passed through the block and form a hinge. When not in use, these plates are pushed over so that they are flush with the top of the block, as shown by the dotted lines in Fig. 1; when raised, the lower ends press against the brass tongues underneath the block, and form rests on which the metal parts of the plug to be tested are placed, as shown. As no circuit is formed until a spark plug is placed across the raised plates, no switch is necessary. A small depression is cut in the bench to permit movement of the brass tongues, when the plates are raised, and the completed testing block is attached with screws.

An Emergency Typewriter Repair

If the spring of a typewriter breaks, the machine can still be operated by attaching a stout rubber band to one end of the carriage, the other end of the band being attached to a thumbtack on the side of the desk, or wall. The operating speed will be reduced, but the machine can be used.—Harry H. Houck, Rochester, N. Y.

Adjustable Table for Plant Breeders

The plant breeder often finds the flowers on a plant so small that it is difficult, or practically impossible, to work on them. As a result of his experiences in this respect, one breeder has evolved the adjustable table shown. It consists of an or horse to which stand for holding attached; this



Owing to the Difficulty of Bringing the Blossoms of a Plant to the Proper Elevation, a Plant Hybridizer Evolved This Adjustable Table

possible, to a result of his this respect, evolved the shown. It dinary saw- the adjustable the plant is stand consists of a vertical metal rod, to the lower end of which is

fastened a platform for holding the flowerpot. Thumb screws make it possible to bring the blossoms to the proper height for ease in manipulation. The top of the horse is provided with a flat surface, for holding the notebook and other accessories of the hybridizer. As delicacy of touch and steadiness of hand are essential for successful work, the bench is equipped with arm supports on both sides. —J. L. Collips, Berkeley, Calif.

Piping Plans Save Repairman's Time

The value of clear, well-drawn plans, or diagrams, of the lighting, gas, water, and sewerage systems of any completed building, or grounds, for reference after the actual construction has been completed,

can hardly be overestimated. Immediately upon the completion of any system of this nature, a clear, concise plan, preferably mounted in a frame, or otherwise protected, should be kept in some easily accessible location where it may be consulted at any time. This seems, at first glance, to be unnecessary precaution on the part of the contractor or builder, but, since men actually engaged in the construction seldom can be called upon for information regarding the location of any given part of the layout, it follows that this information should be available to those who are interested. Such plans should not only show all features of the original plan, but should also contain all changes, additions, and enlargements, together with necessary notes for locating them if any features of the layout are hidden from sight. If it is possible to obtain copies of the architect's plans covering these features, it will save much work and detail; if they are not available, a good working plan should be made in its stead. A suitable scale for this type of drawing is $\frac{1}{2}$ in. to 1 ft., for inside work around houses and buildings, and 1 in. to 20 ft., for grounds, parks, and drives.

In order that the greatest good may be derived from these plans, they should be placed in the most likely or accessible place, at or near the control of the system; for example, the electric-wiring diagram should be placed on the inside of the door of the fuse or switch box; the gas plan near the gas meter, and so on. The time, labor, and expense involved in the preparation and execution of plans of this nature will be well repaid by the saving in these same items, as well as in patience and energy spent in useless searching, when repairs or alterations are to be made.—Roy H. Poston, St. Francois, Mo.

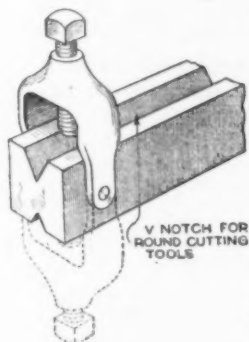
Gasoline for Leaky Inner Tubes

A motorist, while touring, was annoyed at the inability of one of his tubes to hold air for any length of time. He was never able to detect any leaks, and deciding that the tube was "porous," was about to throw it away when he made a final effort at curing the defect. Being an observant individual, he had noted that rubber stoppers, when used in bottles containing gasoline, swelled to almost double their original diameter, when removed and exposed to the air for any length of time. He figured that, if the air in the tire contained some gasoline vapor, it would close

the small pores. He proceeded to apply his theory by injecting about a table-spoonful of gasoline, through the valve stem with a small oilcan. The effect was almost magical, the tube being used for months after without any trouble. While it is generally admitted that gasoline is not good for rubber, the small amount used was sufficient to close the invisible leaks without seriously affecting the tube itself.—E. Stetson, Okmulgee, Okla.

Holder for Small, Round Lathe Tools

The accompanying sketch shows a useful tool holder. The V-grooves on opposite sides are of different depths, to



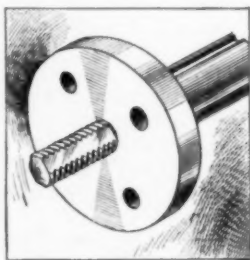
accommodate tools of different diameters. The clamp is set as close to the end as possible, and turns freely so that it can swing around the end to the opposite side. This tool may be used in the shaper or lathe, being especially useful in the latter, as very

small boring tools can be held firmly with it, thus permitting the use of short pieces of drill rod, or broken drills, as cutting tools. The holder also is useful for clamping round stock, for drilling it through the center.

Rapidly Actuated Faceplate Screw

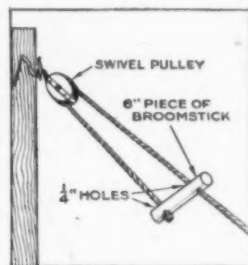
The time taken to screw the faceplate and chuck on a small lathe can be materially reduced if the form of screw shown in the drawing is used.

Three flats, 120° apart, are milled on the screw, and the female portion of the thread in the faceplate or chuck is also shaped out to fit the lands left on the screw. In use, the portions of the thread left on the screw are placed opposite the grooves in the faceplate. The faceplate is shoved home, and one-sixth of a turn will then lock it. To take it off, it is only necessary to reverse the operation.



Quick Tightener for Clothesline

By the use of the very simple device illustrated it is possible to avoid having to tie and untie the clothesline. One end of the line, not shown, has an ordinary loop. At the other is a swivel pulley, around which the line is brought after catching through a piece of broomstick with holes cut in both ends. The end of the line is brought around and passed through the other hole, and then knotted to prevent its pulling through.

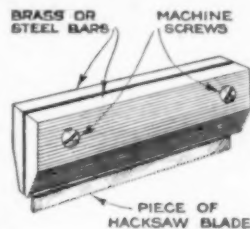


The line is tightened by pulling on the piece of broomstick. When the line begins to pull loose a kink is formed at the stick, which quickly stops the sagging. The line can be readily loosened, however, by gripping the broomstick and letting it slip back. The tightening device can be used at one end of a long line, which may pass over several hooks, through which it should move freely.

Doing Close Work with a Hacksaw

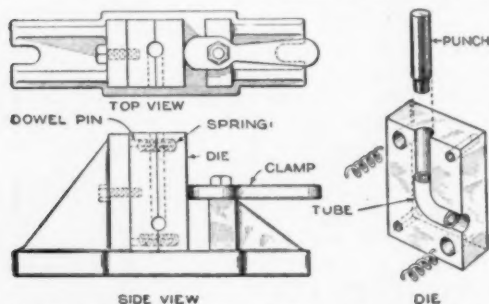
There are many jobs where it is necessary to make hacksaw cuts as accurately as possible, and it is rather difficult to handle the tool so as to get good results.

A good way around the difficulty is to clamp a piece of a broken hacksaw blade, with fine teeth, between two pieces of brass or iron. This forms a convenient handle, and a trial of the plan will show that much better and more accurate results can be obtained, especially by the unskilled worker. If the cut is a deep one, it can be started with the clamped blade and then finished with the regular saw. Incidentally, this method eliminates most of the trouble from the tendency of the saw to slip out of a freshly started cut and mar the adjacent surfaces. If the saw makes too wide a cut, grind down the sides of the teeth somewhat on both sides of the blade, but do not grind too much, or all the "set" will be ground off, and the saw will stick in a deep cut.



A Quick Method of Bending Small Tubing

Having a large number of small pieces of $\frac{3}{8}$ -in. brass tubing, with $\frac{1}{32}$ -in. wall, to bend as shown in the drawing, the job



A Die for Bending Short Lengths of Metal Tubing in a Punch Press: The Curve is Produced without Wrinkles and Scratches by This Method

was quickly completed in a punch press, after a special die had been made, as indicated. The two half dies were sunk by using a ball-shaped end mill of the proper size. The work was strapped to the revolving table of the milling machine at the correct distance from the center, equal to the small radius of the bend required, plus one-half the diameter. The straight parts were cut by using the traverse feed, and the whole job of sinking one half of each die was accomplished at one setting.

When completed, the die was mounted on a specially designed bolster, as shown in the drawing. One half of the die was permanently attached to the vertical part of the casting, the other half of the die sliding on dowel pins held in the rigid part of the die. Compression springs, interposed between the halves of the die, normally hold them apart, to facilitate the insertion and removal of the tubes before and after bending. In the operating position, the dies are held together securely by an eccentric clamp, as shown.

In operation, a piece of tubing of the correct length is placed in the die, which is then clamped shut. The punch is merely a piece of hardened drill rod having a diameter equal to the outside diameter of the tubing and one end turned down to its inside diameter. The length of turned-down end must not be greater than the straight part of the tubing. When the punch descends against the end of the tubing, the latter is forced through the curve of the die.

This method works excellently for any form of tubing providing the walls are not too thin. The curve is produced without wrinkles or scratches, due partly to the

stretching and drawing effect produced on the outside of the curve.—S. B. Royal, Baltimore, Md.

Calcium Carbide Routs Ants

The owner of a lawn, infested with ants, can get rid of them by the recently discovered calcium-carbide treatment. Several holes, about 6 in. deep, are dug into the ground, the number depending upon the size of the hill, or colony, and a handful of carbide is sprinkled into each one and covered with earth. The carbide is not moistened, the moisture of the earth sufficing to generate small quantities of acetylene gas for several days.

Shop-Card Holder of Simple Construction

A shop-record or card holder of simple construction, like the one shown in the drawing, is in use in the machine shop of one of the naval gun factories. This holder consists of a square piece of tin, or other sheet metal, with a hole punched in one corner for hanging to a tack in the wall; the three remaining corners are turned over as indicated by the dotted lines to complete the holder. It will be observed that no soldering or riveting is required to make this holder, which is neat in appearance and serves its purpose admirably.



Keeping Individual Poultry Records without Trap Nests

The advantages of trap nests for keeping an accurate record of hens, are obvious, but the great objection to the system is the labor involved in visiting the nests at frequent intervals to release the fowls.

A new system that has the approval of agricultural experiment stations is known as the "touch record" system, in which trap nests are not used, the hens being put through a daily "physical examination," to determine whether or not they will lay on that day. Each hen carries a numbered leg band. The method followed

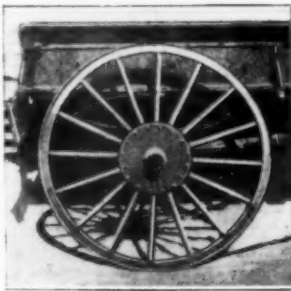
in examining the hens, is to seize them, one at a time, as they emerge from the coop in the morning, and slightly pressing a finger against the side of the abdomen, over the pelvic bone, and near its end; if the hen is going to lay within the day, the presence of the egg will be detected by the finger.—John T. Bartlett, Boulder, Colo.

Making a Punch Cut Easily

There are times when a punch can be used to better advantage than a drill for making a large number of holes in thin sheet metal. A trick worth knowing, and one that makes the punch more efficient, consists in grinding the end of the punch off at an angle of about 1° ; this gives one edge a chance to advance ahead of the opposite edge and the shearing effect produced makes it possible for the punch to be driven through the metal easier and quicker than if forced through with a square end. A block of hard wood or lead under the work to be punched is also an advantage.—L. B. Robbins, Harwich, Massachusetts.

Repairing Broken Wagon Wheel

The delivery-wagon wheel shown in the illustration, was put out of commission in an accident, every spoke in the wheel

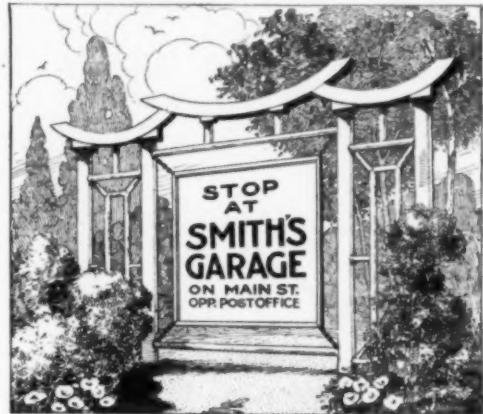


being fractured near the hub. The repair was made by using two paper friction clamps, common around sawmills. The shaft holes in the center were reamed out conically, on the inside, to fit snugly against the hub when placed in position. The wheel was removed from the axle, and one of the clamps was applied to each side, as shown; the bolt holes in the clamps were the right distance apart for a short bolt beside each spoke; these, when drawn up, reinforced the wheel to such an extent that it withstood several weeks of hard use before a new one was obtained.—L. M. Jordan, Wallace, Ala.

¶ When no pencil is at hand, a substitute may be made by pointing a piece of wire solder and using it as a pencil.

Attractive Outdoor Advertising Signboard

This suggestion, of happily wedded art and advertising, is one that may prove of value in ending the guerrilla warfare that



Art and Advertising are Happily Wedded in This Attractive Outdoor Advertising Sign in Japanese Effect

has long raged between artists and the artistic-minded public on the one hand, and outdoor-publicity men on the other.

The upright supports of this sign are made from old telegraph poles sunk into the ground; the smaller round pieces, which form the ornamental braces, are furnished by straight saplings. The curved top pieces are made by nailing planks to a framework of 2 by 4-in. material. The signboard proper, the part that contains the advertising announcement, is made by riveting together several sheets of galvanized iron. The corners are reinforced with heavier metal, so that the whole sign may be held by chains from each corner, as shown in the drawing. By exercising a little care as to location and with tasteful arrangement of inexpensive shrubbery about the base, the appearance of the whole will be decidedly pleasing and the Japanese effect of the signboard will be considerably heightened.

Silencing Valve-Tappet Noises

Automobiles that are not provided with push-rod adjusting nuts can be silenced by drilling a hole in the top of the rod, about $\frac{3}{8}$ in. in diameter and $\frac{1}{4}$ in. deep; this cavity is filled with melted lead or babbitt. In the event that the filling should pound down after long use, the valve can be lifted and the deficiency built up with a drop or two of solder from the end of a soldering bit.

Improved Wheel Chair

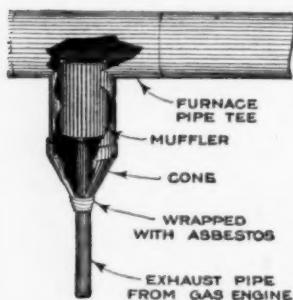
When an invalid's wheel chair is needed for a convalescent patient, but the period of convalescence is judged



insufficient to justify the expense of a more elaborate chair, one may be quite easily made by fitting wheels to an ordinary chair, as shown in the drawing. The two back legs of the chair are clamped to a wooden axle, to which 8-in. wooden wheels are attached. At the center of the axle a piece of wood is bolted at right angles, on the outer end of which a third wheel is mounted; an upright is fastened to this latter piece, in line with the front rungs of the chair, to which it is clamped. A light footrest is also provided, as shown in the drawing. By loosening the three or four bolts which clamp the chair to the wheeled truck, it can be removed, undamaged, in a few seconds.—Henry W. Buzzell, Outremont, Quebec.

Engine Exhaust Carried through Furnace Pipe

When a gas engine for operating a pump was installed in the basement of a house, the disposal of the exhaust gases became a problem; to exhaust in the basement



would soon fill it with smoke, and to exhaust outdoors would mean disgruntled neighbors. The trouble was overcome by having a tinsmith make a special tee which was placed in the furnace pipe between the furnace and chimney at a point far enough from the former to prevent the fumes from backing up into the registers.

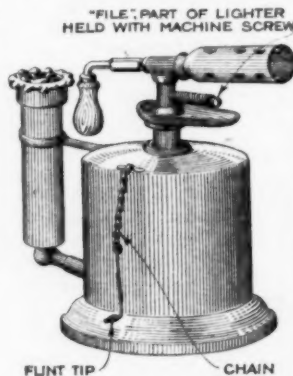
The muffler was inserted inside the tee, as indicated, and the hole sealed up to prevent leakage. Not only was the sound of the exhaust well muffled, but the chimney draft drew the gases out into the open air.

White Paint Improves Garage Light

Nowhere are the advantages of diffused light better demonstrated than when working about machinery. Try painting the walls and floor of the garage pit white and see how the light is reflected to every part of the machine above.—Earl Glass, Monrovia, Calif.

Self-Lighting Gasoline Torch

A satisfactory and convenient arrangement for lighting a gasoline blowtorch, without the aid of matches, can be made from one of the so-called "flint and steel" gas lighters.



As shown in the drawing, the circular "file" part is attached above the gasoline cup with a machine screw; it must be so located that it will not become wet with gasoline from the cup, as this will prevent the "flint" from sparking. The end of the lighter containing the sparking material is cut off and an eye is bent in it for attachment to the torch with a short length of chain, the end of which is soldered to the gasoline reservoir. When the sparker point is drawn across the "file," sparks will fall into the gasoline cup, igniting it. Such a lighter is always at hand when needed, a convenience which will be appreciated by all torch users.

Storing and Running Rawhide Gears

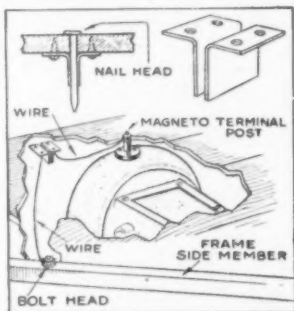
Rawhide gears, when not in use, should be kept covered with shellac or hard grease, and should be stored in a place which is kept at a moderate temperature, in order to keep them from splitting or warping. In running such gears, do not use mineral oils, but lubricate with a mixture of light grease and graphite.—S. Guy, Chicago, Ill.

Lubricating Saws with Graphite

When working with hardwood interior finish, the saw often gives trouble by sticking. Though it is inadvisable to use grease on the saw on account of soiling the wood, finely powdered graphite is not open to this objection. A small cloth bag filled with the graphite is rubbed over the saw as occasion may require, enough of the lubricant sifting out to make opening of the bag unnecessary.—G. E. Hendrickson, Argyle, Wis.

A Reliable Ignition Auto Lock

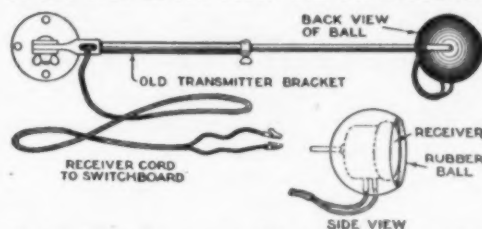
A simple ignition lock for a small automobile of a common type, that defies the efforts of unauthorized persons to start the car can be easily made as follows: Two brass clips are provided and bent to the form shown in the drawing; these are attached to the underside of the footboard, as shown. One of the clips is wired to the magneto terminal post and the other is grounded to the chassis with a short length of wire. A small hole is drilled in the footboard, between the two clips, in which a small nail is inserted in the manner shown, grounding the magneto; this will make it impossible to start the car until the nail is removed.



Insulated Telephone Receiver Used on Power-Plant Line

The operator at a telephone switchboard had experienced trouble with electric shocks transmitted along the line, these being due to the influence of a high-tension transmission line in the neighborhood. The difficulty was overcome by using, in connection with a breast transmitter, a receiver mounted as illustrated. An old transmitter bracket was fixed in place, and on its outer end was fastened half of a large toy rubber ball. Inside this rubber hemisphere a watchcase receiver was installed, and wired with ordinary cord, running along the bracket. The receiver was opposite the ear of the operator, coming about $\frac{1}{4}$ in. from the

ear, when the rubber ball was fitted close to the side of the face. All other sounds

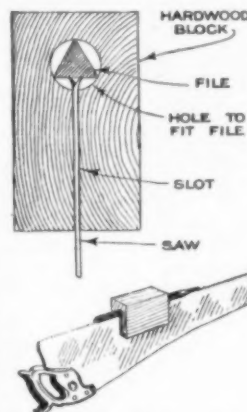


Higher Insulation for the Telephone Operator's Receiver was Provided by the Use of a Rubber Ball

were thus shut out, and the insulated receiver prevented any further trouble from electric shocks.—H. A. Barwick, Shawinigan Falls, Que.

Homemade Saw Jointer

In sharpening a handsaw, or any other kind, it is important that the points of the teeth are all the same height before the actual sharpening is begun; otherwise, with teeth of irregular height, imperfect results are obtained. An easily made saw jointer, for this purpose, can be made in a few minutes, from a hardwood block and a three-cornered file. A $\frac{3}{8}$ or $\frac{1}{2}$ -in. hole, according to the size of the file used, is drilled through the block, and a slot is cut from the edge of the block into the hole. The file, preferably an old one, is fitted into the hole, as shown. After the teeth have been "set," this jointer is placed over the saw and passed back and forth until all the teeth have been brought to the same height, after which the saw is sharpened.—Washington S. Morton, Pasadena, Calif.



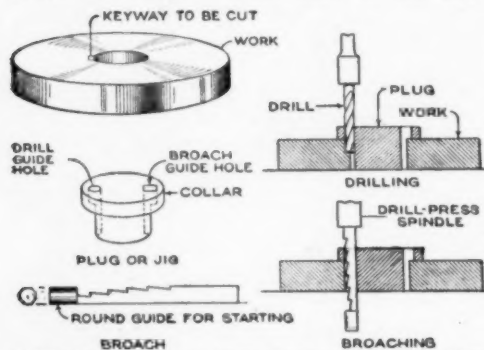
Draft Shield for Bunsen Burner

When a Bunsen burner is used in a draft, or near a fan that is in operation, the flame is likely to be blown out. A draft shield can be made of a can from which one end has been removed and in which is provided a notch to admit the gas tube. The opposite end may be removed, or a hole large enough for the flame may be made, as desired; the shield

is set over the burner and prevents the flame from being blown out.—G. H. Glitzke, Kansas City, Mo.

Keyway Cutting with a Drill Press

The sketch illustrates a method by which a drill press was used to cut key-



A Workman without Great Skill can Cut Good Keyways on a Drill Press, by the Use of a Special Jig as Illustrated

ways in a number of circular plates. The work was found to be quite accurate, although the operator was not a skilled machinist.

A jig is first made in the shape of a plug to fit the hole, having a collar or shoulder at its upper end. Through this shoulder two holes are cut, one round and one square, each being complete in the collar, and being continued as a slot down the body of the plug. The round hole is made to serve as a guide for a drill, and the square one for a broach. The work is first set up in the drill press, as shown at the upper right, and the drill is run through, resulting in a semicircular slot in the work. To square out this slot, the plug is turned so that the square hole comes directly over the slot, and the special broach illustrated is run through. The hand feed of the drill press is utilized for forcing the broach through, as suggested at the lower right. A single broach is found sufficient, as most of the metal is removed by the drill.

Engraved Work Transferred by Chalk Impression

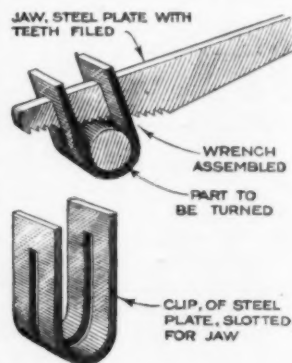
A quick, clean, and efficient process for transferring the design on an engraved article to another article, which is to be engraved with the same pattern or design, is the following: Fill the engraved lines with powdered chalk; then breathe on the left arm, just above the wrist, or moisten it slightly, and press the chalk-filled engraving against the flesh, using a

firm, hard pressure. This will leave the imprint of the article and a chalk impression of the design it is desired to reproduce on the arm. Now, take the next article to be engraved and breathe on it, or rub it with a dampened finger; this will leave a sticky film on the article, which is pressed firmly against the impression made by the pattern, and the chalk design on the arm will be transferred from the arm to the article in the exact location of the first one. From two to a half dozen impressions can be obtained, according to the depth of the engraving and the amount of chalk that adheres to the arm. Practice will enable the engraver to transfer the design to a half dozen spoons, forks, or other pieces in less time than is ordinarily required to coat the part with the various preparations used for laying out the design.

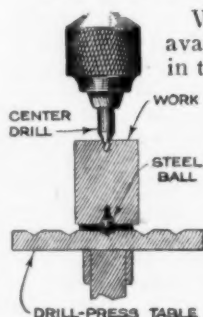
A Simple Pipe Wrench

Where a heavy pipe wrench is only occasionally used, the small shop owner can make a very serviceable one from steel plate.

As shown in the sketch, the toothed jaw is made from plate steel, $\frac{3}{8}$ to $\frac{1}{2}$ in. thick and of any required length; the teeth are cut with a file, the working face being tapered. This face should be hardened before the tool is used. The U-shaped clip is of $\frac{1}{4}$ -in. plate, bent and slotted to an easy fit for the jaw.



Steel Ball Aids in Centering Work



Where no centers are available for centering work in the drill press, a steel ball of suitable diameter can be placed in a drill mark on the drill press table and the work placed on it as shown. The drill mark should first be lined up with the head by running a long drill down into the spot.



Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

The Construction of a Polarized Relay

By THOMAS W. BENSON

THE trend of amateur construction is to utilize standard parts of easily obtained apparatus in making other devices with a minimum of work. A good example of this is the very sensitive polarized relay described in this article.

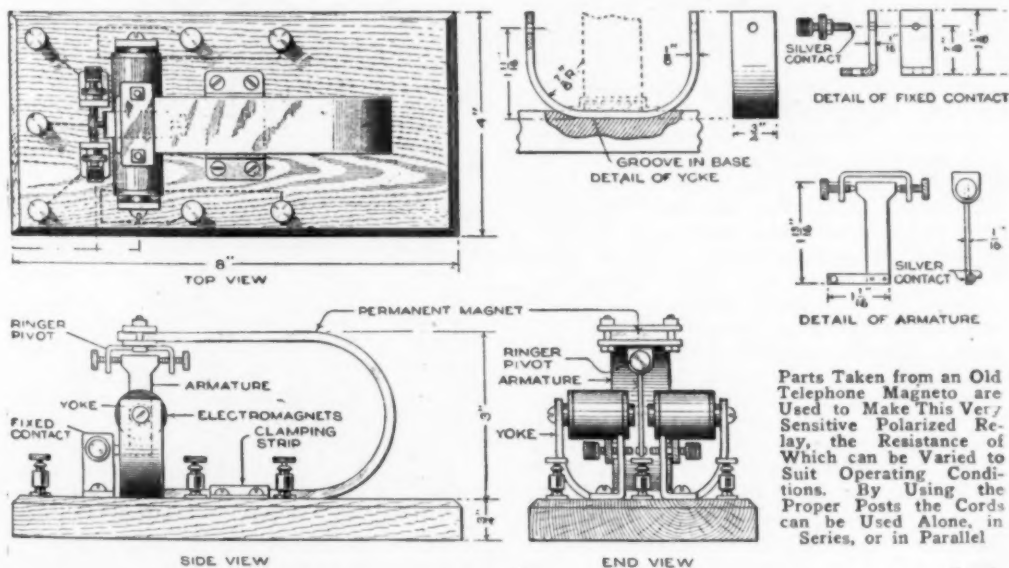
The permanent magnet, used in this relay, is from an old telephone magneto. The pivot for the armature is from a polarized ringer. The long ends of the ringer-pivot bar are cut off, and holes are drilled in it at such a distance from the center that two bolts inserted in them will straddle one leg of the magnet. A short piece of brass, or iron, is similarly drilled, for mounting the armature pivot to the magnet, as shown.

The armature is made of soft iron, just wide enough to fit between the pivot screws, and its length should be about two-thirds of the distance between the ends of the magnet. A center punch is

The rest of the armature may be cut down to the same width as the cores of the electromagnets. At the lower end of the armature a short piece of brass is riveted with small rivets made from copper wire. The free end of this brass strip is provided with a silver contact point, made by drilling a small hole in the brass, into which a piece of silver wire is riveted.

The electromagnets, wound for a resistance of about 75 ohms each, are from single-pole telephone receivers. These coils are mounted at the ends of a U-shaped iron yoke, so as to leave a space of about $\frac{1}{4}$ in. between the cores. The legs of the yoke should be long enough to bring the coils midway between the legs of the magnet. The coils are mounted with machine screws, through holes in the ends of the yoke, and should be lined up accurately.

The stationary contacts are made from



Parts Taken from an Old Telephone Magneto are Used to Make This Very Sensitive Polarized Relay, the Resistance of Which can be Varied to Suit Operating Conditions. By Using the Proper Posts the Cords can be Used Alone, in Series, or in Parallel.

used to make recesses on the edges of the armature, for the pointed pivot screws.

brass strips, bent as shown. Holes for attaching to the base and to the adjust-

ing screws are drilled. The holes for the adjusting screws should be tapped to accommodate the screws, which should be provided with locknuts. Silver contacts are soldered to the ends of these screws.

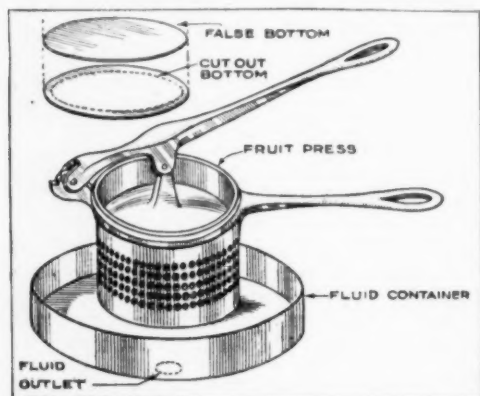
A groove is made in the wooden base to fit the yoke supporting the coils, as shown in the drawing. The yoke is held in place by the magnet, which is attached to the base by the brass clamping strip, as shown. A short length of fine copper wire is soldered to the brass strip on the armature, to carry the current. Each coil

should be connected to a separate set of binding posts; the two stationary contacts and the armature contact being connected to the other three posts.

By using the proper posts, the resistance of the relay may be altered as found necessary. With both coils in series, the resistance is about 150 ohms; using one coil alone, 75 ohms, and with both coils in parallel, about 32 or 33 ohms. In making connections, care should be taken to have the magnets form opposite poles on the different sides of the armature.

Fuel from Garbage and Sawdust

An ordinary fruit press, or potato ricer, can be used for making fuel briquettes



Sawdust or Other Combustible Refuse, in Combination with Oil, is Easily Compressed into Fuel Briquettes in an Ordinary Hand Fruit Press or Potato Ricer

from sawdust, or other combustible refuse, by compressing it together with kerosene. The bottom of the press is cut out, leaving a flange about $\frac{1}{4}$ in. around the edge, and a loosely fitting false bottom, made of a disk of sheet metal, is placed inside over the opening. The material to be compressed is mixed with kerosene in a pail, and the oil-saturated material is filled into the press and pressure applied, the surplus oil running off into a suitable container, as indicated in the drawing. After the briquette has been compressed, it is pushed out by pressure against the false bottom. The briquettes are set aside to dry, and may be used alone or in combination with other fuels.—Arthur J. Kelly, Brooklyn, N. Y.

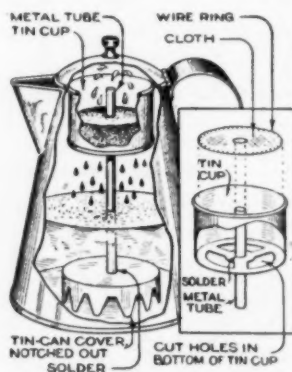
A few drops of carbolic acid, or corrosive sublimate, mixed with paste for paperhanging, will prevent the breeding of insect pests behind the paper.

Photographing a Person in a Bottle

To make a photograph of a man or woman in a bottle, the camera is first focused to obtain a full-length pose. Before the exposure is made, an outline of the subject is marked on the ground-glass focusing screen. Normal exposure is given. After this exposure has been made, an ordinary clear-glass bottle is set up, and the camera adjusted so that the outline on the ground glass fits into the image of the bottle. A short exposure is made for the picture of the bottle, and the plate is developed. If properly made, the picture will show the person imprisoned within the bottle. A black background should be used in both cases.

Coffeepot Made into Percolator

Anyone who can do a little soldering can convert an ordinary coffeepot into a satisfactory percolator by the addition of the device shown in the drawing; it is made from a tin cup, a can lid, and a short length of metal tubing.



A hole is made in the bottom of the tin cup to accommodate the metal tube, and the remainder of the bottom is cut out in the manner shown. The diameter of the tin cup should be slightly less

than that of the top of the pot. To hold the finely ground coffee in the cup, a wire ring to fit the inside of the cup is made, and a piece of thin, white cloth is stretched

over and sewed to it; a smaller ring is sewed into the center in the same way. Any piece of metal tube will answer the purpose, but it should be about 1 in. shorter than the coffeepot; a piece of copper gasoline tubing will answer admirably. A cover from a tin can, a trifle larger than the tin cup, has a hole made in its center, and a series of notches cut around the edge, as shown. The metal tube is soldered to this lid, flush with the top, and to the tin cup, in the manner indicated. In use, the cloth-covered metal ring is fitted into the bottom of the tin cup, and the ground coffee placed inside; the water is placed in the pot, and the percolator is inserted in the pot as indicated. When the water becomes heated, it will be forced upward through the tube, and percolate through the ground coffee. Coffee made in this manner, being free of grounds, requires no settling.

Rabbit Cutter Made in Pocketknife

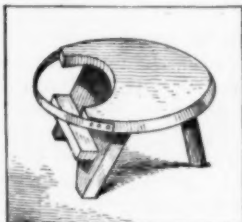
Having occasion to make a small number of boxes, with the lids sliding in grooves, and having no suitable tool to cut the rabbets, one mechanic solved the problem as shown in the drawing. Taking his pocketknife, he filed the blade for a short distance to a depth of $\frac{3}{16}$ in., leaving a projection of the same width as the size of groove necessary. When this projection was beveled to form a cutting edge, the job was finished in a very satisfactory manner.



A Convenient Milking Stool

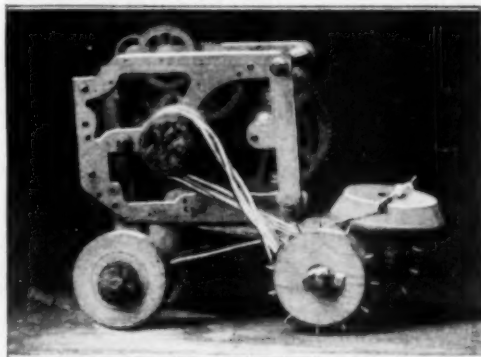
The stool shown in the illustration adds greatly to the comfort of the milker, doing away with the necessity of gripping the pail between the knees.

A piece of band iron is nailed to one side of the stool, as shown; the other end has three or four holes punched in it, which can be slipped over a nail, thus affording a means of adjustment for various sizes of pails. The cleat nailed to the front leg supports the pail.



Toy Tractor Propelled by Clockwork

A powerful toy tractor can be made by mounting the works of an old alarm clock on a small truck, as shown in the



A Small but Powerful Toy Tractor is Quickly Produced by Mounting the Mechanism of an Old Alarm Clock on a Truck Made from Blocks and Spools. A String Belt Transmits the Energy of the Clock Mechanism to the Wheels

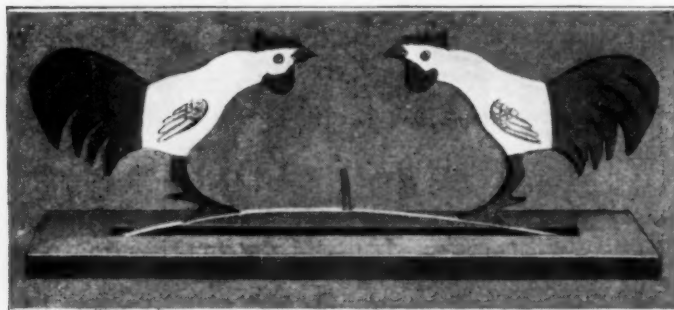
photograph. Remove the balance wheel, which leaves four gears besides the main-spring gear; cut a spool in half and secure it tightly to the shaft from which the hands were removed, to form the driving pulley. The front-axle support is a block of wood, tightly fitted between the spacing rods which hold the side plates together. The front axle is made from a round stick, and the front wheels are two checkers; the axle is held to the support by a small tin strap. The rear-axle support is a wood block, cut to fit between the side plates and held by small brads through openings in the plate, as shown. The block rests against the bottom of one of the spacing rods and no other fastening is required. Tin straps are used for securing the rear axle, which is $\frac{3}{8}$ in. in diameter, to the block. An old spool, cut in half, forms the rear wheels, which are tightly fitted to the axle; to secure traction, small brads are driven into the rim of the wheels and cut off about $\frac{1}{8}$ in. from it. The rear wheel on the same side as the drive pulley is grooved to take a string belt, which transmits the energy of the clock mechanism to the wheels.—Chas. Brocksmith, Bicknell, Ind.

Emergency Ear for Pail

Often, when the ear of an otherwise good pail breaks, its usefulness is somewhat limited. A satisfactory repair can be made by flattening out a window shade-roller bracket and riveting it to the pail.—Forrest Benson, Boulder, Colo.

The Fighting Roosters

The younger child will get a great deal of pleasure, and may occupy long periods of time, in playing with the toy shown in the photograph, a toy which is simple to make, and not apt to get out of order easily.



Two Wooden Roosters Mounted on a Piece of Spring Steel Afford a Comical and Perfectly Safe Toy for the Amusement of the Child

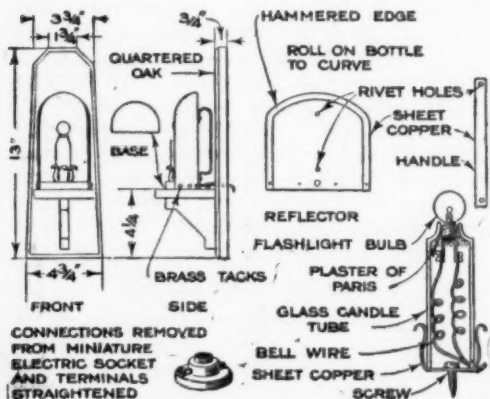
Two roosters are cut out of thin wood or heavy composition board, and are painted in the manner illustrated. The feet of the roosters are fastened to a piece of thin spring steel by driving a tack or brad through a hole in the steel into the wood. The spring is then set into a base some-

what like the one shown, the ends being held so that the steel bends slightly upward in the middle. Finally a wooden pin is fastened to the middle of the spring by the same method as described above. By pressing on the top of this wooden pin the roosters are made to swing back and forth, thus giving a pretty good imitation of the belligerent barnyard fowls.

Electric Candle Sconce

The electric candle sconce shown in the drawing enabled a storekeeper who had become partly deaf to enjoy the comforts of his private rooms while at the same time attending to the store, which was connected with his home.

The sconce will require a glass candle tube, which can be obtained from electric shops, and a miniature bulb, the two being combined as shown in the drawing. The metal parts are removed from the porcelain base, and the terminals are straightened parallel with the socket. The wires are attached and the socket is fastened inside the candle tube with plaster of Paris or melted sealing wax. The candle tube is held to its semicircular



A Deaf Storekeeper Made This Electric Sconce Which Lights When the Door of His Store is Opened

wooden base in a socket, or "husk," cut from a single piece of flat metal and bent into the shape shown. It is attached to the base with a screw.

The completed sconce was placed in a conspicuous place on the wall and connected to the door trip, so that each time the door was opened the light flashed on; three wet cells were used to furnish current. By connecting the sconce to a bell-ringing transformer it becomes very useful in the bedroom, as it provides sufficient illumination without disturbing anyone who may be sleeping. — Chester Disque, Covington, Ky.

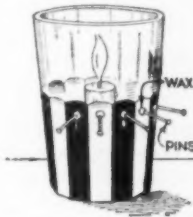
Umbrella Makes Folding Minnow Net

A party of campers overlooked their minnow net. The oversight not being discovered until their arrival at the camp site, a satisfactory substitute was made from an old umbrella frame and some ordinary mosquito netting. The wire holding the ends of the rib braces to the small metal ferrule, which slides on the umbrella shaft, was cut, and the braces were pulled free of the ferrule. A piece of mosquito netting with a small hole cut in the center was slipped over the handle. The rib braces were held upright and the netting was pushed over them, one at a time. Applying the netting as described, it will rest on the underside of the ribs and will have no large holes if care is used in pushing the braces through the netting. After the netting has been fitted over each rib brace, their ends are again wired to the

ferrule. A piece of stout string is tied around the outer edge of the ribs, a half hitch being taken around the end of each rib, to prevent their spreading. When the ribs were secured as described, the edge of the netting was turned over and sewed to the string and also to the separate ribs, so the netting would retain its shape. Applying the netting in this manner, the net can be opened and closed as an ordinary umbrella. For catching minnows in deep water, a pole was attached to the umbrella handle.—Dale R. Van Horn, Lincoln, Neb.

Relative Absorption of Heat by Colors

An easy method of demonstrating the relative heat-absorbing power of black and white, as well as other colors, is provided in this experiment. Black and white stripes are painted around the outside of an ordinary water tumbler. Small lumps of wax are softened and placed on the painted strips, and pins are pushed into the wax, as shown in the drawing. A short length of candle is lighted and placed inside the tumbler; after a few minutes it will be observed that the wax on the black strips begins to soften, and that the pins on these strips fall down, on account of the large amount of heat absorbed.—S. Leonard Bastin, Bourne-mouth, Eng.



the wax, as shown in the drawing. A short length of candle is lighted and placed inside the tumbler; after a few minutes it will be observed that the wax on the black strips begins to soften, and that the pins on these strips fall down, on account of the large amount of heat absorbed.—S. Leonard Bastin, Bourne-mouth, Eng.

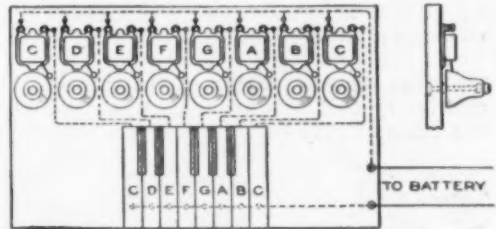
Basin Holder on Hydrant

Where water is drawn from an outdoor hydrant, for washing purposes, it is the usual practice to fill the basin and carry it some distance to a box, bench, or other support. By the use of a basin holder, such as shown in the drawing, the washing can be done right at the hydrant. The frame, or holder, is made from a piece of an old buggy tire, the ends being formed to clamp around the pipe. Holes are drilled at each side of the clamp to receive short bolts, by means of which the holder is clamped to the hydrant pipe.—H. F. Grinstead, Columbia, Mo.



Drummer Uses Electric Chimes

The ordinary orchestra bells, used by drummers in dance orchestras, require the



The Electric Chimes are Played with the Fingers of One Hand Operating the Keyboard, Which may be Made of Wood, or Taken from a Toy Piano

use of both hands in playing them, unless the "roll" effect is dispensed with. By the use of an arrangement of chimes, electromagnets, and a toy-piano keyboard, an apparatus was rigged up which, besides giving a better and clearer sound, could be played effectively with one hand, leaving the other free to manipulate other "traps." The chimes may be obtained from a music store at a moderate price, and they are mounted in a row, as shown. Eight of them are sufficient if they are to be used when playing in only one key, and if one octave is considered sufficient range. The chimes should then have the pitch indicated by the letters in the drawing, the lowest being middle C. The electromagnet and tapper from an electric doorbell is mounted near each of the chimes, the tapper being placed the same distance from the edge of the chime as it was from the bell. The keys were taken from a toy piano, and mounted on a board so as to be in reality eight different switches; pieces of spring brass being fastened to the underside of each of the keys, so as to make contact, when depressed, with the screws in the board.

If a better instrument is desired, the chimes for the chromatic tones may be added, and the range extended to an octave and a half, or 20 chimes instead of eight; this will then cover the range of nearly all popular music. Beautiful effects can be obtained by playing two or even three chimes at once, just as done on the piano. Most drummers soon learn to "fake" other notes to harmonize with the melody, so that two fingers may be used on the instrument continuously.

❗Never fill a gasoline torch more than three-quarters full, and it will be found that the torch will last much longer without the necessity of repairs.

Revolution Counter Useful in Coil Winding

A small revolution counter, or speed indicator, attached to the winding jig, as suggested in the drawings, makes accuracy certain in counting the number of turns when winding electric coils.

As the lathe is usually used for medium and heavy coil winding, Fig. 1 shows how the counter may be attached to a wooden

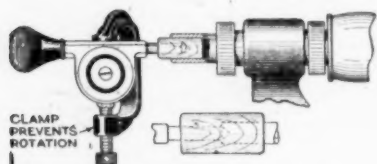


Fig. 1: REVOLUTION COUNTER PLUGGED IN REAR END OF LATHE SPINDLE

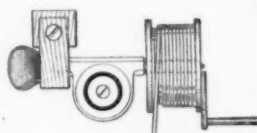


Fig. 2: SMALL BOBBIN DRIVEN DIRECTLY ON COUNTER SPINDLE, TURNED BY HAND

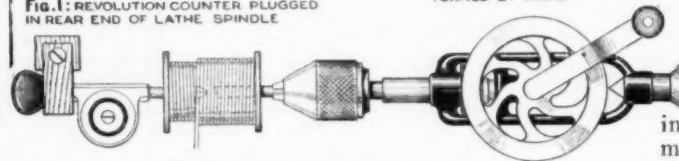


Fig. 3: WINDING MANDREL ON HAND DRILL, BOTH DRILL AND COUNTER CLAMPED TO BENCH

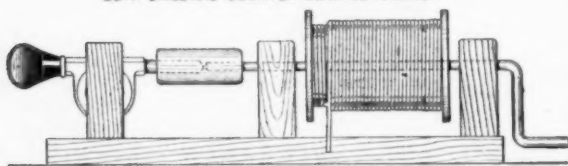


Fig. 4: ATTACHED TO WOODEN WINDING JIG

Various Arrangements are Illustrated by Which an Ordinary Speed Indicator, or "Revolution Counter," may be Used to Keep Accurate Count of the Turns of Wire When Winding Coils

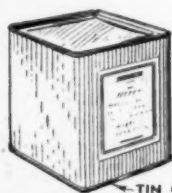
bushing driven into the hollow lathe spindle. If the spindle hole is not large enough, or not hollow, a wooden coupling can be fitted over the spindle instead of into it, as in the detail. If the counter is in good working order, there should be no tendency for it to rotate with the lathe spindle; if it does, a small clamp will act as ballast, as indicated. When a lathe is not available, hand turning must be resorted to. Figure 2 shows an extremely

simple rig for fine-wire coils; the spool is driven directly on the counter spindle. The counter may be clamped in a vise or to a bench, and a handle is fastened to the spool, for turning by hand. To speed up the winding, a hand drill with the spool held in the chuck is frequently used, the drill being clamped down or held in a vise. Such an arrangement is shown in Fig. 3. While the counter is usually clamped to the bench, the same as the drill, it may be allowed to swing free, as suggested in Fig. 1. In Fig. 4 is shown a simple type of winding jig, rotated by a crank handle, while the counter is attached through a hardwood coupling to the other end of the winding shaft; a wood post keeps it from turning.

Can Opener for Large Cans

For opening large cans, such as the square 5-gal. variety, in which paint and other liquid and semiliquid commodities are shipped, a can opener, such as that shown in the drawing, will be found very effective and a great timesaver where the cans to be opened are all square. A piece of thin, hard steel, such as an old saw

blade, is cut into a triangular blade. Holes are drilled in the top edge, and a wooden handle, made from a piece of round wood, is riveted to the blade. The blade is filed



sharp on its two outer edges and with it the tops can be cut from large or small cans with ease.—Washington S. Morton, Pasadena, Calif.

A Celluloid Squeegee Plate

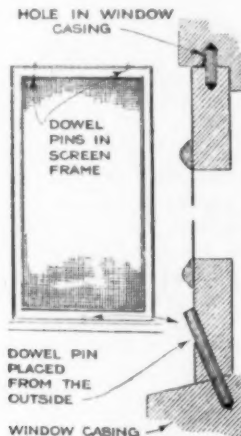
Sheets of celluloid, like that used for windows in automobile curtains, can be used in place of ferrotype plates for obtaining a high-gloss finish on glossy-surfaced paper. Clean the surface of the celluloid and give it a coat of furniture wax; after it has dried for a few minutes, polish the surface and place the wet prints, face down, against the polished side. With a squeegee roller force the water and air bubbles from under the prints, so that the surface of the paper is in contact with the celluloid. The plates are then stood on edge in a dry place. When dry, the prints will peel off the celluloid and have a pleasing glossy finish.

Curing a "Grabbing" Automobile Clutch

A motor car whose clutch persistently "grabbed" was cured by the owner in a simple manner. He powdered a piece of sandstone, about the size of a walnut, and sifted the sand through fine cloth onto a piece of paper; he then dropped small piles of sand on the clutch facing, at 2-in. intervals, dropping in the clutch carefully each time, to bed the sand into the leather. This operation was repeated several times, and the results were a revelation. This treatment, however, is one that should not be applied except in extreme emergency, as the inside of the flywheel is likely to become scored and its diameter reduced from the abrasive action of the sand, and this would only aggravate the trouble.—J. Lewis Llewellyn, Sydney, Australia.

Dowel Pins Make Firm Screen Fastenings

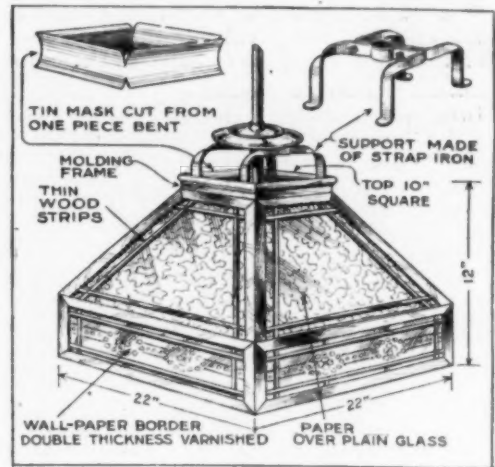
Window screens which are held in place in the window frames with dowel pins cannot rattle in the wind if well fitted, and as there is an entire absence of metal parts and screws, there are no parts to rust. As shown in the drawing, wooden dowels are driven into drilled holes on the upper end of the screen frame; the projecting ends of these dowels fit into holes drilled in the window casing. When the screens have been set in place they are prevented from falling out by another dowel, inserted into a hole drilled at an angle through the bottom of the screen and window casing, as indicated. By removing the bottom dowel, the screens can be easily taken out, and as easily replaced.



Homemade Lamp Shade Imitates Stained Glass

An attractive lamp shade for the dining room, library, or parlor, can be made at slight cost for the small amount of picture-frame molding, glass, paper, and varnish required. The frame of the lamp

is made from plain molding, and its construction will constitute a test of the



A Variety of Attractive and Harmonious Effects in Lamp Shades are Obtained by Using Varnished Wall Paper in Imitation of Stained Glass

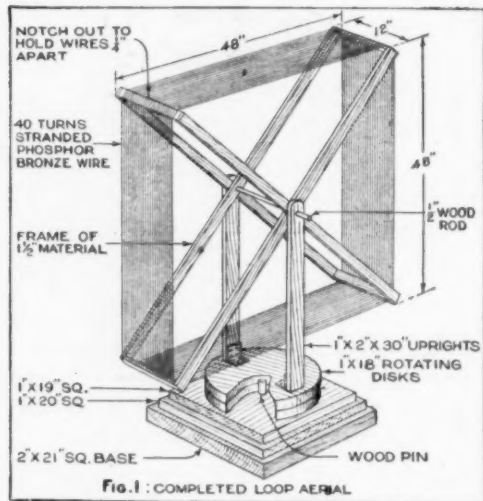
worker's skill at making mitred joints. If the shade is to be used with a gas lamp, a tin mask, such as that shown, should be fitted inside the top, to protect the wood-work against the heat. The sloping panels are filled with clear glass which is held in place by small brads, or glaziers' points, underneath; these panels are covered, on the outside, with one or more thicknesses of ornamental wall paper, or paper colored to imitate stained glass. The sheets of paper should be varnished and evenly pressed against the glass to dry; the varnish makes the paper adhere to the glass, rendering it more or less translucent, and heightening the effect of stained glass. The bottom panels require no glass and are filled with two thicknesses of wall-paper border, each sheet of paper being applied separately. Dampen the first piece slightly and paste the edges to the frame; when dry, the first sheet is varnished and the second piece is applied over the wet varnish, so that the design on both pieces "registers." The best variety of wall paper for this purpose is the so-called "engraved" kind, which is obtainable from most dealers. Thin wood strips are used, in the manner shown, to relieve the blankness of the panels. A simple support, as illustrated, is used for holding the shade to the fixture, the shade resting on the arms.—F. E. Leitch, Brooklyn, N. Y.

Chloroform will remove dried paint from cloth; fresh paint can be removed by turpentine, or alcohol.

Design of a Loop Aerial with Tested Circuits

By F. L. BRITTON

THE loop form of aerial does away with all other forms of receiving antennæ and opens a new field for the amateur. No tuning device is necessary, as the loop



The Loop Form of Aerial: No Tuning Device Is Necessary as the Loop Acts for Itself in This Respect

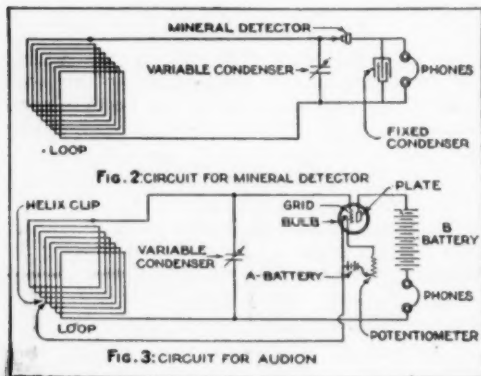
acts for itself in this respect. With a simple 4-ft. loop, such as the one shown in Fig. 1, wound with 40 turns of wire spaced $\frac{1}{4}$ in. apart, it is possible to receive signals from European stations. Amateurs in the central states have received readable signals from the English station "MUU," at Carnarvon, Wales, and also from "YN," the French station at Lyons, using a one-step amplifier in the circuit; these signals were very distinct.

The loop is easy to make and need not occupy any space at the operator's table, as it can be placed under the bed, or sus-

pended from the ceiling, if desired. The square, shown in Fig. 1, is the best design. The X-frame and the supporting uprights should be made of hard wood, for durability; a wood rod is used to support the loop between the uprights, as it is desirable to use as little metal in the construction as possible. The uprights are attached to a wooden disk so that the loop can be revolved for directional effects; a wood pin is countersunk and secured to the upper disk with glue. A hole is drilled through the lower disk, attached to the base, to receive this pin, as shown in the drawing.

The wire used for the clockwise winding of the loop is stranded phosphor bronze, although it has been found that No. 22 gauge enameled wire gives good results. Space the turns $\frac{1}{4}$ in. apart, and cut small notches at the corners of the frame, to keep the wires from slipping out of place. Stain and polish the woodwork of the apparatus to correspond with that of the station.

Figure 2 gives the circuit for using the mineral detector, which gives good results for short distances, the audion circuit shown in Fig. 3 being, of course, more efficient. These circuits work well, and while other circuits have been suggested, it will be found that best results will be obtained by using one of those shown. One lead, as indicated in Fig. 3, is soldered to a snap, or helix clip, and can be adjusted to any number of turns on the loop, as needed for various wave lengths. If the builder wishes, he can arrange a panel, to take the audion circuit, and mount on it a switch with the leads going to the various turns of the loop, which saves time and adds to the appearance of the station.



The Two Most Satisfactory Circuits for Use with the Loop Aerial When Operated in Connection with a Mineral Detector, or the More Efficient Audion

Making Flexible Mirrors

Flexible and unbreakable mirrors, that may be used for amusement or for more practical purposes, are made by silvering one side of a piece of transparent celluloid. Old photograph films may be used, but the emulsion with which they are coated must first be removed.

Dissolve $\frac{1}{4}$ teaspoonful of white gelatin in $\frac{1}{2}$ cupful of boiling water and allow to cool. Obtain a piece of tin foil, not lead foil; rub a few drops of metallic mercury, or quicksilver, on one side until a mirror-like shine results. Next, prepare the celluloid by wetting the fingers in the gelatin solution and coat one side of the celluloid,

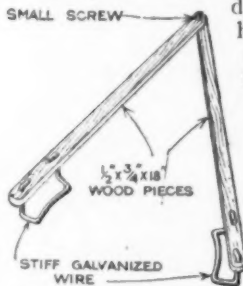
rubbing well until it is thoroughly coated with the gelatine sizing; upon this lay the tin foil, bright side down. Cover the tin foil with a piece of paper, held tightly to prevent slipping, and rub with some hard, round object until the foil is thoroughly attached to the celluloid. When the gelatine has set and become dry, a flexible mirror is the result. While care should be taken not to bend the mirror too sharply, for fear of wrinkling the foil and spoiling the effect, it may be twisted into almost any form.—J. G. Allshouse, Vandergrift, Pennsylvania.

Developing Two Films at Once

Two films may be developed at the same time by the tray method if the films are of the same size, with a consequent saving in time and chemicals. The films are unrolled and placed back to back. The ends may be secured with paper clips, or held in the fingers, and the development proceeded with in the usual manner. Care must be taken to avoid the presence of grit in the bottom of the tray, or the bottom film will become scratched. A long film may be doubled in the center, and developed in the same manner, but care will be required to prevent scratching the surface at the middle, where the film is bent.—Frederick C. Davis, St. Joseph, Mo.

Lifter for Hot Pie Pans

A convenient device for placing pies in, or removing them from, the oven, is made from two wooden strips, as shown in the drawing. Two small holes are drilled 5 in. apart and $\frac{1}{2}$ in. from the end of each piece, to take the pieces of stiff galvanized wire which are bent into the shape illustrated. The wires should fit the holes tightly, and the protruding ends are bent over against the stick. When the wires have been placed, a hole is drilled, about $\frac{1}{2}$ in. from the other end of each piece, for a small bolt, which holds the handles in place. The bolt should not be screwed too tight, as the handles must open and close freely. To lift the pie pan, the wires are placed under the rim of the plate and the handles are squeezed together, like a pair of pliers.



Exhibiting Cut Flowers in a Frame

At a recent flower show, a new and unusual way of displaying the blossoms



A Flower "Picture" That is Made by Displaying Cut Flowers in a Picture Frame, against a Contrasting Background of Colored Velvet

attracted a great deal of attention. A large gilt picture frame was used, the flowers being displayed against a contrasting background of colored velvet. The velvet was backed with a piece of wallboard, or stiff cardboard, and a light tin vessel placed near the bottom for the stems of the flowers; this was effectively concealed. Invisible holders were used to keep the flowers in position against the background, and the picture of the living blossoms was displayed on the wall. The designer has found this a popular arrangement when a novelty is wanted for social functions at private homes, and the scheme is one that can be readily adopted by anyone able to get fresh flowers.—E. I. Farrington, Weymouth Heights, Mass.

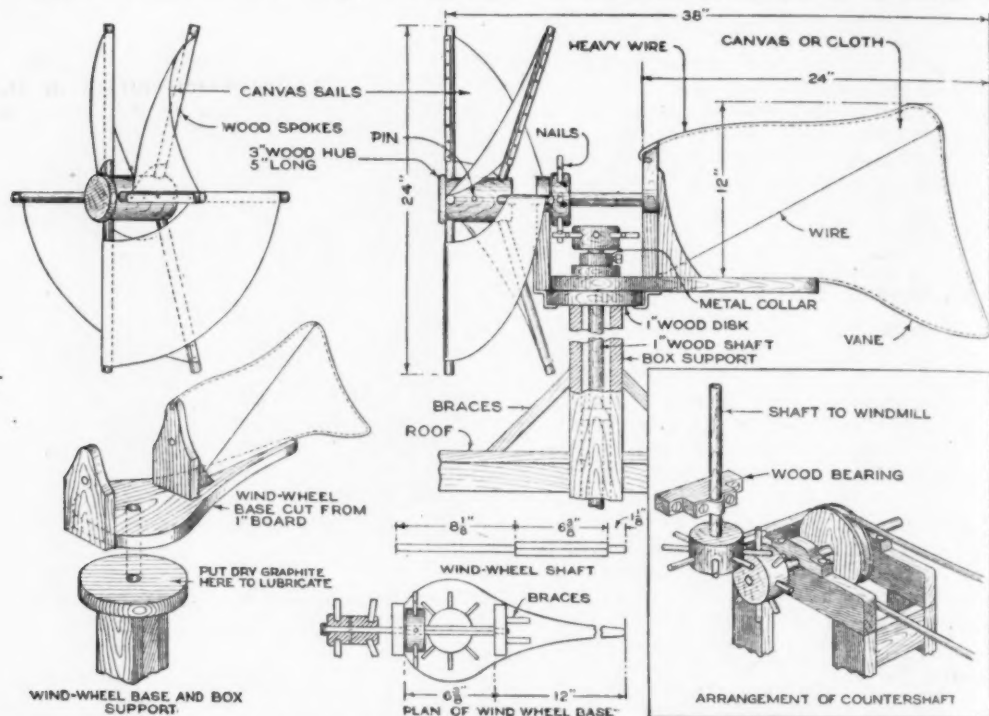
"Noise Absorbers" for Lawn Mowers

The nerve-racking noise produced when wheeling a lawn mower over paved walks, as is often necessary when taking the implement to the shop for sharpening or repairs, can be effectively silenced by equipping the wheels with rubber tires. Such tires are made from two sections of a discarded inner tube, each slightly wider than the rim of the wheel.—G. E. Hendrickson, Argyle, Wis.

Windmill Power Plant for the Amateur's Workshop

By FRANK E. LEITCH

COMPARATIVELY few amateur mechanics have their shops equipped with such simple construction that little or



Constructional Details of the Windmill Power Plant: Such a Plant Is Capable of Operating Light Lathes and Similar Machinery. Besides, It can be Used for Operating Such Things as Churns and Ice-Cream Freezers on the Farm, Where Its Assistance Is Particularly Desirable

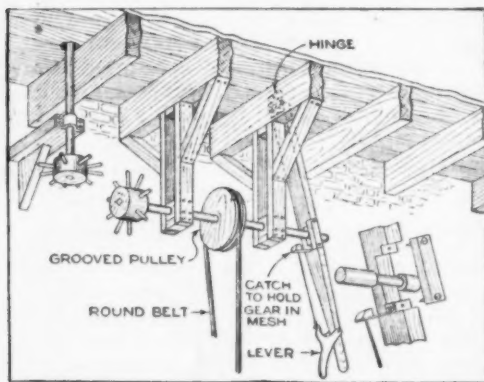
with any device for operating light machinery by power, and many others have forgone the pleasure of such machines and tools on account of their lack of power. This article describes and illus-

no difficulty should be encountered in its making.

The wind wheel proper is simplicity itself, consisting of a wooden cylinder into which eight wooden spokes are driven. The canvas sails are attached to the spokes in the manner indicated, and given a coat of varnish. A hole is bored through the wooden cylinder to take the rounded end of the shaft, a pin serving to hold the two together.

One-inch boards are used for the wind-wheel base and its box support, as indicated, the vertical pieces of the base being drilled to accommodate the wind-wheel shaft. A simple gear, having a square hole through its center, is secured to the square end of the shaft; this gear consists of a wooden disk of suitable size in the circumference of which headless nails, evenly spaced, are inserted.

The vane, which holds the wheel to the wind, is made by sewing canvas over a stiff-wire frame, and varnishing the same as the canvas sails. The wind-wheel base rests and revolves on a wooden disk



A Simple Gear Shifter for Starting or Stopping the Machinery Driven by the Windmill Power Plant

trates a windmill that will deliver sufficient power to drive light lathes and simi-

nailed to the top of the box support, plenty of dry graphite being used between the two surfaces to lubricate them.

The vertical shaft has mounted at its upper end a gear similar to that on the wind-wheel shaft, with which it meshes, as indicated in the drawing. A metal collar and setscrew serve to keep the two gears in mesh. The power of the windmill is transmitted to the machinery, underneath, by another set of gears in the manner shown in the insert.

For starting and stopping the machinery, a simple gear shifter is provided, as shown in the smaller drawing. A wide groove is cut in the shaft over which the gear-shifting lever is fitted, as indicated.

Filtered Oil in the Automobile

With a view to making a somewhat convincing trial of the durability of lubricating oil in an automobile engine, from the standpoint of using the same oil continuously, I started out with a brand-new, medium-priced, but good, car. I used the highest-grade, paraffin-base, eastern oil that I could find. I first washed out the crankcase with new oil, and then put in a charge of new oil, systematically changing the charge about every 250 or 300 miles, running the oil through a separate filter. The second charge was also new oil. From then on I used nothing but filtered oil, replenishing only that which burnt away in the combustion chambers, or drained out through capillary action, incident to all automobile engines. When the car had run about 18,000 miles, during a period of three years, I had the engine taken apart by a first-class mechanic, not because it needed any attention, but for the purpose of noting results. The bearings, pins, etc., showed not the slightest sign of wear, and therefore no adjustment was possible. The cylinders, pistons, and rings showed most of the original machine marks, and compression was excellent. The crankcase was cleaner, if anything, than that of a brand-new engine.

The filter used was a galvanized-iron pan, with a cock at the bottom, about 12 by 18 in. by 3 in. deep. A tray was inserted about halfway up from the bottom, made of 1/2-in. mesh wire netting, on which was placed a sheet of ordinary blotting paper, folded up around the edges so as to hold oil, after the fashion of a filter paper in a funnel. A charge of oil—about a gallon—goes through this

To hold the gears in mesh while the machinery is in operation, a catch which engages the bottom of the shaft hanger is made, simple means being provided for releasing the catch so that the gear shifter can be moved.

Of course, the operation of such a power plant is dependent entirely on the wind, but if there is any wind blowing, no matter from what direction, the windmill will operate. Such an apparatus can be arranged to drive such small machinery as churns and ice-cream freezers, and the speed can be regulated by varying the size of the driving and driven pulleys. The gears, however, for ease in construction, should all be of the same size.

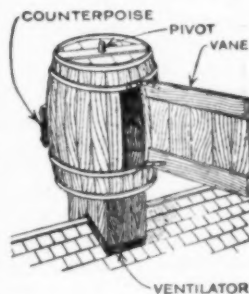
filter in time to be ready for the next charge of oil in the engine. About 15 gal. of oil were used during this mileage, with 1 gal. now in the engine and another in the filter.

The use of good oil and a liberal amount of even unskilled attention are sure preventives of unnecessary repairs and excessive wear on parts, on whose satisfactory functioning depends the life of any automobile engine.—Fred D. Hood, Los Angeles, Calif.

Ventilator Protected from Weather

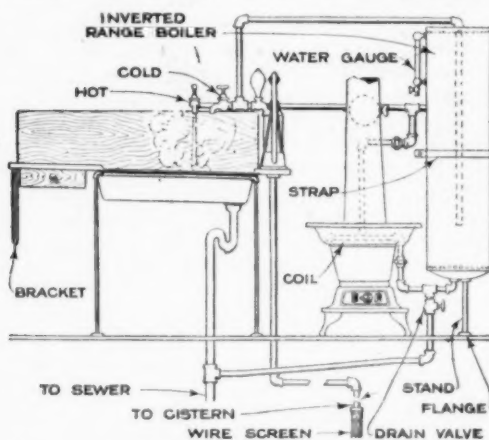
In storage or drying houses, which require a great deal of ventilation, it often happens that rain, snow, and icy winds blow through the ventilating openings, doing more or less damage. The drawing shows how, in one case, an empty barrel

was used to protect such an open ventilator. A vane of thin boards was attached to one side of the barrel, and a counterpoise was fastened to the opposite side. Several staves were cut out on each side of the vane, making large openings on that side of the barrel. One head was removed from the barrel, and a hole was bored in the center of the other; the barrel was then turned over the ventilator flue, a pivot in the top of the flue passing through the hole in the head. A washer and cotter pin underneath the head were used to keep the barrel in position and permit it to revolve freely.



Hot Rain-Water System for the Kitchen

The drawing shows a hot rain-water system, which can be installed at small cost. The pump used was originally



A Simple and Inexpensive System for Heating Rain Water from a Cistern: The Boiler is Attached to a Heater inside the Kitchen Range, Laundry Stove, or Furnace

equipped with a $\frac{3}{4}$ -in. compression hose bibb, or faucet. This was removed and a short nipple and tee substituted, the faucet being inserted into the tee; this arrangement leaves an opening for the $\frac{3}{4}$ -in. supply line which runs to the top of the range boiler, and inside it to within a foot of the bottom, as shown by the dotted lines. The water tank is inverted, to bring the two pipe openings, which are ordinarily at the top, underneath. One of these openings is used to take a stand, for supporting the tank from the floor. Such a stand consists of a length of pipe, which is closed with a plug, and an ordinary floor flange. One or more iron straps, secured to the wall, support the tank in position. A pipe from the second opening, in the bottom of the tank, leads to the heating coil inside the stove. The coil is made to meet individual requirements, from short lengths of pipe and elbows; the outlet pipe extends up inside the stovepipe about 16 in., and is then led out, being connected to the boiler and hot-water line by a tee.

It is not absolutely essential, but quite convenient to have a water gauge placed within a few inches of the top of the tank, to indicate the water level and prevent overfilling the tank. For draining the tank, and to clean it of sediment, a drain valve must be placed in the system at the lowest point, between the stove and the bottom of the tank, as shown.

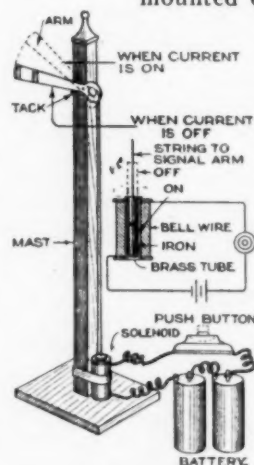
A good feature of such a system is that it can be drained to prevent freezing. By raising the pump handle to its limit, the plunger is forced down, lifting the valve in the bottom of the pump; this will cause the water to siphon back into the cistern and empty the tank to the level of the return bend. The remaining water, sediment, and dirt, is let out into a dry well, if no sewer is available, by opening the drain valve. A dry well, suitable for receiving the waste water from the sink, can be made by digging a hole, 7 or 8 ft. deep, and placing two headless barrels, one above the other, in it.—Carl L. Brandlein, Indianapolis, Ind.

Utilizing Old Shirts

Old shirts, that have become worn around the sleeves and neck, can be converted into satisfactory undershirts by cutting out the sleeves, including the arm-hole seam; the neck is also cut out to a comfortable depth and the cut edges hemmed.—H. M. Gallet, San Francisco, California.

Semaphore Signals for Toy Railway

With only a few simple and easily obtainable materials, a full set of electric semaphore signals can be built for the toy railroad. The semaphore mast is made of wood, while the arm may be of thin wood, cardboard, or metal. The mast is mounted on a small block, as shown.

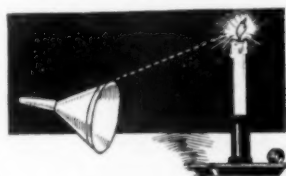


The signal is operated by a solenoid, attached to the bottom of the mast with tape or a small metal clamp. The solenoid consists of several yards of bell wire, wound in a coil around a small brass tube. A light cord or thread is attached to the semaphore arm, and a small piece of iron or steel is attached to the opposite end and is dropped into the hollow core of the solenoid. The string should be just long enough so that when the arm is raised the metal on the string will be drawn entirely inside the coil. By connecting the ends of the coil to a dry bat-

tery and push button, the metal weight will be pulled to the bottom, and the semaphore arm will fly up in the "clear" position shown by the dotted lines; as soon as the current ceases to flow, the arm will drop into the horizontal, or "danger" position. An automatic block-signal system can be arranged by insulating sections of the track from others, and connecting the semaphores to the track circuit, so that as soon as the train enters that "block," or section, the signals will operate.—Chas. Zimmer, Hollis, N. Y.

A Candle and Funnel Experiment

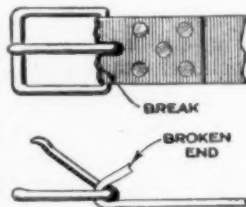
Extinguishing the flame of a candle by blowing through the spout of a funnel appears to be a great deal easier than it really is. The attempt is made at a distance of about 2 ft. from the flame, and those not in the "know" will fail almost every time. The reason is this:



Naturally, the funnel is held so that the flame is in line with the spout, and this accounts for the failure, as, when blowing into a funnel, the air follows the inner surface of the cone and avoids the axis. Not only is this so, but there is actually a back draft into the tube; this can be proved by holding the funnel close to the flame and blowing gently, when the flame will be drawn toward the experimenter by the inward current of air. The flame may be blown out immediately by pointing the outside of the cone toward it, in the manner shown in the drawing.

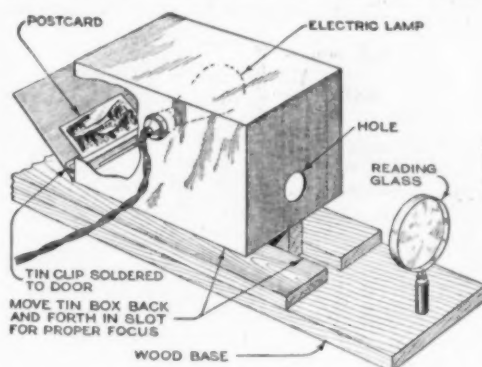
Buckle Strap Repaired Quickly

The buckle on a binder apron broke from the strap during the busiest part of the harvest. It was quickly repaired by cutting a hole in the strap about an inch from the end, large enough to admit the tongue of the buckle. The strap was then put through the buckle from the bottom and slipped over the tongue, so that the greater the pull exerted on the strap, the more securely it would hold. This repair was perfectly satisfactory.



A Postcard Projector

A simply constructed postcard projector that will throw the pictures from



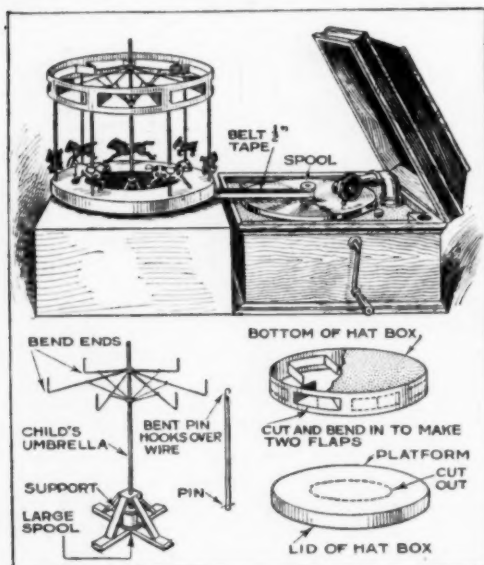
A Postcard Projector Made from a Tin Cracker Box That Throws the Pictures on Postcards, and Magazine and Newspaper Illustrations on a Screen

postcards, and magazine and newspaper illustrations, on a screen, is made from a tin cracker box. A round hole is cut in the bottom of the box, somewhat out of center, and another hole is cut at one side for the insertion of an electric lamp; this latter hole should be at such a height that the lamp will be well above the opening in the bottom, as indicated, and a metallic filament lamp should be used. A tin clip is soldered to the tin lid of the box, which should be hinged, for holding the pictures to be shown; care should be taken to locate this clip so that the center of the picture will be in line with the center of the hole at the front. A wooden base, with a groove in the center, is provided, and a strip of wood is nailed on the underside of the box to fit into it, so that the whole can be moved back and forth. The projection lens is an ordinary reading glass mounted at the front end of the base in line with the hole. The inside of the box should be brightly polished, as its successful operation depends largely upon the amount of light that is reflected onto the picture. In use, the light is turned on, the cover is lowered, and a picture is inserted in the clip, upside down; the cover is then closed, and the box is moved back and forth on the guides until the image on the screen is in focus.—Glenn O. Wilson, Denver, Colo.

Before putting the roof on a poultry shed, let the roll of paper lie in the sun for a few hours. If this is done, there will be no ugly creases in it when the roofing is laid.

Toy Merry-Go-Round with Music

The toy merry-go-round shown in the drawing has most of the characteristics of



No Amusement Device Brings More Joy to the Children than the Merry-Go-Round, and This Toy Brings Clearly to Their Mind Past Pleasures They have Fully Enjoyed

the real thing; it "runs," has animals, and music. The music and operating power are furnished by the phonograph.

The handle of a child's umbrella is cut to a convenient length, and the ends of the ribs are bent up at the ends as shown. A simple wooden support is made, large enough to hold a good-sized spool. Holes are drilled in the top and bottom of this support, to accommodate the handle of the umbrella, which extends about $\frac{1}{2}$ in. below the spool pulley. The bottom end of the handle is slightly pointed, to make an easier bearing in the bottom hole of the support.

The upper part of the merry-go-round is made from the bottom of an old hat box. Oblong holes are cut in the sides, to allow two flaps to bend inward. These flaps are fastened to the umbrella ribs, by vertical slits cut in the ends. The hat-box lid, with a round piece cut from its center, forms the platform; this is suspended from the umbrella wires by slender sticks, each having a bent pin at the upper end, to hook over the wires. A pin is driven through the lower end of each stick, to support the platform. Animal pictures are cut out and glued to the sticks. The merry-go-round is elevated to the same level as the phonograph turntable. A

spool is fitted over the turntable spindle of the instrument, and a $\frac{1}{2}$ -in. tape belt is used to drive the merry-go-round, as shown in the illustration.

Shoe Polish for the Automobile

Common brown shoe paste makes a satisfactory and economical automobile polish, as it has been found that it not only removes spots and dirt, and produces a surface that is proof against finger prints, but has no affinity for dust. One can is enough for two "shines," if the polish is properly applied. The car is washed and dried in the usual manner, and the polish is applied with a piece of slightly dampened cloth. Apply a thin coat of the paste, with a circular motion, and, when it has dried, polish with a piece of dry cheesecloth, using a long, swinging motion. The polishing paste can also be used on the top, in the same manner.

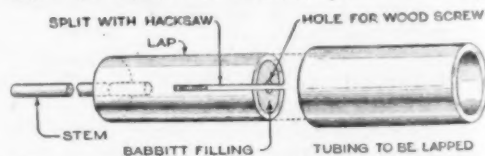
An Easily Made Dress Form

A serviceable and inexpensive dress form, for the woman who makes her own clothing, can be made, as shown in the engraving, from a French lining which is made to the exact fit of the wearer. The lining is tightly stuffed with excelsior and closed at top and bottom with wooden disks. The stand supporting the form extends through the body, the lower end of which is secured to a base made from an ordinary box with two crosspieces across the top. Ballast, in the form of two bricks, prevents the completed form from being easily upset.



Truing Up the Bore of Tubing

When a piece of drawn brass, or steel, tubing is used for such purposes as the cylinders of model engines, it is frequently found that the bore is not true but, if no lathe or reamer is available, as is usually



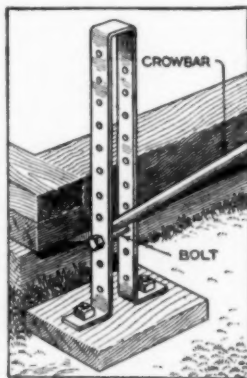
When a Lathe or Reamer Is Unavailable, the Bore of Drawn-Steel or Brass Tubing Intended for Experimental Purposes can be Trued by Lapping

the case, it is still possible to true up the bore by lapping, using the tool shown in the drawing. The tool, or lap, as it is commonly called, is made from a piece of tubing that will just slide inside the tube to be trued; an iron rod, with one end roughened, is held in the lap so that it will not reach all the way through, and is secured by filling the lap with melted lead, or babbitt, as indicated in the drawing. In the end of the lap, opposite the rod, drill a hole for a wood screw, and with a hacksaw make a slit through the center of the hole, as shown. The tube to be trued, which is cut somewhat longer than required, is held in a vise, and the lap, which is held in the jaws of a hand drill or bit brace, supplied with valve-grinding compound, or other abrasive, is inserted. The lap is rotated and pulled back and forth; both the lap and the tube being trued will be cut away, and this wear is compensated for by inserting a wood-screw into the hole provided in the end of the tool and screwing it in until the tool has been expanded sufficiently. If a very fine, smooth finish is desired, use very fine abrasive and much oil, and, at the last, keep adding oil, but no abrasive; finish by lapping with oil and graphite, running the lap rather tight.

If no tube can be found to fit the tube to be lapped, make a lap from lead or babbitt, by pouring it into the tube to be trued after thickly smoking the inside with a candle, so the babbitt can be pushed out. The other details are the same as for the tool described.—Howard Greene, New York, N. Y.

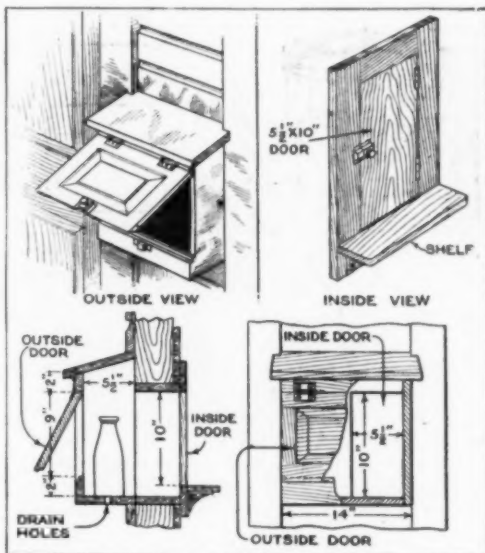
Adjustable Crowbar Fulcrum

The drawing clearly shows the construction of an adjustable crowbar fulcrum made from a piece of old $\frac{1}{4}$ by $2\frac{1}{2}$ -in. flat iron. The iron is bent into the shape shown, a space of about 2 in. being allowed between the sides. The feet, which are bent at right angles to the upright part, are drilled for attaching the device to a block with bolts. The sides are provided with holes at $2\frac{1}{2}$ -in. intervals through which the bolt supporting the crowbar is inserted.



A Box for Bread and Milk Deliveries

In addition to its convenience, the built-in box shown in the drawing protects deliveries of bread, milk, and other



A Box Built into the Wall of the House, at the Rear, Where Deliveries are Made, Protects Bread, Milk, and Other Foods from Damage and Contamination

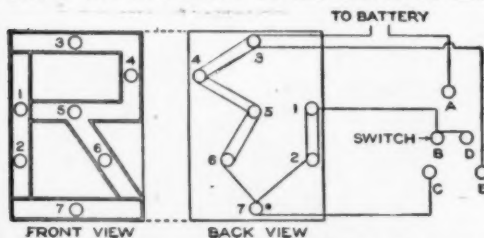
small packages from possible damage and contamination. Such a box is provided with both inner and outer doors and is best built between two studs at the rear entrance, where deliveries are usually made. After the articles have been placed in the box by the deliveryman, they can be removed from the inside without leaving the house. The box shown in the drawing is designed to hold two 1-qt. bottles of milk and a loaf of bread.—George F. Conrad, Germantown, Pa.

Vacuum Cleaner for the House Cat

An ordinary vacuum cleaner can be used to advantage in removing loose hair from Angora and Persian cats. The hair from the latter breed is so fine and downy that it cannot be easily removed from household draperies and cushions unless a vacuum sweeper is used. The suction from the cleaner is too strong to run over the cat's fur, but if the current is turned on and the sweeper held close to the animal while the hair is combed or brushed, all the loose hairs will be taken in by the suction of the machine. It is necessary to teach the cat to become acquainted with the sound of the cleaner, but after a few trials it will not be disturbed by the hum of the motor.

Automobile Direction Indicator

A direction indicator for automobiles, for use at night to show a following driver the intentions of the driver of the



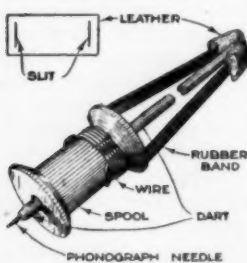
An Electrical Direction Indicator Which Shows the Driver of a Car Following the Intention of the Driver to Turn to the Right or Left

car, is easily made and attached to any car with an electric-lighting system. The indicator shown is an electrically illuminated combination of the letters "R" and "L," with a switch on the dash or on the steering wheel.

The letters are formed by troughs about 1 in. wide and $\frac{1}{8}$ in. deep, and painted white, to reflect the light from the small electric lamps which are mounted in them, as shown. The entire monogram should be about 3 by $4\frac{1}{2}$ in. When lamps 1, 2, and 7 are lighted, the "L" will be illuminated, and when lamps 1, 2, 3, 4, 5, and 6 are on, the "R" will appear; these results are obtained by throwing the switch lever to the right or left. The switch lever is fastened at A, and when thrown to the left, makes contact with B and C. By tracing out the circuit, it will be seen that this will light the "L." In the same manner, when the switch lever is thrown into contact with D and E, the "R" will be lighted.—Alton D. Spencer, Columbus, Ohio.

Spool Bow for Shooting Darts

A good substitute for a bow and arrows, and one that is much easier to make and use, is made from a large



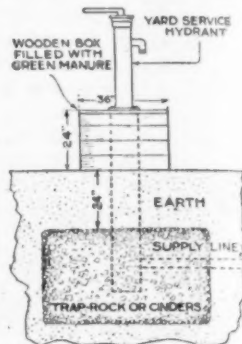
spool and a wide rubber band. The rubber band is cut in the center and a piece of leather, $\frac{1}{8}$ in. wider than the band, is slitted at each end. This piece of leather is slipped over the rubber band, as shown in the drawing; then the ends of the band are bound to opposite sides of

the spool with fine wire or strong cord. The darts are made from small, round sticks with an old phonograph needle for a point. The darts should fit loosely in the hole of the spool. If available, butcher's skewers may be used instead of the needle-tipped darts, and the trouble of making them will be saved.

Correct Installation of Yard Hydrants to Prevent Freezing

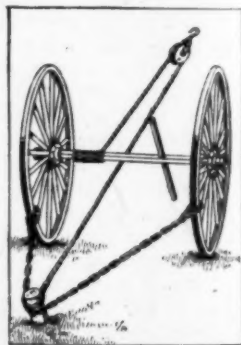
By using a little care in installing yard service hydrants, much subsequent trouble will be avoided; one of the commonest troubles is that of freezing.

The illustration shows a method of installing a hydrant, which will eliminate "soggy" or wet spots around it, by providing a good drain for waste water. As the drawing shows, the hydrant is set in a basin of trap rock or cinders, which should occupy 8 or 10 cu. ft.; the flange of the hydrant casing is bolted to the top of a wooden box, 36 by 26 by 24 in. high, which may then be filled with green manure.



Wire Stretcher Made from Wagon Axle

Designed particularly for stretching wire fencing, the device shown in the drawing, which is made from the wheels and axle of an old buggy or wagon can be used for a variety of purposes around the farm. As indicated in the drawing, the wheels are firmly anchored, as well as one end of the rope, the other end being secured to the axle, which takes the place of a windlass drum. A hole is drilled through the axle at some convenient location and an iron bar is inserted for exerting pressure on the rope, as shown. Such an arrangement can also be used for uprooting small saplings.



OPPORTUNE ANNOUNCEMENTS

Whenever prize competitions mentioned on this page are conducted by a public institution, the name and address will appear with the announcement. Industrial addresses will not be published, but may be obtained from our Bureau of Information by request, mentioning the title of the article and date of publication.—Editor.

NEED WATER-SUPPLY ENGINEERS FOR GEOLOGICAL SURVEY

Gauging streams and investigating water supply, utilization, and power, in various parts of the country, is an interesting work for which the U. S. Geological Survey, Water Resources Branch, is in need of engineers. An open examination will be held **October 1**, and successful applicants graded as engineers will be appointed at \$2,400 or more per year, assistant engineers at \$1,800 to \$2,340, and junior engineers at \$1,440 to \$1,740, with the temporary additional \$20 a month granted by congress. Besides graduation from an engineering course, engineers must have had four years of responsible work, and assistant engineers two years, and both must be 25 years old or more. Juniors should be between 20 and 35. Applicants are required to secure Form No. 1312 from the Civil Service Commission, and should specify the precise examination in which they are interested.

WAR DEPARTMENT CHIEF ENGINEER WANTS ELECTRICAL DRAFTSMEN

Electrical draftsmen of three grades of experience are needed in the office of the chief of engineers of the War Department at Washington, with salaries ranging from \$1,200 to \$2,400, plus the \$20 monthly emergency increase, and an open examination is to be held **October 1**. Education, training, and experience will count 80 per cent, and practical tests, based on work submitted, 20 per cent. Necessary qualifications for the different grades vary from the mere possession of an engineering degree, to eight years' experience in engineering work. Those interested should apply to the Civil Service Commission for Form No. 1312, specifying the particular examination desired.

OPPORTUNITY FOR SHOP APPRENTICES IN BUREAU OF STANDARDS

Vacancies in the U. S. Bureau of Standards, at Washington, offer opportunity for a number of shop apprentices, between 16 and 18 years of age, to get their names on the eligible list for this desirable appointment. The usual entering salary is \$720 a year, plus \$20 a month temporary increase. Education, training, and experience count 90 per cent in the test, and physical ability 10 per cent. Applicants should have common-school education, with six months of practical work, or a year of manual training. The position affords splendid training for fine-instrument making. No. 1312 is the Civil Service Commission form on which application is made, and the closing date is **October 1**.

FAST QUANTITY OF ARMY MAIL STILL AWAITS CLAIMANTS

Great quantities of mail, including practical and sentimental merchandise of all varieties, as well as money, lie stacked in the offices of the adjutant general of the U. S. Army, awaiting claimants. It is the accumulation of matter addressed to soldiers in France, and returned as undeliverable. All those whose property mysteriously disappeared in the postal complexities of war time are invited to forward accurate identifications of it, and if found, it will be returned. Chapters of the Red Cross are assisting in the work of finding the owners.

PRIZES OFFERED FOR NEW METHODS OF MEASURING METAL HARDNESS

To encourage the further development of methods of testing the hardness of metals, and especially the accurate determination of unusual degrees of hardness, a British scientist has established a prize fund with a nominal value of about \$1,000. The money is in the hands of the Institution of Mechanical Engineers in London, and awards, based on descriptions received of new methods, will be made from it by the council of the society. The prize offer will be withdrawn in **January, 1922**.

SELECT STATEHOUSE ARCHITECT BY SECRET COMPETITION

Political motives and the bias of friendship were wholly eliminated as influences in the recent selection of an architect for Nebraska's new \$5,000,000 capitol building, by the simple but unusual method of holding a secret contest, in which unsigned plans were submitted by the competing artists. Three competent judges, from Washington, New York, and San Fran-



BERTHAM G. GOODHUE, ARCHITECT

The Winning Design for Nebraska's New \$5,000,000 Capitol Building, Selected in Secret Contest

cisco, passed upon the designs, which were identified only by number, and the final selection proved to be the work of a New York man. The winning design may not be the one actually used, but it will serve at least as a basis for further study. It provides for a building 400 ft. square, with a central tower 400 ft. high, pierced by a 45-ft. driveway. It is so planned that it can be built around the old statehouse without interference, saving much confusion.

SUGGESTIONS FOR USE OF RUBBER TO DRAW BIG CASH PRIZES

Evidently there is no shortage of rubber, in spite of auto tires. A sum totaling, in American money, \$24,335 is being offered by the Rubber Growers' Association of London, Eng., for practical suggestions of new uses for rubber, or extensions of present uses, calculated to increase the consumption of the raw material. The contest closes **December 31**. The first prize is \$4,867, the next three \$2,433 each, the next ten \$487 each, and the remainder, \$7,300, is to be divided into final prizes not larger than \$487. No application or process suggested, or apparatus employed, is to be patented, and the competitors are required to make a statement to that effect.

LONDON EFFICIENCY EXPOSITION TO HAVE WORLD-WIDE SCOPE

Efficiency, much abused but highly potent subject, is to be the prime motive of an exhibition, held in London, as broad in its scope as the word itself. The conduct of affairs, as qualified by the adjectives scientific, industrial, commercial, civic, national, and personal, will be treated in different sections of the display, which, in its entirety, practically is open to every suggestion, process, and mechanism intended to aid the orderly progress of civilization in any way. The exhibition, which will be held at Olympia, in London, **Feb. 10 to 26, 1921**, is to be international in its interest and representation, and offers opportunity to American manufacturers, organizers, and educators.

RESIDENCE INSULATED LIKE GIGANTIC ICE BOX

THE problem of keeping the wintry cold out of the house interests every North American householder dwelling above the 40th parallel of latitude. Of

only 10 per cent more than a similar frame house, it holds the heat four or five times better than the ordinary, substantially built structure.

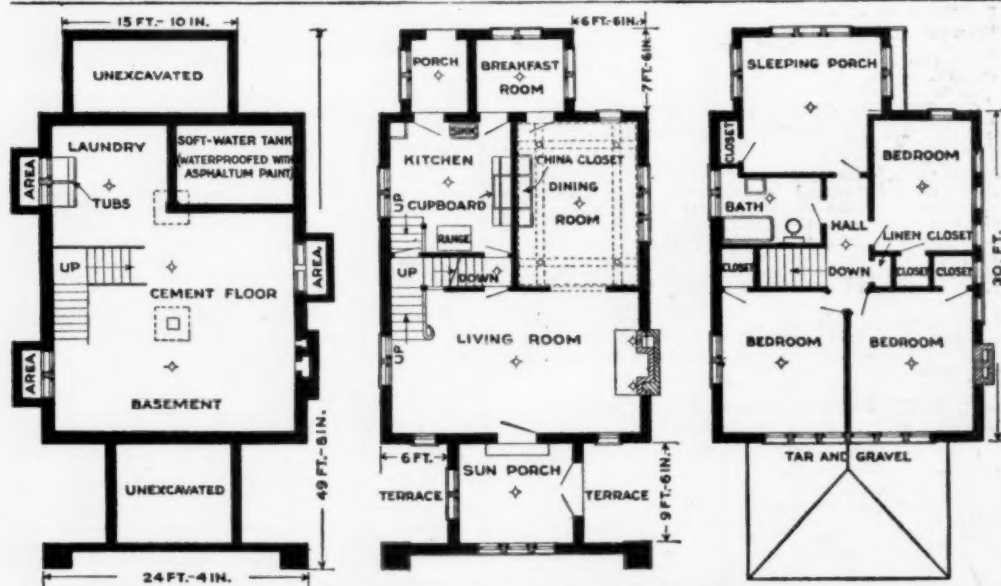


The Decorative Exterior Gives No Hint That the Principles of Refrigeration were Employed in the Construction of This "Cold-Proof" Residence. The Walls are Stuccoed

The walls of the cold-proof house consist of 8-in. studs carrying an outer surface of 1½-in. reinforced concrete and an inner surface of asphalt paper, wooden lath, and plaster. The air-tight spaces between the studs are filled with granulated cork with a 10-per-cent admixture of dry planer shavings. This substance is packed to such a density that, while air circulation is stopped, there remains a fairly uniform distribution of tiny air pockets. Similarly, the insulating material fills the spaces between the stringers of the roof and of the first floor. All the doors and windows are carefully weather-stripped, in addition, with the

them all, however, a home owner and refrigeration engineer of Saskatoon, Canada, is probably the first actually to build

result that, though there are two of the former and 43 of the latter, the coldest wind fails to drive the heat out of the



From the Floor Plans of the "Ice-Box" House It is Seen That Only Two Entrance Doors are Provided, and That Both Open into Vestibules to Prevent the Inrush of Cold Air

his house like a gigantic ice box. The house is a nine-room affair with flat roof and stuccoed walls, and though it cost

most exposed bedroom. The heating plant consists of nine steam radiators which are heated by electric coils.

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