

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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DOWN POPOCATEPETL
ON A STRAW MAT

Dec. 1937

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It takes *only* 8 weeks to get a big job



O. H. Justus owns a big agency and repair shop at Parkersburg, W. Va. He says "that my schools give motor secrets that will put any man 'on easy street.'"

In the Auto and Tractor Business

Read what these men are doing—here is your big chance to get "on easy street." Come to these great shops on the biggest **FREE** offer ever made.

Big Firms Need Trained Men

The Auto and Tractor Business is on the boom. Thousands of trained men will be needed during the next few months. I get calls every day from Garages, Battery Stations, Auto Repair, Welding Shops and other successful concerns for Rahe men. When the big fellows need high grade men they know where to come for them. They want Rahe trained men.

My Training Unusual

Scientific tool training—that's the secret. You do things here according to the latest engineering standards. Thousands of dollars have been spent in modern tools and equipment. That's why my men are at home in the biggest shops in the country. If you want to succeed the way Beimer and Justus and the rest have—qualify by the same method in only eight weeks or stay as long as you like.



Emanuel Rushfeldt, Alberta, says: "Earning \$10 a day and only 20 years old."

I'll Pay Your Railroad Fare and Board You

In order to fill the openings that now exist, I am making an offer no one has ever made before—**Free Railroad Fare, Free Board for eight weeks.**

SAVE
\$50 to \$75

You Save Big Money by acting now. Pack your grip—get on a train—Come to school right now before it is too late—**OR WRITE TODAY.**



W. W. Peace gets \$250 a month and expenses operating a tractor in the oil fields.

Send for **FREE** Book

My big illustrated training book tells how others are succeeding. It tells many things you ought to know about Autos and Tractors. Write for it and my **short time** offer NOW. It soon expires.

Rahe *Auto & Tractor* Schools

CHICAGO
4445 Grand Blvd.

Dept. 900 CINCINNATI
Ninth and Walnut



Louis Beimer at 24 was made foreman over men many years older. That's not luck—it's Rahe training.



Rahe Auto & Tractor Schools,
Dept. 900, (address school nearest you
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Chicago, Ill. Cincinnati

Without any obligation, send me
book, "The Evolution of Transportation"
information regarding special terms.

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Vol. 39

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No. 2

Turbine-Driven Locomotive Cuts Coal Consumption in Half

By GEORGE F. PAUL

A TURBINE-DRIVEN locomotive embodying such radical departures from accepted designs as to form a decided innovation in the field of locomotive engineering, has been developed in Sweden.

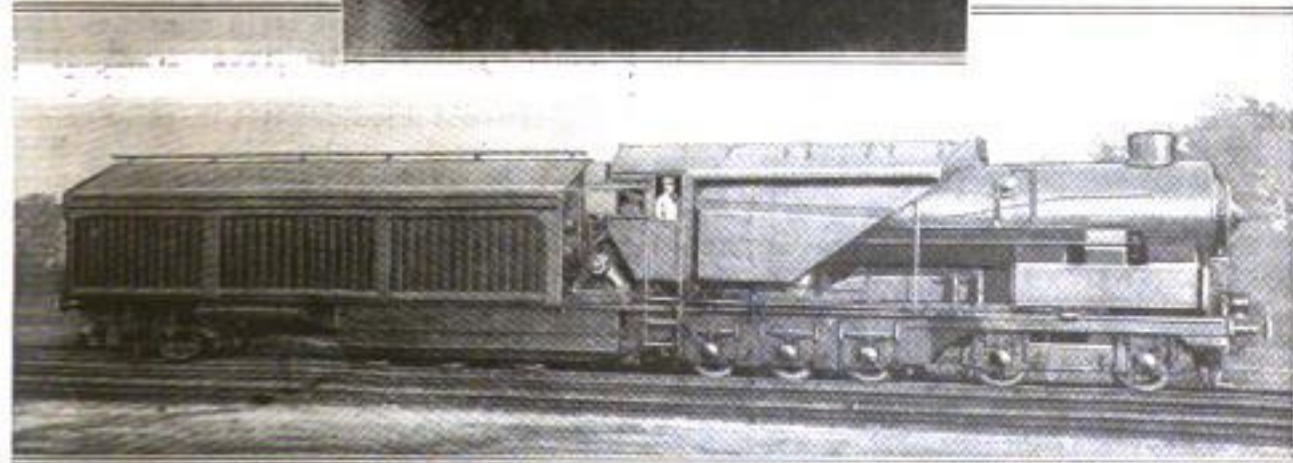
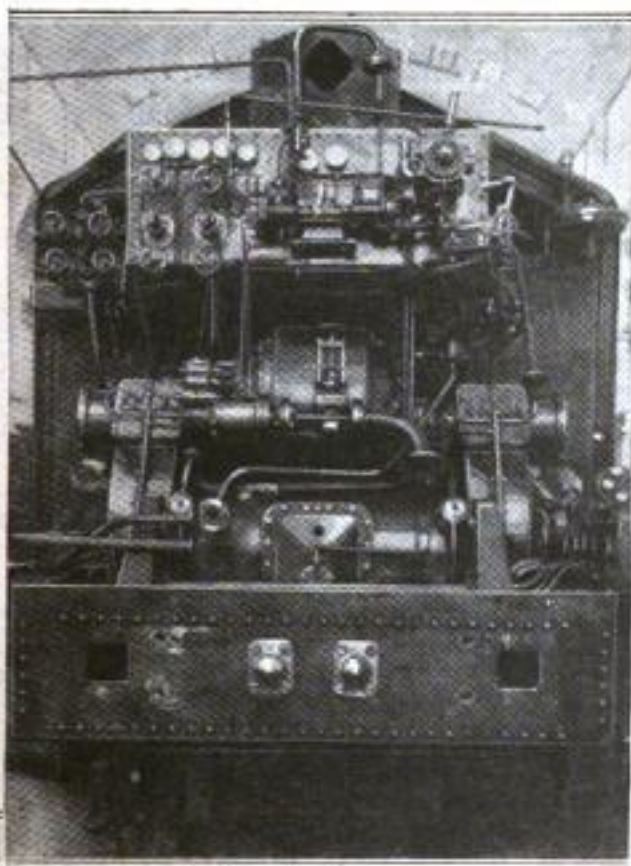
When it is remembered that an ordinary locomotive turns only about 6 per cent of the heat of its coal into useful work, whereas in modern power plants from 10 to 20 per cent of the heat of the coal is utilized, it is evident that the locomotive offers great scope for improvement.

This new locomotive is 72 feet long over all, and weighs, in running order, 126 tons. The motive power is a steam turbine capable of developing 1,800 horsepower. This turbine drives the three pairs of

coupled wheels by means of double-reduction gearing. The turbine is carried on the front end of what one is tempted to call the tender. In reality it is the engine part of the complete locomotive. It

embodies the whole of the driving mechanism and auxiliary apparatus, as well as the condensing plant. The front part of the locomotive carries the boiler, with superheater, the turbine-driven induced draft for the air heater, and the coal bunker. The latter is in the form of a saddle tank, and has a capacity of seven tons of coal. The tractive effort of the locomotive is 12 tons, and the maximum speed 60 miles an hour.

It should also be noted that the de-



Above: View of Turbine-Driven Locomotive, Showing Main Turbine, Reduction Gears, and Control Apparatus. Below: Side View of Locomotive, the Front Part of Which Carries the Boiler, Superheater, Induced-Draft Fan, Air Heater, and Coal Bunker, While the Rear Carries the Power Equipment and Condensing Apparatus

sign includes forced lubrication to all working parts—which, moreover, are totally inclosed—and a device for blowing the soot from the boiler tubes when running. The boiler is fed with condensed steam at a high temperature, the condensate being driven by a turbine-driven feed pump through three feed heaters in series. Each feed heater takes exhaust steam at a different pressure, and therefore at a different temperature, so that the feed temperature is progressively raised to the required point.

The most advanced power-station practice has been followed or adapted to suit the special conditions, with the result that economies have been realized which were utterly unattainable with locomotives of the ordinary type. In actual service the locomotive, from the inventor's name generally designated as the Ljungström turbine locomotive, has shown a fuel consumption less than half that of the corresponding locomotives of the standard type. The adoption of forced lubrication and the total inclosure of moving parts permit longer runs without stoppages for oiling and cleaning.

The main turbine develops 1,800 horsepower at 9,200 revolutions per minute. Steam from the boiler is led to a cast-steel steam chest containing five nozzles, each of which is independently controlled by a valve operated by oil pressure. The steam emerging from the nozzles acts first on an impulse wheel with two moving rows of blades, which, on account of the very high speed of rotation, are built up of two separate disks mounted side by side and registered together. Then the steam passes through the reaction blading.

The turbine rotor runs in two plain bearings, the journal blocks acting as nuts to hold the rotor together. The outer end of each journal block is bolted to one side of a flexible diaphragm coupling, the other end of which is fastened to a hollow shaft running through the center of the first gear pinion. These hollow shafts are connected to the outer ends of their respective pinions through other diaphragm couplings, so that the drive between the turbine and the pinions is thoroughly flexible.

The success of any form of turbine locomotive is intimately bound up with the provision of a suitable condenser, as the economy of the turbine depends largely upon the vacuum into which it exhausts. The problem of designing a portable condensing plant adapted to deal satisfactorily with anything up to about

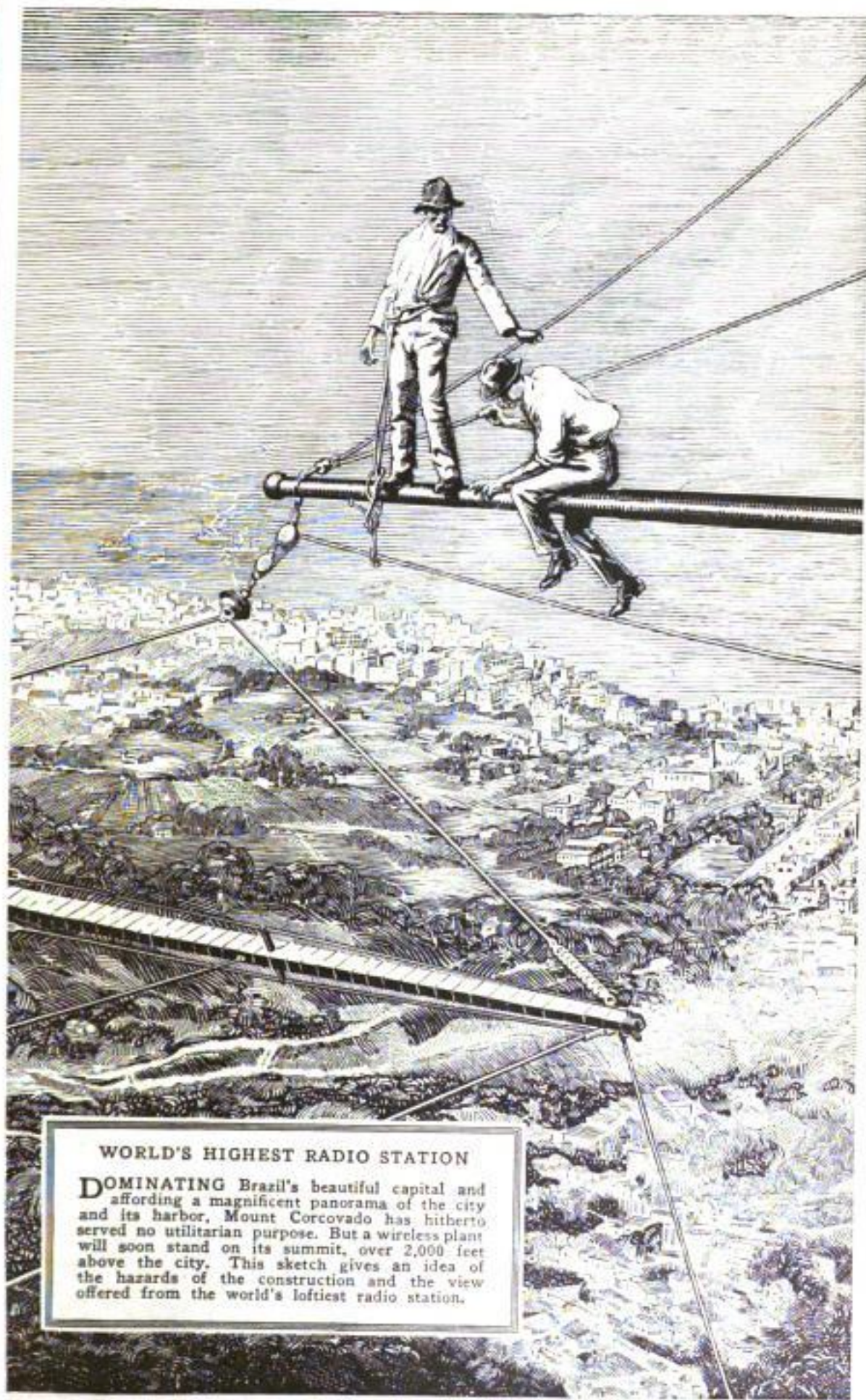
20,000 pounds of steam per hour, yet kept strictly within certain limitations of size and weight, is by no means an easy one. This condenser embodies the principle of direct cooling by means of air.

Except for the very small amount of space taken up by the turbine and gearing, the condenser occupies the whole of the engine car. In the interior of the car, and running the full length of the body, is a cylindrical vessel, normally half full of water of condensation. The turbine exhaust branch is bolted directly to a flange on the front end of this vessel, into the front end of which the steam first passes. From this vessel it rises through two short pipes into a much smaller cylinder, centrally above the larger one. Between the two cylinders are placed three large fans on vertical shafts. They are driven by friction wheels running in contact with their disks. The drive from the main turbine to the fans is by means of an inclined shaft with bevel gear at each end. These fans induce a strong current of air over the lower cylinder and particularly upward between the copper elements, wherein most of the condensation is effected.

Above the drums, there are, on each side of the condenser car, a very large number of flattened copper tubes packed closely together and sloping downward like the rafters of a roof. They form, in fact, the roof of the car, and it is in them that the main work of condensation takes place. The air from the three fans is forced through narrow channels between the tubes. Water for boiler-feed purposes is withdrawn from the condenser by means of a pump, driven by a steam turbine, and delivered to a boiler-feed pump, which forces it into the boiler.

An inspector recently traveled with this locomotive, riding on the footplate for one journey and in the dynamometer car when returning. The train consisted of a number of heavy sleeping cars, aggregating about 475 tons. Special permission had been obtained from the railway administration to exceed the normal high speed; the engine was opened out, and a speed of 59.5 miles was reached over one portion of the track.

"At all speeds," he says, "the engine ran with great steadiness, and except for the indications of the speed recorder one would hardly have realized that 60 miles per hour was being touched. The main gearing worked practically inaudibly, or at any rate, it made much less noise than the small bevel-gear drive to the condenser fans."



WORLD'S HIGHEST RADIO STATION

DOMINATING Brazil's beautiful capital and affording a magnificent panorama of the city and its harbor, Mount Corcovado has hitherto served no utilitarian purpose. But a wireless plant will soon stand on its summit, over 2,000 feet above the city. This sketch gives an idea of the hazards of the construction and the view offered from the world's loftiest radio station.

RELIEF RIVETS IN SAFE DOOR FOIL "YEGGMEN'S" BLAST

The failure of burglars to blow open a country-bank safe not long ago, was largely due to the scientific construction



Bank Safe Which, Owing to Its Scientific Construction, Resisted the Efforts of Burglars to Blow the Door off Its Hinges

of the safe door, which was provided with eight large safety plugs, or rivets. These blew out, making vent holes for the relief of the gases generated by the explosion of a charge of nitroglycerin that was poured into a small hole made by knocking off the combination. In this way the force of the explosion was sufficiently dissipated to prevent the door from being blown off its hinges.

ARMY PLANE FLIES 90 MILES WITHOUT A PILOT

The pilotless airplane, with which the Army Air Service has been experimenting for some months, recently made a number of successful flights of more than 90 miles. The automatic control, consisting of a gyroscope and an arrangement of bellows similar to those used in piano players, is said to be more accurate and dependable than a human pilot. The tests proved it was possible to drop bombs from this plane, on targets on or off the ground, with great accuracy.

WAR AGAINST PINE BEETLE REDUCES TIMBER LOSS

A crusade against the pine beetle that has been causing so much destruction in the yellow-pine districts of the Northwest, as to alarm several government agencies and a number of private interests, is reported to have reduced the infestation about 50 per cent during 1922. This work, which is under the supervision of the Bureau of Entomology, consists of locating and felling all infested trees, and it is expected to result in the saving of over \$78,000 worth of lumber during the next three years, over and above the cost of the work. On a million acres as yet untreated, the loss from this pest is now \$300,000 a year.

PACK EQUIPMENT MODELED FROM INDIANS' OUTFIT

A combination pack board and knapsack for the use of hunters and hikers, has been designed by a trapper along ideas gathered from his own experience and from the crude ones used by the Indians of the Northwest. It consists of a ladderlike wooden frame, the cross-pieces of which are curved to fit the back. Over the frame is laced a stout piece of canvas, to which the knapsack is attached by means of a convenient fastening. The knapsack has, on the outside, one large and one small pocket, each with a snap-button flap, and is protected by a large canvas flap that folds down over the top and buckles near the bottom. The comfort of the knapsack lies in the ventilation afforded the back of the wearer and the relief from chafing.



The Combined Pack Board and Knapsack, as Used, to the Left; and without the Knapsack, Above



HUNTING BIG GAME WITH BOW AND ARROW

By LYLE ABBOTT

THE sporting rifle has kept pace with the military arm. In some respects it has set the pace for the weapon of the soldier. But in the United States, the gray-steel barrel, the nickel-steel jacketed bullet, and the balanced ration of smokeless powder have outstripped the game they were intended for.

To equalize the contest somewhat, some of the sportsmen on the western coast are returning to the weapon that made Crécy and Agincourt notable victories, and that gave a glamour to the feats of Robin Hood

and his merry men. The American long-bow, a descendant of the English arm that gave the Henrys the supremacy over the less accurate and effective French arbalest or crossbow, is now making its debut before men and women devotees of the big-game hunt in this continent.

When Dr. Saxon T. Pope, of San Francisco, Donna Smith, of Oakland, and W. J. Compton, of Visalia, Calif., joined Arthur Young, of Octave, Ariz., at Prescott, to engage in a

bow-and-arrow hunt for the famous mountain lion that is the principal big game of the high northern plateau and mountains of the newest state, I thought: "Merely another new fad!" And then I put my right forefinger, and the one next to it around the string and grasped

the bow with my left hand, and "nocked" an arrow. I exerted a manly pull and drew the arrow half-way to its head—which naturally made these experts laugh.

The bow that has bagged the wild things of the western United States from the size

of the quail to that of the grizzly bear, is a "he-bow." It is not strictly the English longbow of historic times, but a cross-breed. It is partly the bow that the Indian used—and rather successfully—to equip his cooking pot with the wherewithal of the wild life of his day. This

instrument varies from 5 feet 8 inches to 6 feet in length, and is made of Oregon yew. It is home-fashioned, and it publishes the skill of the quartet who use it. The "pull" is from 75 to 85 pounds, and

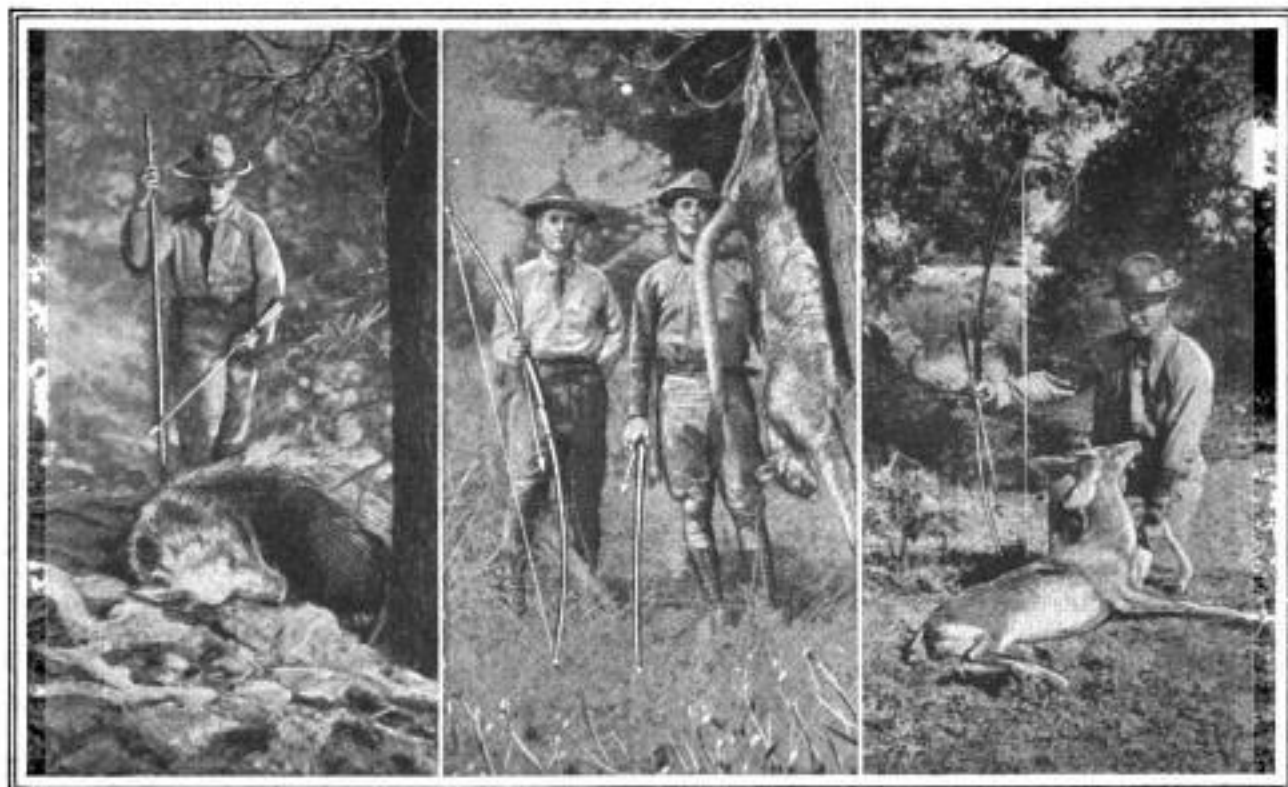


This Picture Illustrates the Effectiveness of the Modern Long-bow, by Showing the Penetration of an Arrow in a Bear at 45 Yards



Left: Bow Requiring Pull of 75 to 85 Pounds to Bend. Right: Shooting a Blunt Arrow through a Pine Board





Left: A Grizzly Bear That was Killed by Doctor Pope with One Arrow through the Heart. Center: California Lion That Fell before the Two Archers. Right: Young Buck Killed by Arrow Shot at 65 Yards

in some cases 90 pounds. The arrows are of birch dowels, $\frac{3}{8}$ inch in diameter and 28 inches long. They are fletched with turkey feathers. Each arrow carries feathers from the same wing, so that there is a definite curve, and it rotates like a bullet in flight, the feathers acting as a turbine wheel, or propeller, to twist the shaft as they steer it. The arrow tips are steel, welded to brass ferrules like cartridge cases, and these points are 3 inches long by $1\frac{1}{4}$ inches wide and filed as sharp as daggers. Used against heavy game, they are more deadly, even, than rifle bullets, for they not only remain with their shafts in the wounds, but cause hemorrhage such as is not known to the leaden missile, which often cuts clean or shocks on expanding. The extreme range of such a bow is 300 yards. Hunting distances range from 20 to 100 yards. Point-blank range is about 75 yards.

Of course, the trajectory is not flat, and the striking force of the light arrow is but 25 foot-pounds. In spite of this apparently insignificant force, an arrow is capable of being driven clear through a large animal, such as an elk or bear.

The bladed points can cut ribs in two and pass completely through a deer at 100 yards. They cause tremendous bleeding and kill quite as promptly as bullets. Some of the large bears shot, died in less than half a minute after being hit with only one arrow.

A blunt arrow will pierce a 1-inch pine board. Doctor Pope has tested a bodkin-pointed arrow on a suit of chain armor—shot the missile through the thickest part of the metal, through $\frac{1}{2}$ inch of wood, and then the point bulged out the other side of the coat of mail.

Doctor Pope and his associates have learned to be bowmen from Ishi, an Indian unspoiled by civilization. He not only taught them to shoot with the bow, but to make their own, after the fashion of those red-skinned hunters who pursued their meals before Columbus landed. Experiment, however, carried the sportsmen into more scientific realms, and they now have practically rediscovered the ancient art of making archery tackle that is efficient in the sporting field.

They have been hunting with the bow in preference to the rifle for several years. They believe it is more sportsmanlike, because it gives the game a chance, and because they drive their flying shafts with their own strength. The eye must be keen, the nerves strong, and the muscles must replace the charge of powder that so-called civilization has brought to such a high standard of perfection.

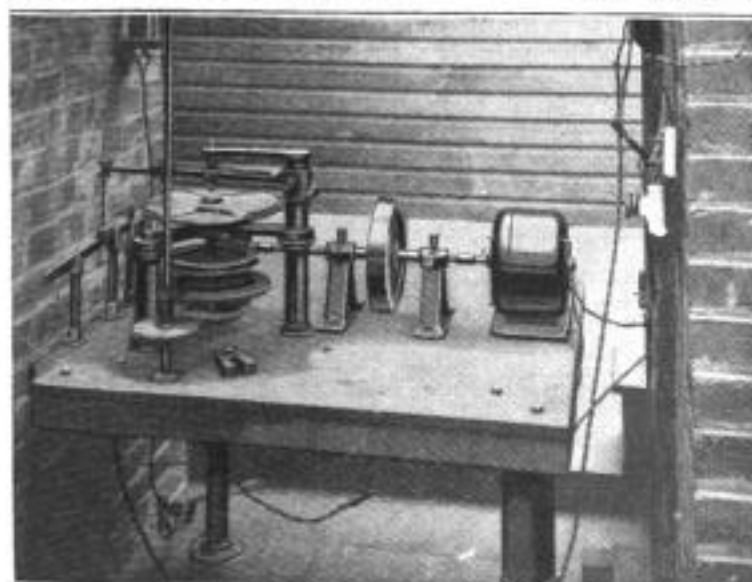
Moreover, the bow hunting is a noble sport, for it has a background of romance. It is an art difficult to learn. No novice can pull these bows. Only practice will enable the hunter to master the technical points of true archery.

PHOTO TELESCOPE HAS ELECTRIC DRIVING CLOCK

The 26-inch equatorial telescope at the Naval Observatory in Washington, D. C., has recently been equipped with a new electric driving clock designed by Capt. W. D. MacDougall, superintendent of the station. This driving mechanism was developed to meet the need of an accurate and reliable means of guiding the telescope, which is used for photographing the positions of stars and planets, in keeping it fixed upon some celestial body. It is arranged so that a $\frac{3}{8}$ -horsepower, alternating-current motor, rated at 1,750 revolutions per minute, drives, through a horizontal worm, a wheel and a train of spur gears mounted on vertical shafts. The slowest of the shafts is extended to connect with the gearing of the equatorial mounting of the telescope. The worm-wheel shaft carries at its upper end a turntable, provided with a segmental plate arranged to engage a small wheel hung from a lifter arm that periodically interrupts the motor circuit,



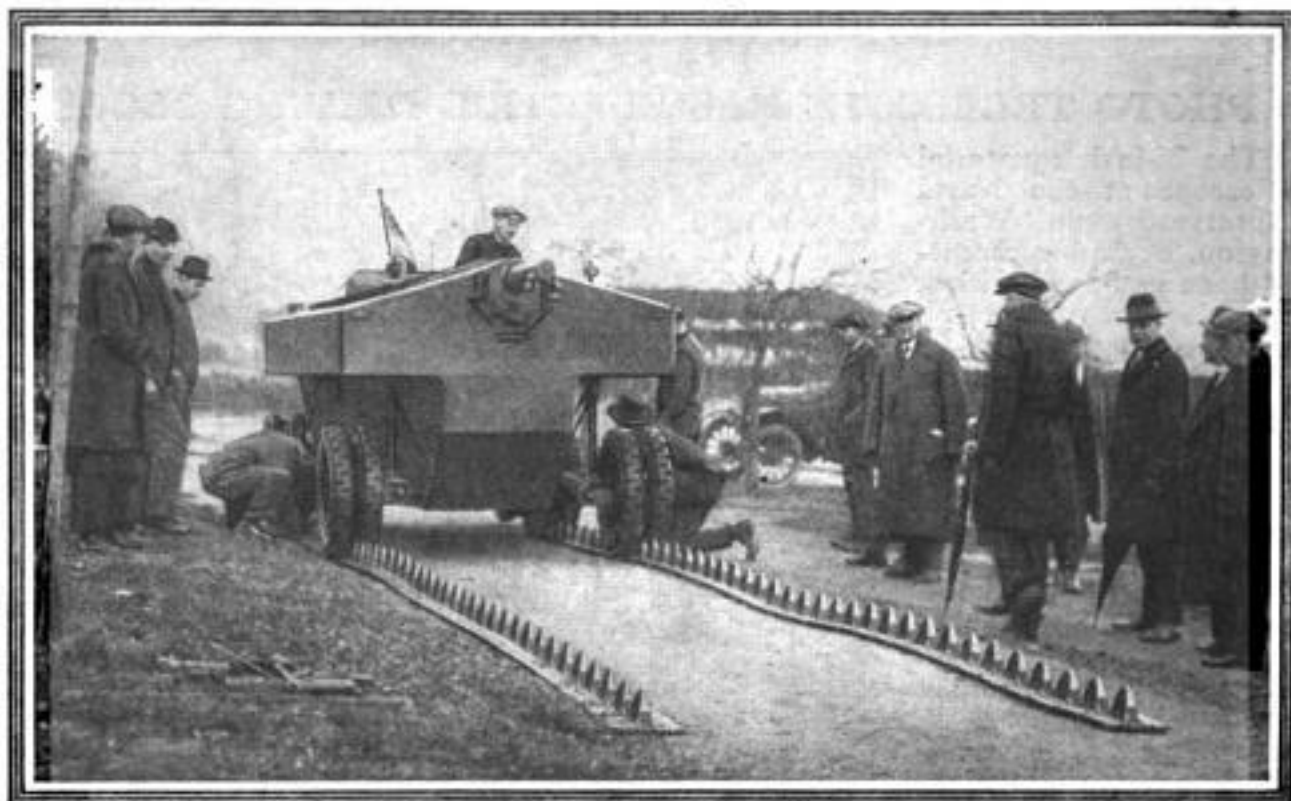
View Showing the Operating Mechanism of the 26-Inch Equatorial Telescope at the Naval Observatory, with the Old Friction-Drive Clock Mechanism Used for Photographic Purposes



New Electric Driving Clock Used as an Accurate and Reliable Means of Guiding the Telescope When Photographing a Star

so as to maintain the motor at a practically uniform speed. This is believed to be the first driving clock for precision work which does not require a pendulum, and although considerable work has been done with the telescope since it was installed, no adjustments have yet been necessary.

Exactly 113,597 patents, the largest number on record, were filed in the fiscal year ended June 30, last year, according to the commissioner of patents. The previous record was made in 1921, when 107,656 were filed. The department also made a surplus over expenses, the commissioner states.



Front View of the New Armored Truck, Showing the Method of Installing on the Wheels the Long Continuous-Tread Attachment: When in Place, This Converts the Truck into a Tractor. The Width of This Attachment Is Equal to the Combined Treads of the Heavy-Tired Double Wheels

WAR TANK THAT TRAVELS BY LAND OR WATER

By HENRY S. WHITE

THE last word in war vehicles is an armored truck that travels by land or water, that climbs steep embankments, that jumps over trenches, and that makes short work of any obstacle such as wire entanglements, walls, or breastworks. In general construction it is more like an armored truck than the tanks that took part in the World War, but it does all that these did, and more.

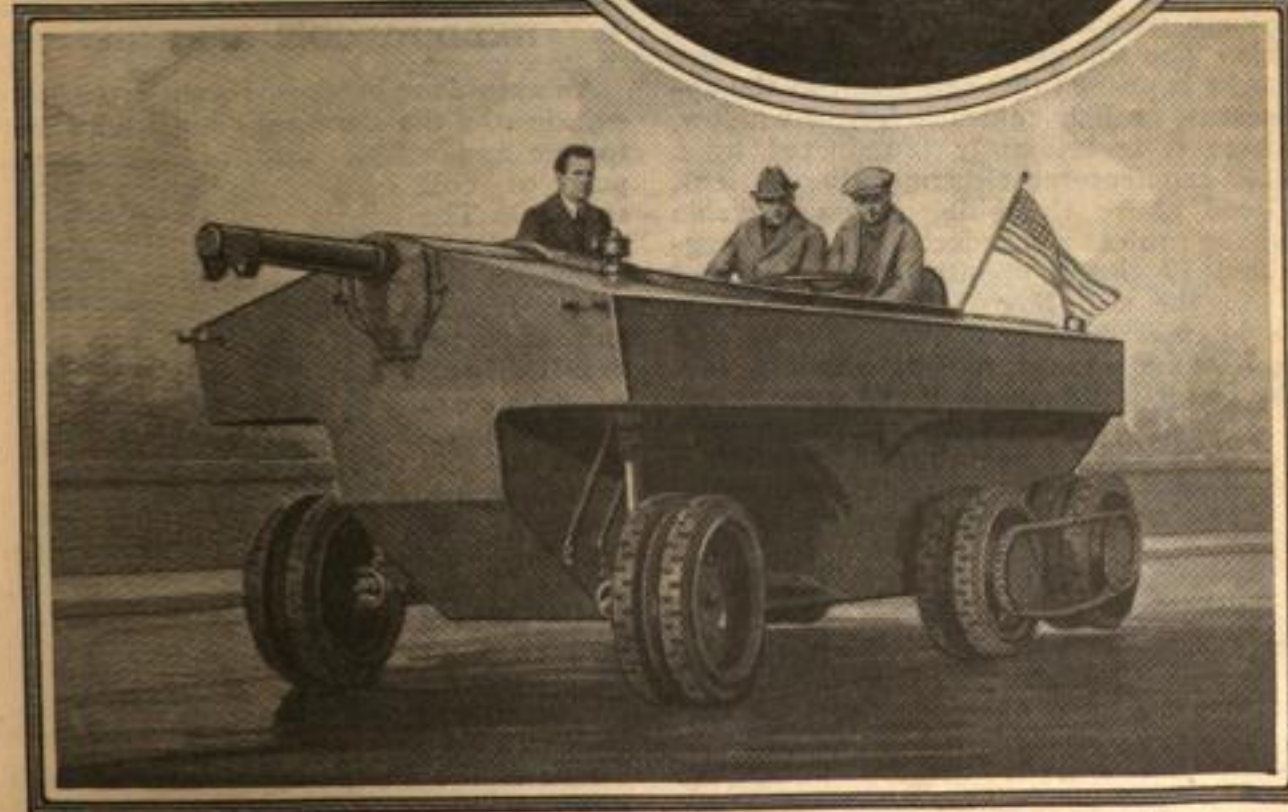
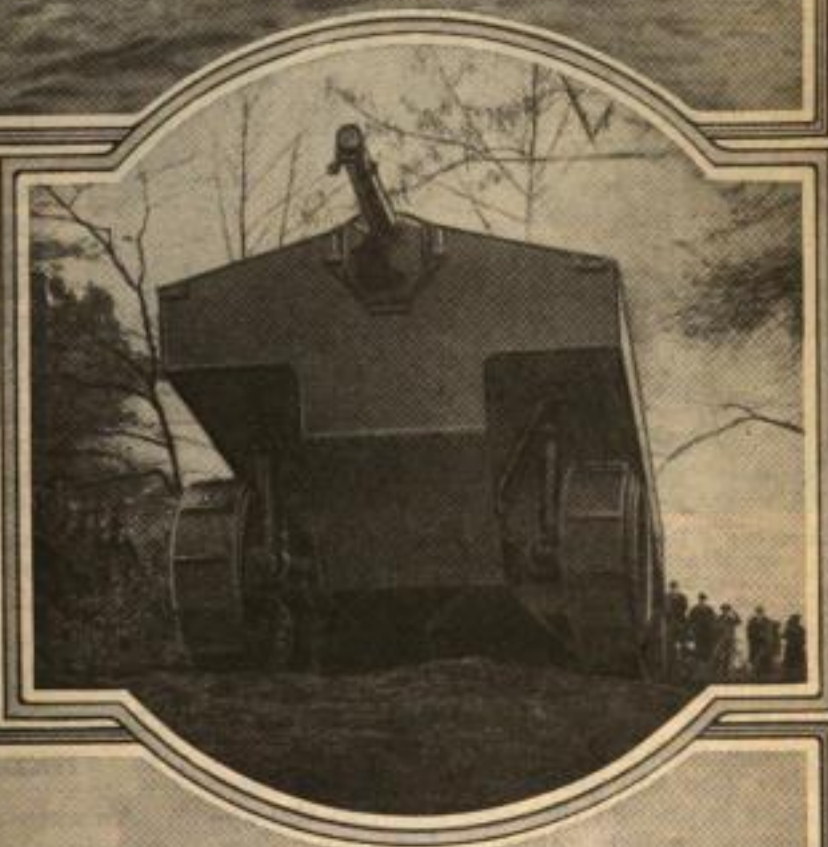
A demonstration of one of these war machines was recently given in New York City, and was attended by enthusiastic representatives of the army and navy, and by several hundred members of the American Society of Mechanical Engineers. It traveled along Riverside Drive at a speed of 25 miles an hour, followed by a long column of automobiles, and was then ferried across the Hudson River to the New Jersey side. Here it climbed the towering palisades on a 40-per-cent grade to a height of 100 feet, where it reached a level spot, turned around, and then slid back to the road at the riverside. After incidentally bumping over a 4-foot stone parapet, it drove to the water's edge, where propellers were mounted on shafts provided for the purpose at the rear end of the truck. Then it crossed the river, which is at that point nearly 2 miles wide, in about 45

minutes, the steering being done by means of the propellers.

The armored truck that made this remarkable demonstration is the invention of Walter Christie, first well-known as a dare-devil automobile racer, and more recently as a successful inventor of war tanks. His new machine has an armored body mounted on three pairs of double wheels with heavy rubber tires, and in this form it looks much like a heavy motor truck. A wide continuous-tread attachment can be installed in from 10 to 15 minutes around the treads of the wheels, giving the machine the characteristics of a tractor. The armored body is 15 feet long, 6 feet wide, and carries one 75-millimeter gun pointing forward. The crew consists of 10 men, and the truck carries provisions and ammunition sufficient to last 24 hours. Altogether, it weighs 6 tons, and on land, in its truck form, it is capable of traveling over 30 miles an hour, and in its tractor form, with the continuous tread, it can do about 12 miles. A duplicate machine that was demonstrated recently at Camp Meade, Md., made a run of approximately 225 miles in 7 hours. Altogether this new amphibious tank is considered to be a great advance in war machines of its type.



Above: The Armored Truck Seen Crossing the Hudson River at a Speed of about 20 Miles an Hour. Right: Front View of the Armored Truck as It Climbed to a Height of 100 Feet up the Palisades on the New Jersey Side of the River. For This Kind of Work the Continuous-Tread Is Necessary, and This can be Seen on the Wheels. Below: Armored War Truck without the Continuous-Tread Attachment. The Rear Set of Wheels does Not Touch the Ground When the Machine is Running as a Truck on Smooth Level Ground. The Gun Carried by the Car Is a 75-Millimeter Fieldpiece of the Type Made Famous by the Late War



NEW INSTRUMENT FACILITATES FINGER-PRINT STUDY

An instrument that makes an enlargement, upon a sheet of prepared paper, of



Studying a Reproduction of a Finger Print Enlarged 10 Times by Means of the Instrument Recently Developed for This Purpose by the Paris Police Department

finger-print marks, has recently been designed and put in use by the police department of Paris, France. It consists of a boxlike device mounted on a short column that is screwed to a flat piece of oak. The specimen bearing the finger marks is pushed through a slot in the apparatus, until it comes before a window, where it is brilliantly illuminated by a 1,000-candlepower electric bulb. A lens, placed above the bulb, and a movable mirror project and reflect the image, magnified 10 times, upon the paper placed upon the oak board. This provides a rapid method of examining side by side and in the same degree of magnification, the finger-print record of the suspect and the marks upon the object he is supposed to have touched. The total time required for making both prints ready for comparison, is about five minutes.

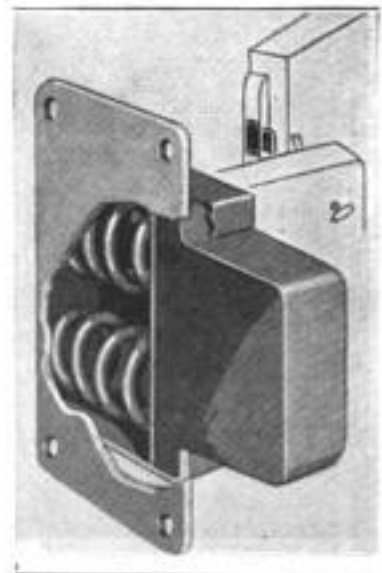
¶ In a new furnace for automatically heating rock-drill steels to the correct tempering point, the steel is held in the furnace by a magnet, against the tension of a spring, and when the required temperature is reached, the steel loses its magnetism and is withdrawn by the spring.

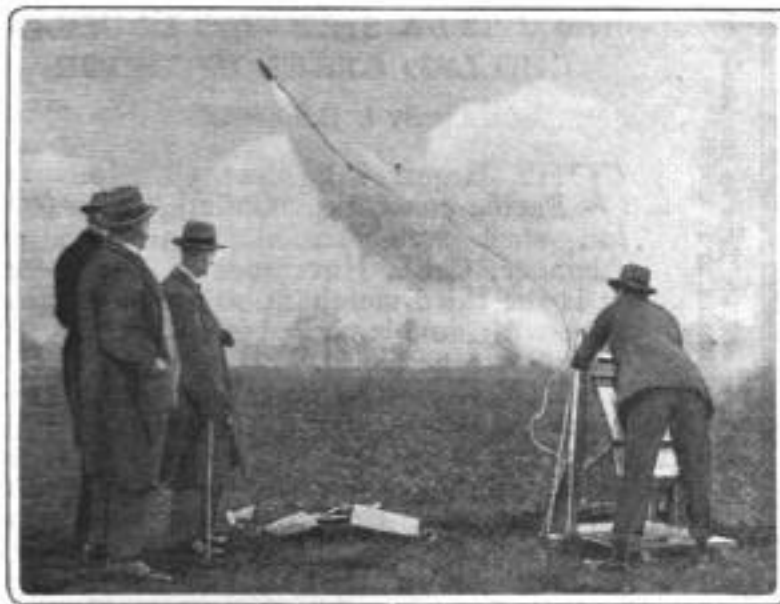
MECHANICALLY INDUCED DRAFT APPLIED TO LOCOMOTIVES

Stationary-plant methods of controlling the draft in boilers have been applied to locomotives, and the American Railway Association will make a series of tests of the new method which are expected to show great economy of fuel, increase of power, decrease of the water used, and prolonged life of the boiler. The present system of utilizing the exhaust steam from the engine to create the draft for the boiler will be abandoned, and instead a mechanically induced draft will be used that is independent of the engine. In connection with this there is to be used a new fan, or blower, that is small enough to suit the restricted available space in a locomotive, and yet with sufficient capacity to do the work economically. With this induced-draft blower the exhaust steam is discharged with the gases through the stack, resulting in a reduction of back pressure in the cylinder, and thus adding to the power of the engine with a consequent fuel economy. Moreover, there will be a decrease in the work of the fireman and engineer, resulting in increased efficiency.

RUBBER AUTO-DOOR BUMPER HELD BY COIL SPRINGS

An auto-door bumper, recently marketed, absorbs the slam with both a rubber tongue and a pair of coil springs. The springs are hidden in the door frame and support a small block of rubber. This arrangement has still another advantage in that the pressure of the springs serves to prevent the closed door from rattling. Three of the bumpers are used for each door.





Above: Aiming the Pistol and Firing from It the Rocket Which can be Seen Drawing the Lifeline That is Attached to It. Right: Inventor of the Apparatus Seen Holding in His Left Hand the Steel Rocket to Which the Long Lifeline is Attached. With His Right Hand He is Holding the Pistol, below Which is the Lifeline Box



PORTABLE ROCKET APPARATUS FOR FIRING A LIFELINE

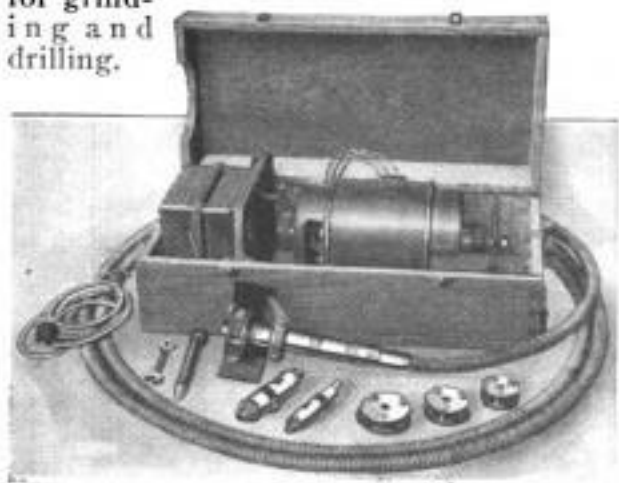
With a portable rocket pistol that weighs only about 6 pounds, recently invented in England, a lifeline for rescue work at shipwrecks can be thrown, it is said, nearly 400 yards. The small steel barrel of the pistol is only about 18 inches long, and when in use, it is mounted on a wooden stand with two uprights, from which it is supported by a small cable. In this manner it is aimed and fired with one hand. Beneath the pistol hangs a sheet-metal box in which the line is kept.

IMPROVED CELLULOID ENAMEL FINISH DRIES QUICKLY

Recent developments in a celluloid type of paint have resulted in a finish that has the body and desirable appearance of an enamel, and that dries sufficiently in 30 minutes to be handled. It can be used on metal or wood, and articles can be packed in two to three hours after finishing. It is waterproof to the extent that boiling water does not affect it, and is said to be very resistant to knocks and abrasions. It can be put on with a brush or by dipping or spraying, and is available in a variety of colors and several grades, suitable to the method of application.

ELECTRICAL BOILER SCALER HAS FLEXIBLE SHAFT

An electrical boiler scaler, which includes a 24-foot flexible shaft that revolves in a flexible steel casing, is now available for repair work on boilers. The motor and starter of the outfit are included in an oak box, the former driving the shaft at 2,500 revolutions per minute. At the end of the shaft is attached a special handle for holding any one of the numerous different-shaped scaling and tube-boring tools. The equipment is said to be particularly adapted to light work, in which portability and a flexible shaft are needed, and in addition, may be used for grinding and drilling.



Electrical Boiler-Scaling Outfit: The Motor and Starter Are in the Box, and the Flexible Shaft and Different-Shaped Tools Outside



Early-Morning Launching of the Merchant Ship "Chilore," the Largest Ship Ever Built on the Pacific Coast and the Third Largest Freighter of This Type in the World to Have a Double-Chilled Steel Interior. The Proximity of the Vessel's Stern to the Shore, Was the Result of the Breaking of Drag Chains as It Glided down the Ways, the Ship Crossing the 1,000-Foot Expanse of Water and Nearly Climbing the Opposite Bank

NEW TYPE SHIP HAS DOUBLE-CHILLED STEEL INTERIOR

By L. R. PERRY

THE largest ship ever built on the Pacific coast, the "Chilore," a 20,000-ton steel freighter, was launched at Alameda, Calif., November 28, last year. It is the third merchant ship of this new type with double-chilled steel interior to be built in the world.

It is a twin-screw vessel, driven by turbines capable of giving it a speed of 13 $\frac{1}{4}$ miles an hour, and will carry ore from Cruze Grande, Chile, to New York, and oil from the United States to Cruze Grande in 17-day trips.

The "Chilore" is the fifty-eighth vessel to be launched at this plant since November, 1916. The West is still building ships. Both this and another similar ship, the keel of which was laid following the successful launching of the "Chilore," were contracted for by private concerns.

This large freighter is 571 feet long, 72 feet in breadth, and 44 feet in depth. Six mammoth drag chains failed to hold it back well enough as it glided down the ways. Some of them parted and the vessel nearly climbed ashore again on the opposite bank, 1,000 feet from the starting point. Aside from this, the launching was without incident and formed a picturesque show.

RADIO-AMPLIFYING CIRCUIT USES 60-CYCLE CURRENT

A five-stage radio amplifier which operates satisfactorily when using 60-cycle 110-volt, or alternating-current, supply for both the filament and plates of the vacuum tubes, thus eliminating the A and B-batteries, has been developed. The different potentials for the operation of the various parts of the equipment are obtained from a special power transformer which has five windings. With this transformer, one connection of 4 volts, two of 8 volts each, and one of 300 volts, are possible. A crystal detector is used instead of the usual electron-tube type, to reduce the 60-cycle "hum" in the current. The complete outfit consists of three stages of radio-frequency amplification, galena-crystal detector, two stages of audio-frequency amplification, loud-speaking reproducer, and the necessary power-transformer and rectification circuits. Since this amplifying set may be operated from the ordinary house-lighting circuits, it should prove popular with amateurs.

SCULPTURE MASTERPIECE BY SARAH BERNHARDT



THE striking piece of sculpture illustrated above, was recently exhibited in Paris as the work of Mme. Sarah Bernhardt, the celebrated actress, who is shown in the circle below. This talented artist, who for over 50 years has charmed audiences all over the globe by her



magnetic personality and the beautiful qualities of her voice, is not often heard of as a sculptress, yet as far back as 1876, honorable mention was given to a piece of her work that was exhibited in the Paris Salon. She also has had some success as an author and painter.

CAKES OF ICE ARE USED TO PLACE STATUES

Cakes of ice were used in the placing of two heavy sculptured stone lions at the entrance of the Summit County Court-



Sculptured Stone Lion Shown Resting upon Cakes of Ice, the Melting of Which Slowly Lowered the Statue to Its Foundation

house in Akron, Ohio, recently. When the statues had been hauled to the scene, it was found that no derrick having sufficient lifting capacity to hoist them from the wagons and into position, was available. Consequently, the excavations in which the stone lions were to rest were filled with ordinary cakes of ice to a level with the wagons. Sliding the figures from the wagons onto the ice was an easy matter, and by melting the ice with hot water, they were soon lowered to their foundations.

TUBERCULOSIS-TEST TABLETS MADE IN DRY CHAMBER

Tablets used by the government in testing cattle for tuberculosis can now be made in any weather with apparatus recently designed. The material used in making the tablets absorbs the moisture of the air so rapidly that hitherto it was possible to manufacture them only at irregular intervals. With the apparatus now in use, the air is first cooled and dried in a special chamber in which the

moisture is frozen by circulation over brine coils, then heated in another chamber, and finally sent to a working box, arranged to admit the hands of the operator without letting in the outside air.

EFFECT OF STORAGE ON GLASS BOTTLES BEING STUDIED

Hundreds of bottles are being stored by the Bureau of Standards to determine the effects of surrounding conditions on the appearance of the glass. While the tests are not completed, at the end of six months the bureau has found that a dry room, kept at an even temperature, is more satisfactory than the outdoors or a very humid room, the latter, particularly, often resulting in "scummed" glass. Thin fiber boxes are said to be better than open crates.

ADJUSTABLE EGG BEATER HAS DOUBLE DRIVE GEAR

An egg beater that is adjustable to suit the shape of a wide range of cooking dishes, from a wide-bottom mixing bowl to a narrow tumbler, has just appeared. One of the distinctive features, which can be adapted with benefit to other devices, is the double drive, consisting of a large bevel gear that drives from opposite sides the two pinions fastened to the beater spindle. Other points in its construction are the clutch that holds the beater blades in the desired position, and the ball bear-



Above: At the Left the Egg Beater is Shown Adjusted for Use in a Mixing Bowl, and at the Right to Suit a Tumbler. Right: Normal Position of the Beater Blades

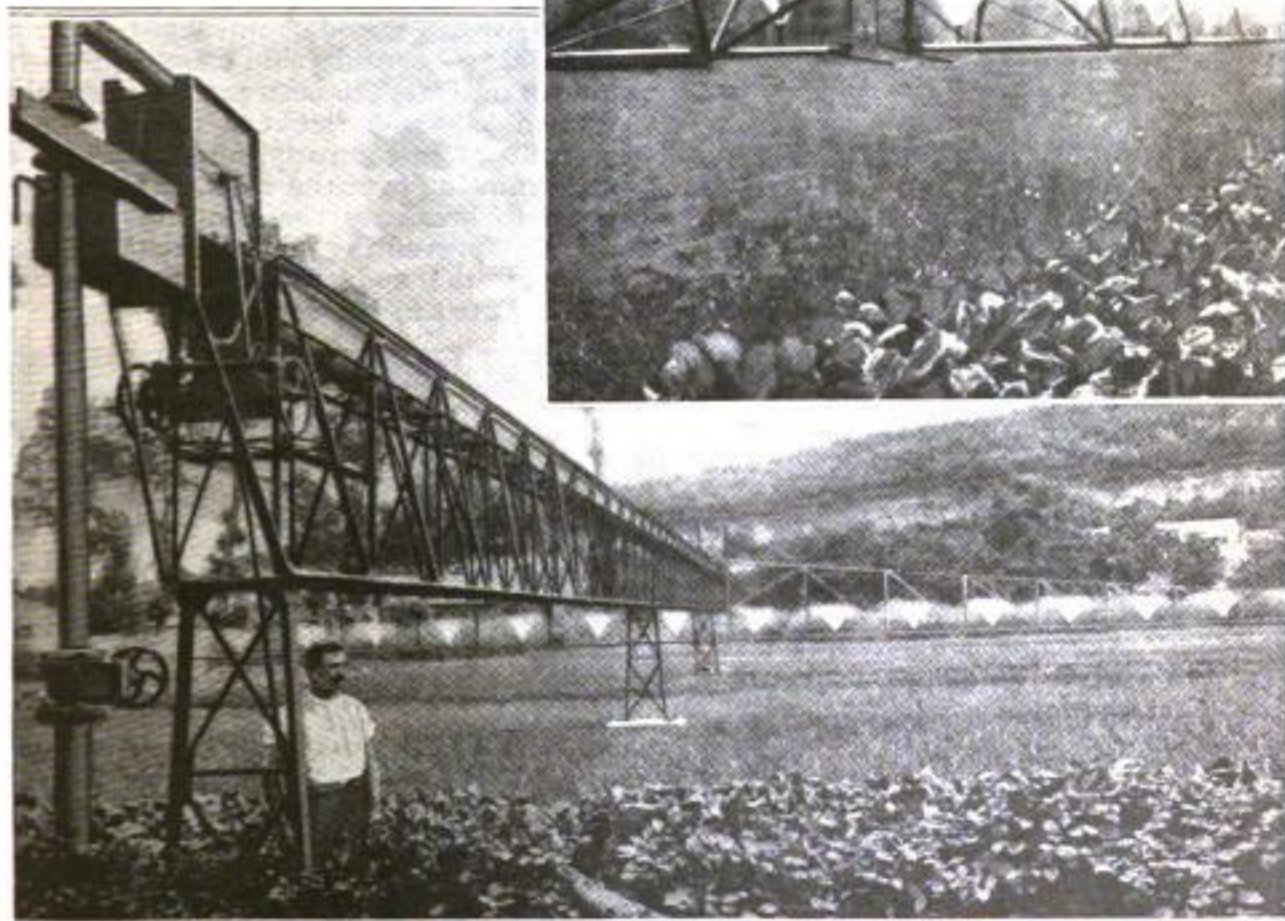
ing at the bottom of the spindle that keeps it from "walking" around the beating dish.

AMERICAN SHIPS NOW CARRY HALF OF FOREIGN TRADE

American ships carried 52 per cent of the foreign-trade tonnage in the fiscal year ended last June, according to a report from the Shipping Board. These vessels handled more than 4,000,000 tons of imports, over 6,000,000 tons of exports, and operated from 43 United States ports. Approximately 50,000 men are now engaged in running the boats, and a larger number are employed in loading and unloading. As a further evidence of the stabilization and success of the Shipping Board's activities, it is pointed out that more than \$10,000,000 have been saved in the reduction of longshore and marine wages alone. Passenger ships under the American flag are now plying in the north Atlantic, in the Pacific,

LARGEST IRRIGATION SPRAYER TRAVELS ON WHEELS

The largest automatic sprayer in the world, used for irrigation purposes, has



Above: Partial View of Sprayer Bridge, Showing the Wheels and Rails on Which the Sprayer Runs. **Below:** General View, Showing the Complete Bridge, and the Sprayer at Work. This is Reported to Be the Largest Irrigation Sprayer in the World

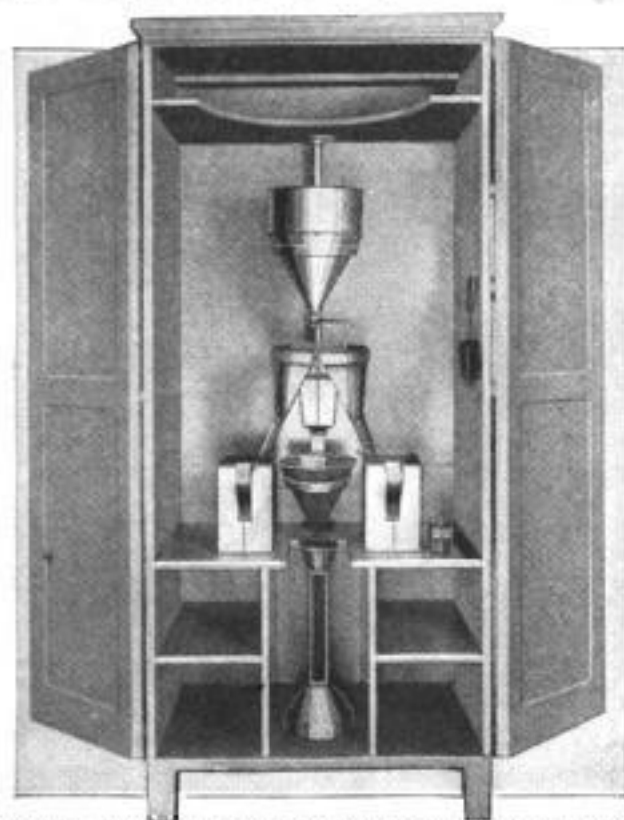
and to South America. As many as 327 go to northern Europe, while 56 run to Mediterranean ports, 46 to South America, and 91 to the Far East.

recently been completed according to the designs of an engineer of Paris, France and is now in use in that country. It consists of several structural-steel bridges lo-

cated at suitable intervals in the field to be sprayed, which carry rails for the wheels of the traveling sprayer to run on. The sprayer is built up of piping, with a number of outlets on which nozzles are located, and as it travels along the bridge, it is fed with water from a long trough running the length of the bridge.

DEVICE ACCURATELY MEASURES SIZE OF BREAD LOAVES

The exact size of a loaf of bread is determined by a new machine designed by the Department of Agriculture while



Simple Apparatus Used by the Department of Agriculture to Determine the Size of Bread Loaves Quickly and Accurately

making tests to fix the standard volume of a loaf. A funnel is filled with flaxseed, and the loaf to be tested is placed in a container, of known cubic capacity, immediately below. The flaxseed is then allowed to pour in until the loaf is completely immersed. Any overflow will fall into pans, placed at the sides for this purpose. At the bottom of the container is a small valve, which, when opened, permits the seed to fall into a narrow graduated container. The measure of the seed in this container subtracted from the known cubic capacity of the larger container, gives the size of the loaf. The volumes of standard loaves are fixed at from 1,800 to 2,600 cubic centimeters (about 112 to 162 cubic inches).

OPEN NEW MUSEUM DEVOTED TO AMERICAN INDIAN

A new museum, erected for the purpose of studying the life of the aborigines inhabiting the western hemisphere when Columbus reached these shores, has recently been opened in New York City. The institution, which already contains 1,800,000 specimens of aboriginal life in the Americas, is the only one in the world devoted exclusively to the preservation of the records of those early races, and one of its objects will be to discover the origin of the so-called Red Men.

WEDGES ON CREST OF DAM END MYSTERIOUS EARTHQUAKES

Placing wedges at intervals along the crest of a dam, was the simple remedy that put an end to a series of earthquakes, the source of which was for some time a mystery to the people of Albany, Ga. After several months' investigation, engineers discovered the cause of the vibrations—which varied from slight tremors to shocks of considerable magnitude—was hidden in the space between the dam, that formed a barrier between two ponds of a local power company, and the sheet of water flowing over the crest. The wedges serve to break up the continuous sheet, thereby preventing the formation of a vacuum, the sudden breaking of which had resulted in the earthquake effect.

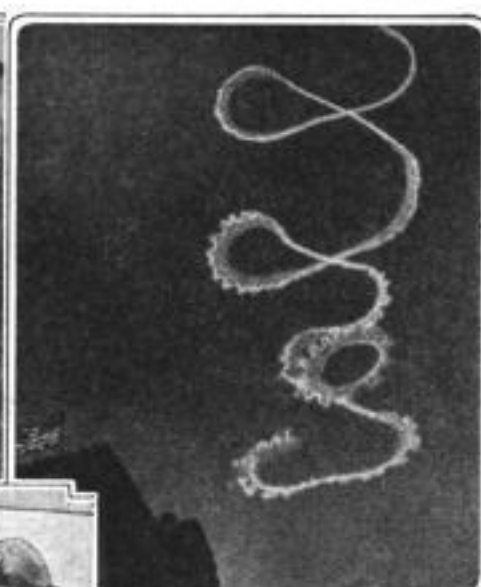


The Wedge-Shaped Wood Blocks, Seen along the Crest of This Dam, Stopped a Series of Mysterious Earthquakes in the Neighborhood

CLEVER AIRMAN TRACES HUGE WRITINGS IN SKY



View Showing Extended Exhaust Pipe of Airplane Used in Sky Writing



COPYRIGHT, JACK SUSHMAN
Start of Sky Writer's Message Suggesting Call of a Given Phone Number



Close-Up Showing Captain Turner Seated in the Cockpit of the Airplane Which He Piloted in His Recent Sky-Writing Stunts over New York City

Undoubtedly the tallest and broadest letters and figures ever written, were those formed in the sky over New York City in a recent series of stunt flights by Capt. Cyril Turner, of the British Royal Air Force. This clever flier has astonished and

delighted thousands of people by doing queer things, like scrawling his telephone number and short messages in the sky. The exhaust pipe, extended to the tail of the ship, serves as his pen, and a chemical introduced into the exhaust as the "ink."

SEDAN CAR FITTED AS REAL-ESTATE OFFICE

A sedan car fitted with desk, files, typewriter, and other office equipment, is used as an office by a woman real-estate agent in Seattle, Wash. Clients sit opposite the desk on the rear seat while the front seat is made revolvable so that the agent can face them. Files are kept in trunks on the running boards. The car is usually parked in a prominent place with a telephone extension running to it from a near-by store. If, however, the prospective buyer wishes to visit the property for sale, the telephone is immediately disconnected and client, agent, and office spin along to the

new location. This method helps "clinch" sales which might otherwise fall through.



Using a Specially Fitted Sedan as Her Office, a Woman Real-Estate Agent in Seattle can Take Her Prospects to the Property being Considered, So That There may Be No Claims of Misrepresentations Later On, and "Clinch" the Deal on the Spot

CARUSO'S MEMORIAL CANDLE TO BURN FOR CENTURIES

There has been manufactured in New York the largest candle in the world as a memorial to Enrico Caruso, generally



Largest Candle in the World Made to Burn for 24 Hours Each Year in Memory of Caruso: The 11-Year-Old Girl beside It Indicates Its Size

conceded to have been the finest tenor singer the world ever heard. This giant candle, 16 feet high, 5 feet in circumference at the base, with a taper to 18 inches at the top, and weighing a ton, will be shipped to Italy, where it will be placed in the church of Our Lady of Pompeii, the last place that Caruso worshiped in. It will burn for 24 hours on All Souls' Day, November 2, of every year, and is expected to last for several centuries.

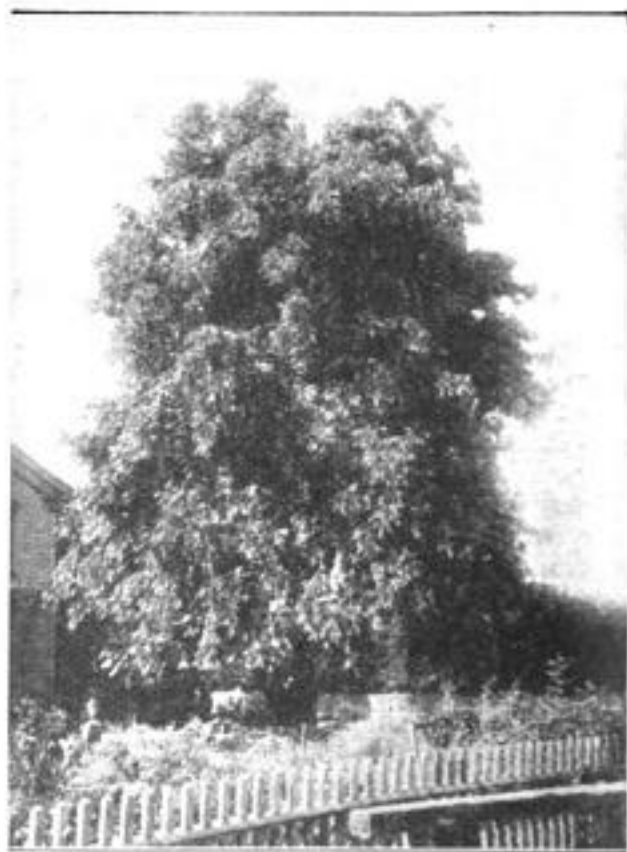
EXTENSIVE BAUXITE FIELDS FOUND IN SOUTH

Owing to the increasing uses of aluminum, considerable interest attaches to large deposits of bauxite recently explored in northern Mississippi. Bauxite, the ore from which metallic aluminum is obtained, is one of the most widely distributed ores in the world, although it usually occurs so contaminated with

other materials as to make it unsuitable for use for the reduction to metal under present commercial conditions. This Mississippi ore, which runs 40 to 60 per cent alumina (oxide of aluminum), will become of increasing importance as the supply of higher-grade ores nears exhaustion, because of the ease with which the deposits can be worked and their proximity to projected huge power developments and transportation facilities.

LARGE HYBRID WALNUT TREES WITH DENSE FOLIAGE

Hybrid walnut trees, produced in California by the skill of Luther Burbank, and which have been in the past described in this magazine, have been of great interest in the development of timber production in the United States. One type of walnut has been created by crossing the Persian with the California black walnut. Mr. Burbank has called it the "Royal," and in California it has grown rapidly to very large sizes. In 10 years' time the tree has developed a trunk diameter of about 2 feet, with great height



Hybrid Walnut Tree Produced in California by Luther Burbank, and Called by Him the "Royal": It Is Rapid-Growing, and Forms a Beautiful Shade Tree

and dense symmetrical foliage. It is a beautiful shade tree, and the timber is hard and rich in color.

COASTING DOWN POPOCATEPETL ON A STRAW MAT

By H. A. LANE

VOLCANoes, nature's fiery manifestations of the continual unrest prevailing in the depths of earth, are sources of never-ending interest to man. No exception to this general rule, even though it has been dormant for more than a century, is Popocatepetl, the great volcano 50 miles southeast of Mexico City, Mexico. Every year many tourists journey to that country for the purpose of ascending the historic mountain. When making these ascents, Mex-



Popocatepetl, Famous Mexican Volcano, Belching Heavy Sulphurous Vapors and Clouds of Smoke That Rise to an Immense Height over the Snow-Capped Summit of the Mountain, the Whole Presenting an Unusual Sight for Tourists

ico City is usually the headquarters, and from here travel is by train to Amecameca, about 10 miles from the volcano. Horses are obtained at this town and used until an altitude of 14,000 feet is attained. The remainder of the trip, nearly 400 feet, must be made on foot, and requires considerable effort, especially if the snow happens to be deeper than usual.

Once at the summit, however, a wonderful view is presented. Far below, in the valley, is seen the tropical vegetation in



Early-Morning Start from Amecameca. Where the Horses Used in Making the Ascent of Popocatepetl are Usually Obtained: As may be Seen from the Appearance of the Vegetation, the Tourists are Not Yet Out of the "Tropical Zone," Which Is but One of the Three Zones They must Pass through

all its brilliant coloring. Farther up, the ending of the "tropical zone" and the beginning of the "temperate zone" may be plainly distinguished, seemingly within a stone's throw of each other. Still higher may be clearly perceived the joining of the "temperate" to the "frigid zone," the edge of the timber line defining this quite sharply.

Turning away from this beautiful and strange panorama, descent is made into the volcano to the crater floor. This floor, a half mile in diameter, contains innumerable fissures through which sulphurous fumes are constantly escaping. When these are not too heavy to prevent work, laborers, or "peons" as they are termed, are busy here mining sulphur and carrying it, in 25-pound sacks, to a point from which a

windlass hoists the mineral to the edge, or rim, of the crater. From the rim, the sulphur is transported down the mountain by peons and horses to the railway in the valley. The sulphur in Popocatepetl has

been estimated to be 1,000 feet in depth, and although mining operations have been carried on here for more than a hundred years, no appreciable diminution can be observed.

Climbing out of the immense cavity, the descent from the rim, over the expanse of glistening snow, to the timber line, is begun. During this portion of the return trip, a thrill hunter, with a liking for speed, has an opportunity to satisfy his desire in that respect. The ordinary procedure is for the guide to sit upon a common straw mat, with the tour-



The Four Guides on the Left have Just been Engaged by the Two Tourists for the Ascent of Popocatepetl. Note the Contrast between Their Heavy Blankets and Light Straw Hats



Rude Camp in Which the Tourists are Making Preparations for Stopping Overnight While Ascending Famous Popocatepetl: The Party have Traveled Up Out of the "Tropical Zone" and are Now Located in the "Temperate Zone," as is Plainly Evidenced by the Appearance of the Surrounding Trees. Breaking Camp Early the Next Morning, They will Soon Find Themselves in the "Frigid Zone"



Tourists and Guide Nearing the Snow-Capped Summit of the Famous Volcano, Showing the Steep Grade up Which the Sight-Seers must Climb



Another View of the Route: The Drawing Shows Guides and Tourists Coasting on a Straw Mat from the Rim of the Volcano, over the Expanse of Snow, to the Edge of the Timber Line, Far Below

ist behind and tightly clasping him around the waist. The experienced native then grasps the front end of the mat in one hand, turning it up in the form of a toboggan and, by means of the alpenstock, held in his other hand, "pushes off" for the start down the steep incline. Gathering momentum quickly, the mat is soon literally flying over the snow, while the guide, who knows every foot of the route, skillfully avoids the deep crevasses and

protruding boulders, by quick use of his alpenstock, and shortly makes a safe "landing" at the edge of the timber line.

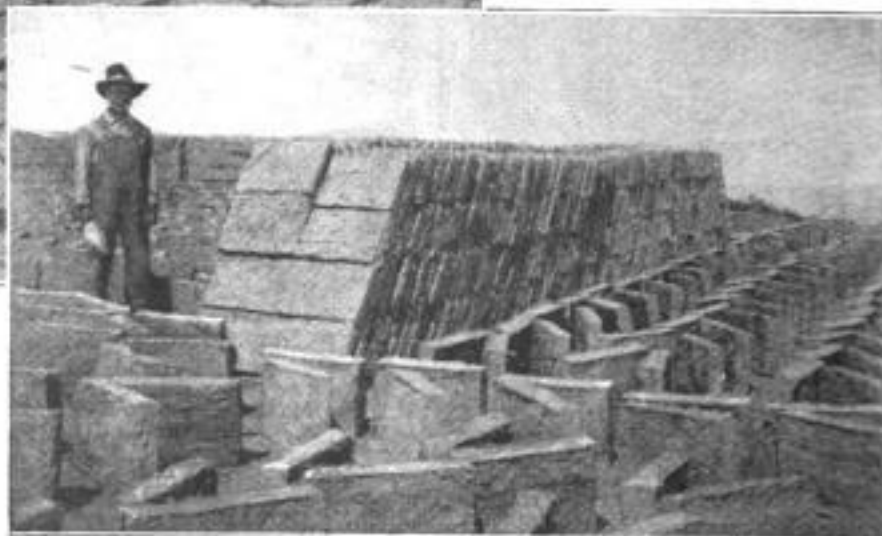
From the timber line to the horses is a short journey, and after the ride back to Amecameca, the train is again boarded and soon carries the weary but satisfied sight-seer to Mexico City, whence he can clearly see distant snow-capped Popocatepetl, down which he coasted so spectacularly on the straw-mat toboggan.

ADOBE BRICKS MADE FOR MODERN BUILDING

Adobe is the most simple form of building material, being an unbaked brick made from the surface soil and dried in the sun. It has been so used in southern California and Mexico from the earliest times, and that it is enduring is proved by the fact that the old mission buildings there have withstood the ravages of all weather conditions for centuries. But as a modern building material its use is very limited. However, such a building is now being erected at Torrey Pines Park, in San Diego, Calif., to serve as a lodge for the keeper, and for the comfort of tourists. The adobe bricks, each weighing 30 pounds, are being made from the soil on the site of the building. This is first converted into mud by the addition of the proper amount of moisture, and is then

mixed with straw as a binding material. With their bare feet Mexicans tamp this into shallow frames, which are removed after 24 hours, leaving the bricks flat on the ground. After three days, the bricks are placed on end, and become sun-dried in three weeks. They are then piled in ricks, ready for use, having been produced at a cost of about \$30 a thousand. The 10,000 bricks used in the building will be laid in cement. The exterior of the lodge will be tinted red and yellow, over a cement finish, to harmonize with the surrounding landscape. The interior walls will be tinted a soft gray.

☐ A two-ton section of a petrified redwood trunk was sent to New York City as a Christmas gift by Harold Bochee, whose mother owns the "petrified forest" in Sonoma County, Calif. Though now hard as stone, the section plainly shows the fiber and texture of the original state of the tree. It is planned to place the specimen in Central Park.



Adobe Bricks Made for Building the Keeper's Lodge at Torrey Pines Park, San Diego, California, Shown Above, Lying Flat on the Ground After the Frames in Which They were Made had been Removed: When Sun-Dried They are Piled in Ricks, as Shown to the Right. In Constructing the Building, the Bricks will be Laid in Cement



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House of Representatives' Chamber, Showing the Amplifying Horns Installed on the Ceiling and a Transmitter on One of the Desks: Insert Shows Part of the Radio-Amplification Equipment, Which is Located in the Basement of the Capitol Building and from Which the Amplifying Horns are Operated

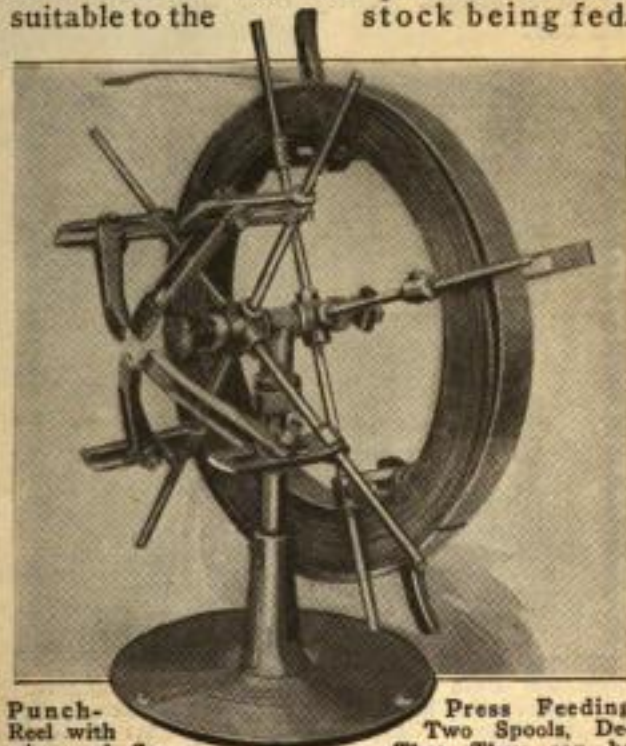
INSTALL LOUD-SPEAKING HORNS IN CAPITOL BUILDING

Amplifying horns have been installed on the ceiling of the House of Representatives' chamber, in Washington, to make the speeches of the members more easily heard. Transmitters are mounted on each of the desks, and through the medium of these, the voices are carried to the radio-amplification equipment, located in the basement of the building. From here, the greatly amplified sound waves are carried to the loud-speaking horns in the chamber, or to the radio stations at Arlington and Anacostia, for broadcasting.

POWER-PRESS REEL LOADED WHILE IN OPERATION

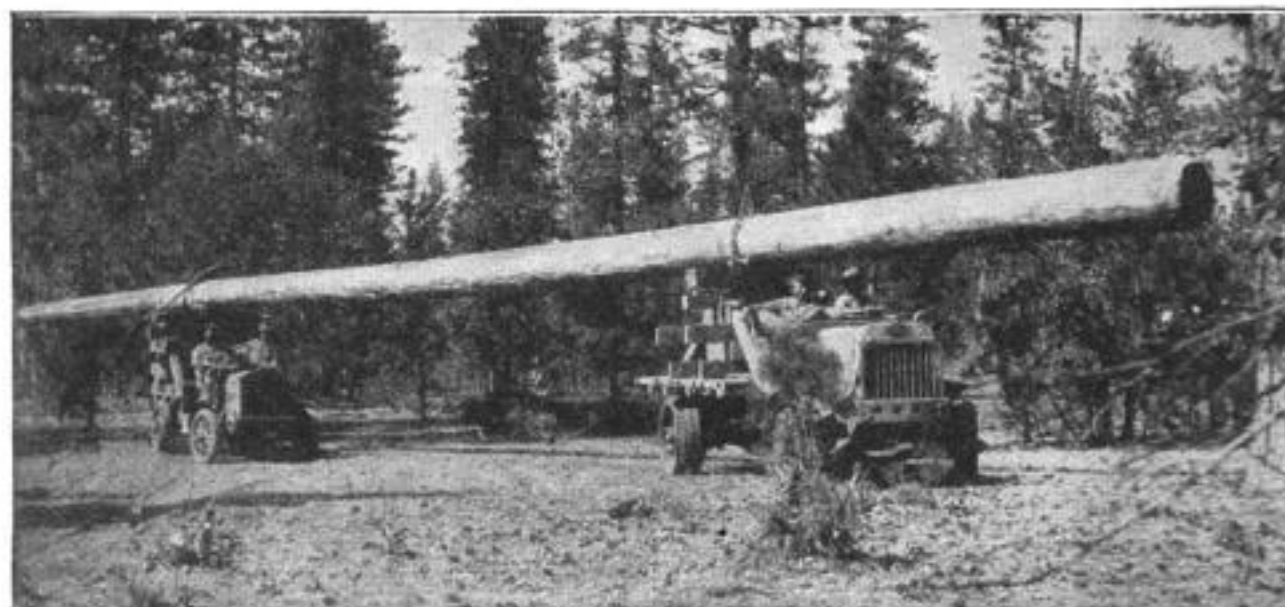
In order to keep power punch presses running steadily, a new stock-feeding reel is provided with two spools, designed so that the empty spool may be reloaded while the other is reeling out the stock. The spool arms, which are adjustable to different widths of stock and different core diameters, bend toward the center

for loading and are pushed outward until a knuckle joint holds them in position for the stock. An adjustable brake on each side of the reel provides tension suitable to the stock being fed.



Punch-Reel with
signed So
Reloaded with Stock While in Operation

Press Feeding
Two Spools, De-
signed So
That They can be



One of the 92-Foot Poles being Transported over the Countryside by Means of the Two Ordinary Motor Trucks on Which Blocking was First Erected: The Need of Signals to Operate the Machines in Unison is Clearly Apparent When the Length of the Timbers is Noted

"PAY-AS-YOU-LEAVE" CAR TRIED IN NEW YORK

A new method, being tried out on New York street cars, allows passengers to enter at both ends and to pass, without paying, through a turnstile to their seats. On leaving, however, they must pass through other turnstiles which will not swing until a nickel has been inserted. If needed, change can be obtained through automatic change machines. Another new feature is an automatically controlled sign on the forepart of the roof which displays the word "Full" when the capacity is reached. Only one man operates the car.



Equipment Used on New York "Pay-as-You-Leave" Car. Left: The Exit Turnstile Which Automatically Unlocks When a Nickel is Inserted. Right: A Near View of a Change Machine

POLES 92 FEET IN LENGTH HAULED ON TWO TRUCKS

Poles, 92 feet in length, were hauled on two motor trucks from the woods where they were cut, to an electric transmission line in course of construction. Blocking was first erected on the trucks, and with the long poles resting on this, they were transported over the countryside with little difficulty. In accomplishing the task, the only extra equipment used on the trucks were exceptionally loud whistles, or sirens, with which signals were blown, so that the drivers could act in unison when rounding corners, negotiating steep grades, or traveling over unusually rough places.

CLAY DEPOSITS IN CANADA TO BE DEVELOPED

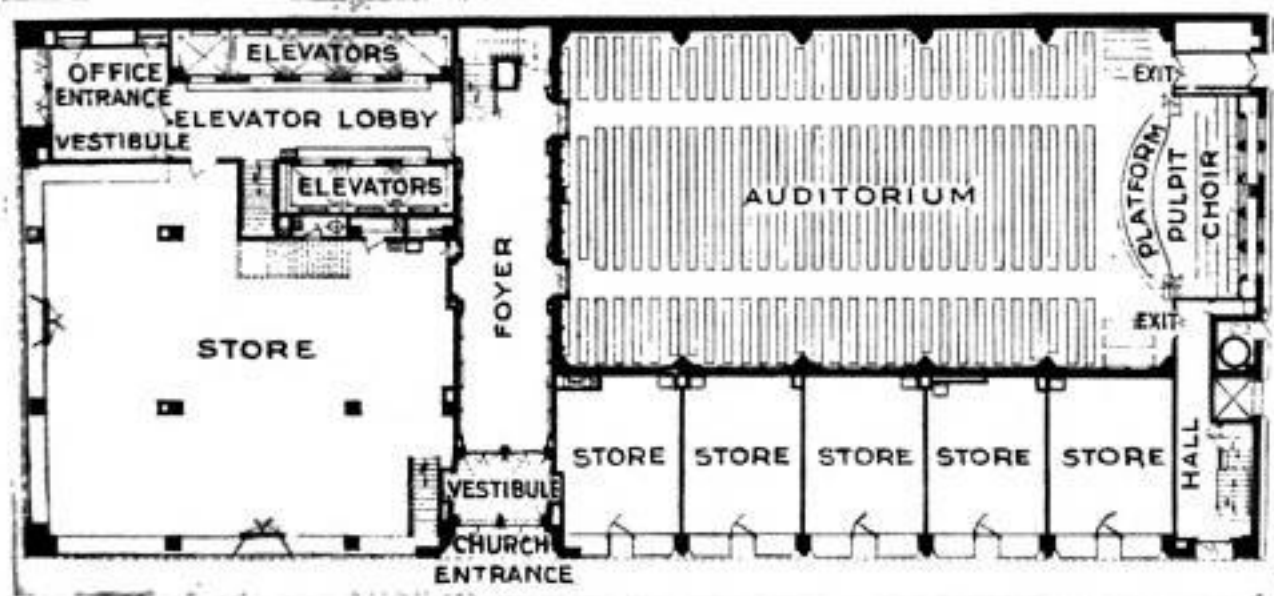
Numerous varieties of valuable clay deposits, some of these being brick, tile, earthenware, and fire clays, have long been known to exist in Saskatchewan, Canada. To promote a knowledge of these deposits and to encourage their development, the provincial authorities have recently included a course of ceramics in the curriculum of the Saskatchewan University. Thus, although there are no pottery-manufacturing plants in this province at present, the people of that section of the Dominion are obviously aware of the possibilities in the situation and are taking steps to make Saskatchewan one of the leaders in the manufacture of brick, tile, pottery, or other products of the ceramic industry.

CHURCH ON FIRST FLOOR OF NEW SKYSCRAPER

On the ground floor of a new office building, being erected by the First Methodist Episcopal Church at the corner of Washington and Clark streets, in the Chicago business district, has been built the church proper, two stories high, and capable, with its balcony, of seating more than 1,300 persons. On the first floor are also stores, and elevators running to the business offices in the building. A special, large foyer, however, is run from Clark Street directly to the church, so that both convenience and privacy are secured. The business elevators are reached by another foyer opening on Washington Street. Several stories above the first are given over to Sunday-school classes, a pastor's study, and other religious purposes, while the remaining



floors are taken up entirely by business offices. The building, 21 stories high, is admirably done in French Gothic, and has a beautiful steeple, with chimes, rising to a height of 556 feet above the street level, 1 foot higher than the Washington Monument. The building is being erected to give expression to the idea that religion is not merely a "Sunday matter," but rather an integral part of life which should be of concern to the business man and worker every day in the week. Carrying out this theme, it is planned to hold services at noon throughout the week, and conduct the various charities and activities of the church within "earshot" of the worker. The immediate neighborhood is one of the most crowded business districts of the city.



The Skyscraper Pictured Above is being Erected in Chicago by the First Methodist Episcopal Church to Be an Everyday Inspiration to the Business Men and Workers of the City. The Plan of the Ground Floor Indicates the Isolation of the Church from Business Spaces

KNOB REPLACED BY HOOK ON HOSPITAL DOORS

Continually passing to and from rooms with trays or surgical instruments, hospital attendants often find it necessary to



A Hook having been Substituted for the Regular Door Knob, the Nurse can Open the Door with Her Arm

dispose of whatever they are carrying before they can turn the door knob. To remedy this annoyance, a simple hook has been invented by means of which the door can be pulled open with the arm. The hook is placed slightly higher than the ordinary knob and is shaped to fit the forearm.

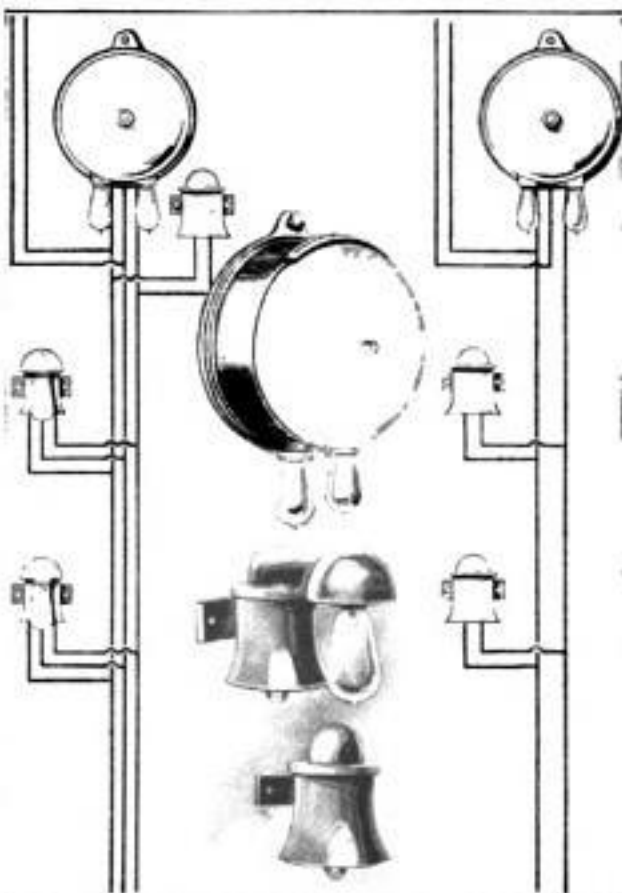
ELECTRIC STEEL REFINED BY NEW PROCESS

A new plant has been put into operation in England, using electric furnaces for refining steel by a process somewhat analogous to the duplex process of making steel with a combination of the Bessemer converter and open-hearth furnace. Scrap steel is electrically melted and refined in a continuous manner in a large primary furnace, from which, at intervals, about a third of the molten bath is drawn off into a smaller secondary furnace for finishing. Metallurgically, this arrangement combines the advantages of operating continuously a plant of large output, with the ability to produce small quantities of steel of varying composi-

tion. Electrically, the power factor is improved by the maintenance of molten baths, and the load factor increased by the continuous working.

MINE SAFETY-SIGNAL SYSTEM AUDIBLE AND VISIBLE

A new safety-signal system, developed with especial reference to the requirements of coal mines and other underground workings, but applicable to many operations above ground, has for its principal feature a combination of bell and light signals, operated from the same electric circuit. Mounted so as to be in plain view of the hoisting engineer from his station, is a bell to which is attached a colored lamp that lights at the same time the bell rings on signal from one of the mine stations. Another lamp on the bell base indicates to the engineer that the system is operating when he wants to repeat a signal or to give one, for which purpose he is supplied with a conveniently located circuit closer. Similar closers at the various signal stations are provided with a colored pilot light that indicates to the operator that the signal has been correctly given or that there is a short circuit on the line.



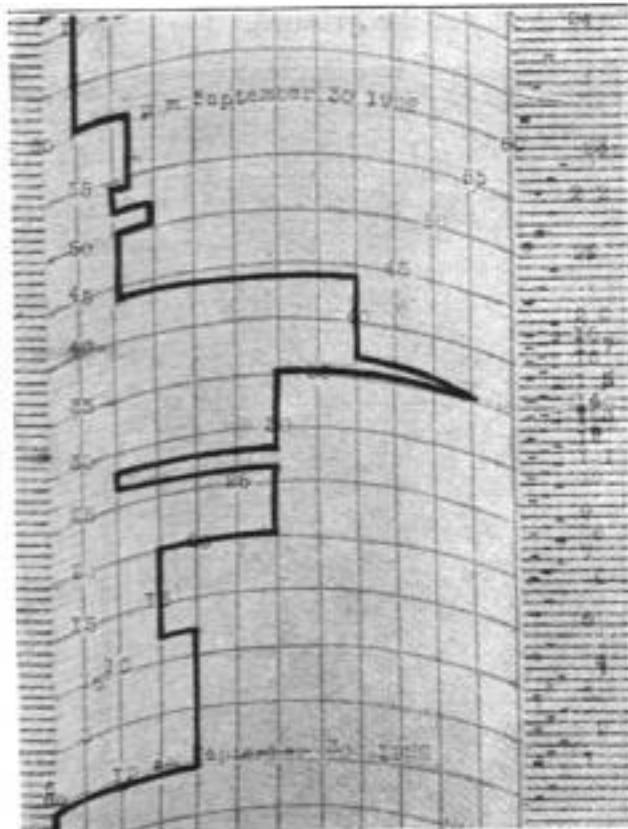
Left: Signal System with Pilot-Light Circuit Closers. Center, Top Down: Mine-Signal, Pilot-Light, and Plain Closers. Right: Plain Circuit-Closer System

AMERICAN-MADE AUTOMOBILES POPULAR IN ARGENTINA

American-made automobiles, which found appreciation in Argentina during the late war, have retained their popularity to such an extent that the percentage of European cars formerly sold there, is relatively small. Although many higher-priced cars are sold, the heaviest demand is for those of medium price, and it is reported that popular-priced American cars are being imported at the rate of 1,200 a month. Improved highways, now being urged, will further stimulate the use of automobiles in that country.

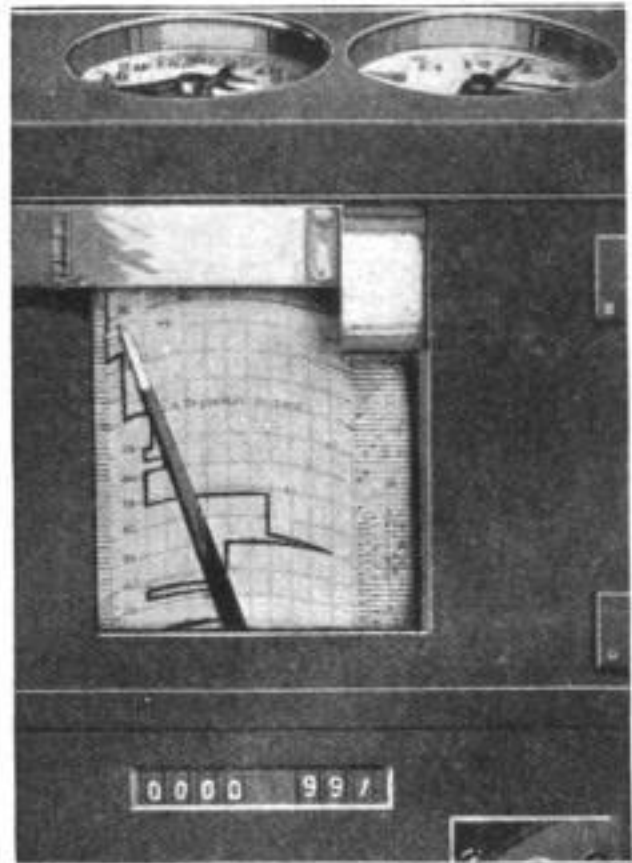
NEW AUTO DEVICE TO KEEP YEARLY SPEED RECORD

A new automobile device that is a combination of a clock and a speedometer, has been worked out so as to keep a permanent and continuous record of the speed of an automobile to which it may be attached. The record is made by a stylus on a ribbon of paper unwound from a roll sufficient to last one year, and which is marked with the units of speed along one edge and with units of time along the length of the ribbon. It is put up in a box with a transparent face so that the



Portion of Ribbon from Speed Recorder, Indicating the Speed of Some Automobile at Any Time during a 24-Hour Period

record covering several days can be seen, and the box is provided with lock and key and arranged to be sealed. The object of



Combination Speedometer and Clock Device That Keeps a Continuous Yearly Record of Speed of Automobile to Which It may be Attached

the inventor is the elimination of reckless driving and the reduction of accidents.

LARGEST MOTOR SHIPS BUILT FOR ORE CARRYING

Two motor-driven ore-carrying ships of over 20,000 tons, dead-weight, are about to be built in Germany to carry out a freight contract with an American steel corporation. The engine room will be located aft, and forward from it will extend the ore hold, which will be divided into three sections by cross bulkheads. The hold will be only 30 feet wide, although the ship will have a width of 72 feet. In the space on either side will be large water-ballast tanks with a total capacity of 24,000 tons. Fuel oil will be carried forward and aft in deep tanks holding 3,600 tons. The ships will be propelled by two 3,000-horsepower Diesel engines, but the auxiliary machinery will be steam-driven. The over-all length of the ships is to be 571.6 feet, and they are expected to be placed in commission next summer.

SIMPLE TRANSPOSING DEVICE AND MUSICAL TYPEWRITER

Music may be easily transposed from one key to another, and also transcribed onto paper, by means of a new device that



COPYRIGHT, KEYSTONE VIEW CO.
Above the Movable Superimposed Keyboard Is the Musical-Typewriter Mechanism, Showing the Type Bars and the Motor-Driven Paper Roll

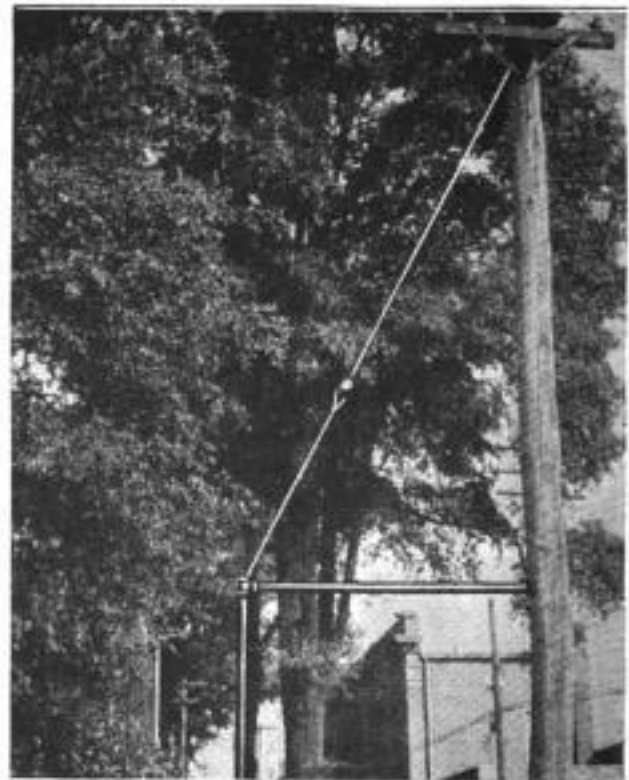
is in the nature of a musical typewriter. The transposing apparatus consists of a portable keyboard that is superimposed upon the piano keyboard, along which it can be moved for a range of two octaves. Underneath each of the superimposed keys is a bent lever that transmits the impact of the finger to the corresponding piano key. Therefore, by shifting the superimposed keyboard, it is possible to change the key of any musical composition in any way desired. In connection with the transposing device is a typewriter attachment, which, by the action of each of the levers between the two keyboards in combination with a bell crank, operates through fine wire connections a type bar, so that it strikes upon a scroll of paper as it passes over a small inked roller. The paper runs from one motor-driven roller to another, both of which are mounted in a frame that is placed at the center of the upper keyboard, or moved to any position required. By substituting for the type bars a special set of hammers, the paper may be perforated for use on player pianos.

PRICE OF RADIUM REDUCED BY DISCOVERY OF ORES

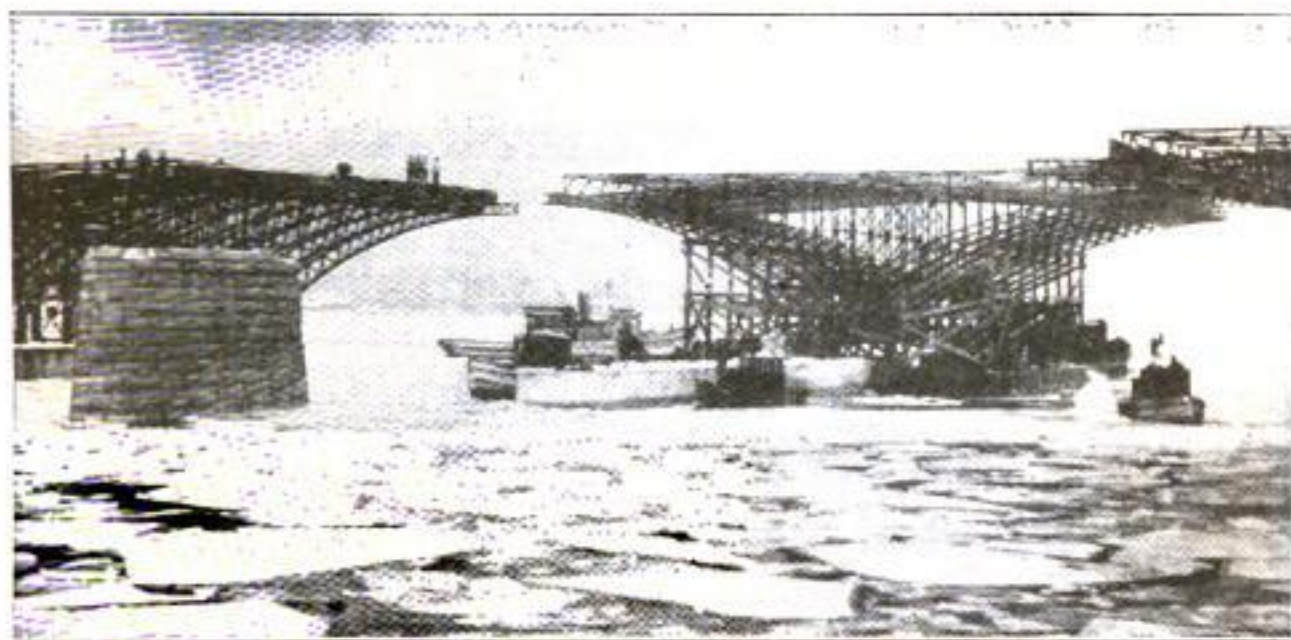
Due to the discovery in Katanga, Belgian Congo, of large deposits of easily worked pitchblende ores, and the erection in Belgium of a plant for producing radium from these ores, the price of that precious mineral has dropped from \$120,000 to \$70,000 a gram. The newly found deposits carry many times as much radium as the carnotite ores that have hitherto been the governing factor in the world's markets. It is not yet certain, however, that these Congo deposits will eventually yield as much radium as the deposits in the plateau region of the United States, but for the present, lending themselves to a cheaper process of refinement, they will control the market.

PROTECTION FOR GUY WIRES IS SIMPLE AND SAFE

A simple method of installing guy wires, attached to telegraph and telephone poles, so that they are not a menace to pedestrians, is in use in a southern town. It is particularly serviceable where the guy passes above a sidewalk, for the pipe in which the wire is inclosed is held vertical by another piece of pipe braced against the pole and placed at a suitable height above the ground.



Method of Installing Guy Wires of Telephone and Telegraph Poles So That They do Not Obstruct the Sidewalk Space



Large Steel Span of the New Belle Isle Bridge being Placed upon Its Foundation Pier by Two Barges Afloat among the Ice Floes: The Barges on Each Side of the Pier were Filled with Water, Causing Them to Sink Gradually and Allow the Span to Settle on Its Anchor Bolts

BRIDGE ERECTION HAMPERED BY MASSIVE ICE FLOES

In bolting into place the cast-steel span of the new Belle Isle bridge at Detroit, Mich., great difficulty was encountered on account of the presence of a nearly solid mass of ice floes. At the yard where the steel span was fabricated, it was placed upon two barges, and to break through the ice and haul and steer the two barges into position, two tugs and two gasoline launches were necessary. At the foundation pier upon which the span was to rest, the barges straddled the pier, and when the span was in proper position, the barges were filled with water, gradually sinking and allowing the base of the steel span to settle down onto the anchor bolts set in the concrete.

THUMB AND FOREFINGER PADS ON NEW GOLF-CLUB GRIP

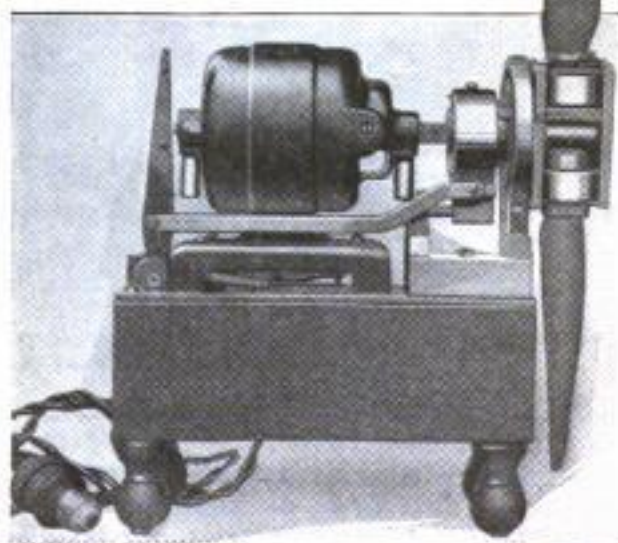
Increased confidence, greater distance, and accuracy are claimed to be gained with a new grip for golfers. Two glove-like finger pads fitting over the thumb and forefinger, are connected by a short bridge strip. This arrangement, it



is said, enables the golfer to tighten his hold on the club, permitting a firmer stop at the top of the swing.

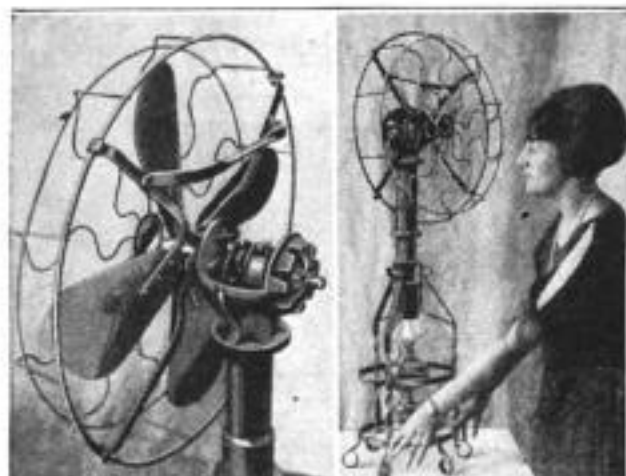
NEW AIR PROPELLER DESIGNED AFTER DUCK-HAWK WING

An interesting air-propeller model has recently been designed along the lines of the wing of a duck hawk, which is generally credited with being one of the swiftest of flying birds. In order to obtain data for the design, a duck hawk was tethered by an elastic cord, and high-speed motion pictures were taken as the bird struggled to free itself. A slow-motion analysis of the pictures, combined with measurements



One of the New Air Propellers, the Blades of Which have been Designed after a Duck-Hawk Wing of the wings, formed the basis of the design. Experiments brought out the fact that the higher the speed, the easier it was to reverse the propeller blades.

NEW VENTILATING FAN RUN BY KEROSENE LAMP



Left: Close-Up of New Ventilating Fan Which Derives Its Power from a Kerosene Lamp.
Right: General View of Odd Appliance

The latest thing in ventilating fans is one that can be operated in places where electric current is not available. Except for the lower part, which supports the kerosene lamp that runs it, the fan has the outward appearance of the familiar type of electric fan. Heat rising from the flame of the lamp works a piston in an eccentric cylinder, which in turn operates two other pistons that turn the fan shaft at the top of the stand.

Invitations to a party he was giving were sent on phonograph records by a New York man recently. The records told of the good time his friends might expect at the party and ended with a medley of popular tunes.

FAMOUS OLD STAGECOACHES MADE INTO AUTO BUSESSES

Several famous old stagecoaches have been converted into auto busses by put-



The First of Several Famous Old Stagecoaches That have been Converted into Auto Busses and are Used in London

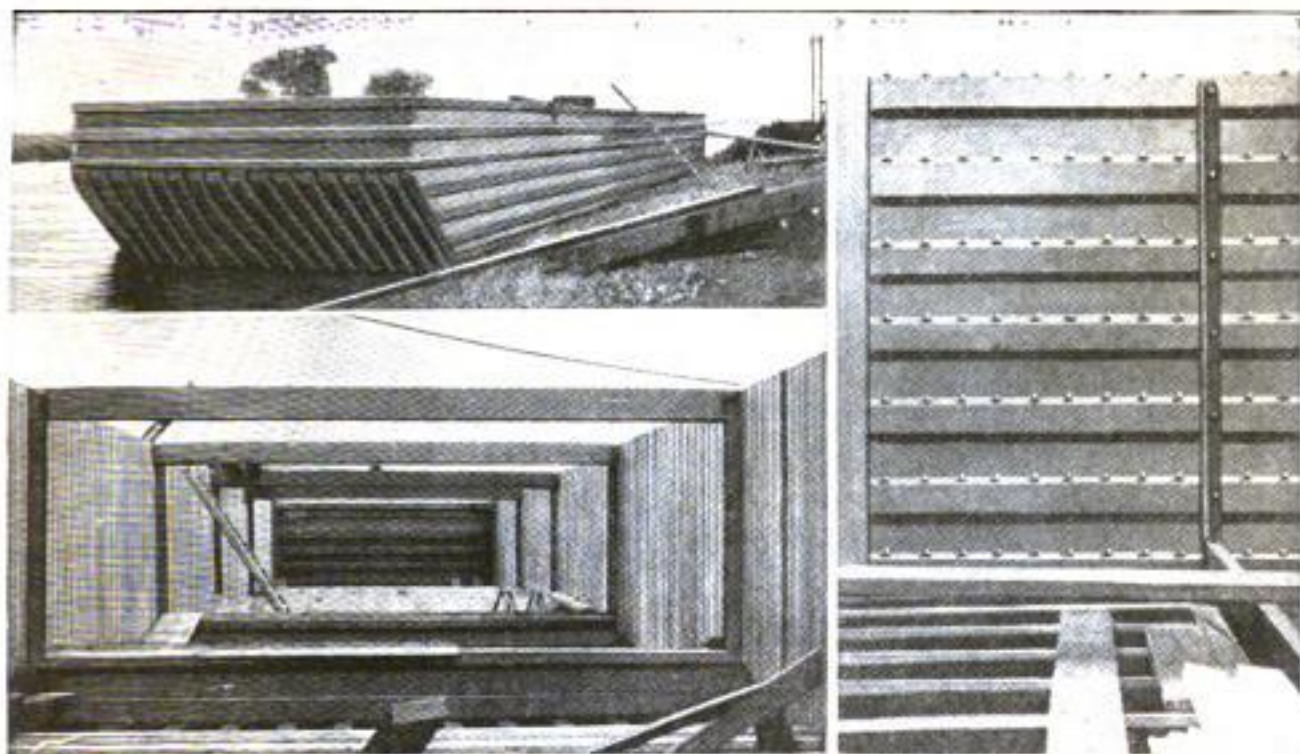
ting an automobile power plant where the horses used to be, and by replacing the coach wheels with rubber-tired truck wheels. The first of these converted stagecoaches made its appearance recently on the streets of London, where the old vehicle was always so popular. The driver's seat has been removed from its old position on the top front, leaving room for more outside passengers at this most desirable position.

MOVEMENT OF STEEL RAILS ALONG ROADBED

It has been observed at different times that the steel rails of a railroad move along the roadbed at a rate considerably slower than the travel of a mountain glacier. In order to convince himself of this fact, a telephone lineman working along the right of way of a western railroad, marked the ground opposite the junction of two rails, and after a year had passed, noted that a distance of 9 feet had been covered. Similar observations have indicated that the movement of rails on this railroad, which is 160 miles long, is from 4 to 11 feet yearly. This pronounced movement is thought to be due to heavily loaded trains that travel over the road in only one direction, which corresponds to the direction of the rail travel.

BARGES OF NEW TYPE BUILT OF BOTH WOOD AND STEEL

Designed especially for carrying cargoes on inland waterways, a new type of barge is now being built that is partly of wood and partly of steel. The new barge



Upper Left: Barge of 500 Tons, Built of Creosoted Wood-and-Steel Channels. Lower Left: Interior of the Barge, Showing the Wood Lining on the Face of the Hull, and the Wood-and-Steel Forward Bulkhead. Right: This View Shows How the Creosoted Timbers and Steel Channels are Bolted Together

is stronger and more durable than a wooden one. The sides, bottom, and ends of the hull are built with alternate tiers of standard 12-inch 25-pound steel channels, and creosoted hard-pine timbers, 6 inches square for the sides, and 6 by 8 inches for the bottom. These are bolted together through the flanges of the channels with $\frac{3}{4}$ -inch bolts at a pitch of 8 inches. The joints are made watertight with felt packing. The forward and aft bulkheads are of similar construction. The decks are of wood. The new barge is 110 feet long, 22 feet wide, and 10 feet deep. It has a cargo capacity of 500 tons.

BUMPER THAT IS FLEXIBLE AND ALSO UNBREAKABLE

In a serious automobile collision, the first thing to break is the bumper bar. For this reason an attempt has been made to construct a bumper bar that is unbreakable on account of its extreme flexibility. It consists of a large, long outside coil spring, another smaller one



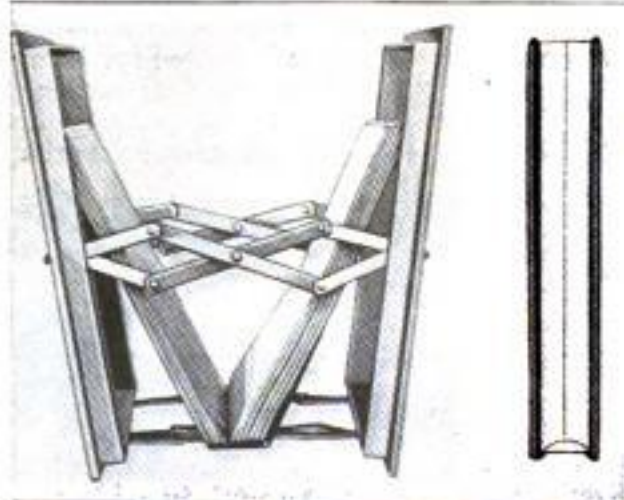
Automobile Bumper Bar That Is Flexible and Unbreakable: Inside Coil, Tube of Rods, and Outside Coil Are All of Tempered Spring Steel

inside it, and a tube formed of separate small rods in close contact between them.

The rods are of the same temper as the springs, and the whole is expected to be so flexible that, after being bent by a blow, it will straighten itself immediately.

BINDER FOR LEDGER SHEETS IS EASILY OPERATED

For handling ledger sheets in machine posting, a new binding device is being



Left: The Binder Shown Open, as It would Be While in Use. Right: Closed and Ready to be Shelved

marketed which is simply operated and requires no brace to hold it in place. The arrangement consists of two cover frames joined at the sides and bottom by lazy tongs. No keys, handles, or levers are needed to lock it.

RAT-HUNTING WITH RIFLE AT NEW YORK ZOO

Putting his skill with the rifle to practical use, Capt. H. S. Reynolds has nipped



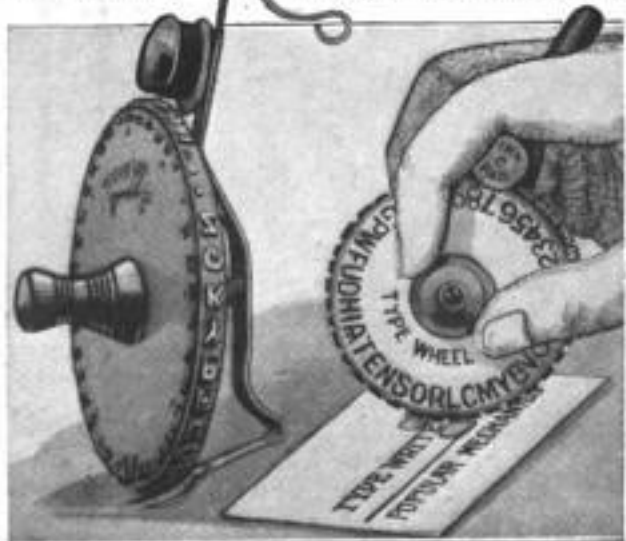
Using This Rifle, Captain H. S. Reynolds has Killed Hundreds of Rats Infesting the New York Zoölogical Garden. The Flashlight Dazzles the Pests

off scores of rats which have been annoying the animals at the Central Park Zoo in New York. In order to see, and to dazzle the pests, the captain has attached just in rear of the front sight of the rifle, a rather large flashlight. This is controlled by a push-button switch on a loose wire running from the light to the battery carried in a bag slung over one shoulder. It is said that his total score runs up into the hundreds.

SIMPLE PRINTING MACHINE FOR LABELING

A small wheel is the basis of a handy printing device intended for labeling or any other kind of writing. The wheel is about 3 inches high and has ar

vice intended for labeling or any other kind of writing. The wheel is about 3 inches high and has ar



Left: How the Brace Holds the Wheel Upright When Not in Use. Right: The Device in Operation

the alphabet, numbers, and punctuation marks. Protruding from the center on the left side is a small knob for turning the wheel, while a spring on the other side runs to a metal brace which holds the wheel in its perpendicular position, shows just where the letter is to strike, and serves as a rest for the hand used in the operation of the device. A small circular inking pad, fastened to the brace immediately above the rim, inks the letters as they pass under it.

EXTENSION HANDLE ATTACHED TO HAND-BRAKE LEVER

On an automobile in which the hand-brake lever is at such a distance from the



driver that it is difficult to reach it, a new accessory in the form of an extension handle, that can be attached to the standard hand-brake lever, brings it within easy reach of the driver. It enables the

driver to operate the hand brake without stooping or taking his eyes off the road, even for a moment.

NEW PROCESS FOR CLEANSING POLLUTED OYSTERS

After several years of effort by the New York State Conservation Commission to purify shellfish so as to make available large areas, suitable for breeding grounds except for the presence of some pollution, a method has been found for cleansing oysters from such grounds so as to make them edible. This is done by placing the polluted oysters in shallow layers in clean tanks full of sea water. With this is mixed a certain amount of water in which some of the salt has been electrically changed to sodium hypochlorite, a compound fatal to disease germs. The oysters are given two treatments with this mixture, each lasting several hours, and at the end of the process they are found to be thoroughly purified, and this without any attendant impairment of either their flavor or digestibility.



In Order to Provide Building Space for the Extension of a Chain of Apartment Buildings in Washington, District of Columbia, the Steam Shovel is being Used to Excavate Truckload after Truckload of Dirt from This Hill, Which is Used for Fill on Another Job

HILL TORN DOWN TO PROVIDE BUILDING SITES

Desirable building sites for high-grade apartment houses and office buildings have become so scarce in our national capital that builders are spending large sums filling in deep depressions or leveling high hills in order to increase the available construction space. One contractor at present has two powerful steam shovels tearing down a hill, 100 feet high and covering four acres of surface, that obstructs the construction of a chain of apartments, which is pushed forward to occupy the reclaimed building area, as rapidly as the hill is razed. An idea of the size of the hill can be gained from the

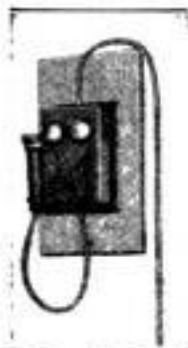
fact that the ninth floor of a neighboring apartment house is on a level with the plateaulike top of the hill. This contractor is realizing a double benefit from his activities in cutting down the miniature mountain, for about three squares from the present scene of construction is another mammoth apartment project, now nearly completed, to which he is hauling the hill, truckload after truckload, and using it as material to level the depressions and valleys. He anticipates that more than a million truckloads of dirt will have to be hauled from the hill before both projects are carried out.



View during Construction of the Chain of Apartments That are being Extended as Fast as the Razing of the Hill Progresses: It is Estimated over a Million Truckloads of Dirt will be Moved

AUTOMATIC CIGAR LIGHTER RESEMBLES TELEPHONE

A novel-looking cigar lighter recently gotten out resembles a telephone in appearance. What would be the receiver



of the telephone is in this case the lighter, which is connected with a flexible tubing to the gas service. When the "receiver" is taken from the hook, the gas is automatically turned on and lighted by an electric spark from a battery. When the user "hangs up," the light is extinguished.

DESIGN NEW HOPPER DREDGES FOR ELECTRIC CONTROL

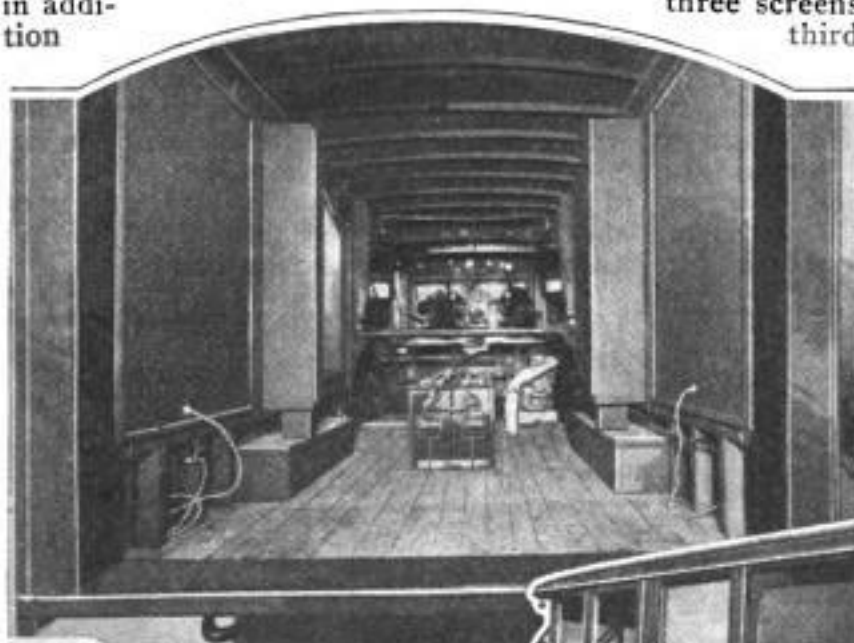
Four new hopper dredges, recently designed by the U. S. Army Engineer Corps and now under construction, will be run completely by electricity. Power will be furnished by three 700-kilowatt, 500-volt, and two 150-kilowatt, 250-volt direct-current generators, both groups being driven by crude-oil engines, and in addition

a 150-horsepower motor-generator set which derives power from one of the larger generators. Flexible switchboard connections will be provided for the generating machines so that each of them may be utilized to drive either the dredge pumps or the propellers, thus assuring continuous operation of the dredger, even in the event of a breakdown of two of the three generators. In addition to the electrically driven machinery, many room heaters, water heaters, fans, and two 22-kilowatt cooking ranges will be installed on the vessels, thus providing them with many modern conveniences.

TRAVELING MOTION PICTURES SHOWN ON MOTOR TRUCK

Itinerant motion-picture shows for entertainment or advertising are now being conducted in a motor truck with a large inclosed body, in which is installed all the necessary apparatus. This consists of a 32-volt, 250-ampere storage battery that is charged by a 2-kilowatt generator, which in two hours during the day charges the battery for a five-hour operation of the show during the night. On the outside of the truck body there are three screens, one on either side and the

third one at the rear end, so that simultaneous shows on all the screens can be given by means of a triple projector. Thus the pictures can be viewed by a wide-spread crowd, and the show can be repeated several times in a night at widely separated localities.



Above: Interior of the Large Motor Truck, Which Contains All the Apparatus Necessary for Giving Three Motion-Picture Shows at One Time. Besides the Triple Projector, There Is a Storage Battery and a Two-Kilowatt Generator That Charges the Battery in Two Hours. Right: Exterior View of the Truck, Showing the Rear Screen and One of the Side Screens



WORLD'S LARGEST HOTEL FOR CHICAGO

The Population and Facilities of a Fair-Sized City to be Housed
under One Roof—Hotel and Its Service Building
will Occupy Nearly a City Block

BY HENRY S. WHITE

AN enterprise that is the embodiment of magnitude in all its component parts is the design of the Stevens Hotel, about to be erected in Chicago. This huge structure will be a veritable museum of world's records in connection with other things besides mere magnitude, although this will be its most arresting characteristic, for it will be the largest hotel in the world, containing altogether about 3,000 bedrooms, or nearly 800 more than the world's present largest hotel. It will have a population equal to that of a fair-sized city, averaging about 7,000 residents, with an estimated daily transient traffic, including visitors, of around 40,000 people.

Besides the main hotel itself, there is to be an annex, or service building, which will correspond to what is often referred to as the "back of the house." Through the means of this service building, a guest, without leaving his room, by the use of his telephone, will be able to order any kind of modern hotel services. The laundry will be located in the service building, and he will be able to send his soiled linen there in the morning and get it back clean and fresh in the evening of the same day. In case of sickness, serious or slight, the guest will not have to leave the hotel, for on the fourth floor there will be a hospital, with reception room, consulting and operating rooms, two wards for patients, and bedrooms for the physician and the nurses.

The hotel with its annex will occupy nearly a whole city block between Michigan Avenue on the east, Wabash Avenue on the west, Seventh Street to the north, and Eighth Street to the south. The main building will have a frontage of 400 feet on Michigan Avenue, and a width of 175 feet on Seventh and Eighth streets back to an alley on the west. It will have 25 stories above grade, and in addition four stories of roof promenade, with an observation tower. On the ground floor the total area will be 70,000 square feet. Above the fourth story there will be three courts facing Michigan Avenue, and two in each of the north, south, and west façades. These upper stories will each have an area of 46,883 square feet. Below grade, there will be a basement, a mezzanine floor, a sub-basement for the boilers, engine, pump, and fan rooms, and

a lower level for ash handling, the ash tunnel being 67 feet below grade. In the basement will be an exhibition hall of 35,000-square-foot area, believed to be the largest hotel exhibition hall in the world. The annex, or service building, will front on Wabash Avenue. It will be 52 feet wide and 189 feet long, and will bridge the alley. It will have 12 stories above grade, and below it a basement and sub-basement.

The hotel is to be built of Bedford stone and light-red brick. The main entrance will be at the center of the Michigan Avenue front, leading to a rotunda, 140 feet long and 40 feet wide, with a ceiling height of 40 feet. The carriage entrance will be on Eighth Street, and near this on the second floor will be the ballroom and grand banquet hall.

One of the most striking features in the design of this hotel are four steel trusses above the suspended ceiling of the great ballroom, at the level of the fifth floor. These trusses and their supporting columns carry 20 stories, and are the largest steel structures of the kind in any building in the world. The span of each truss is 86 feet from center to center of columns, and its over-all height is 38 feet. Each truss weighs 200 tons, and carries a total load of 5,000 tons, or the weight of one of the largest passenger ships on the Great Lakes. This remarkable feature of the building, which is, of course, entirely a steel-frame structure, together with its vast size will make it not so surprising that a total of 40,000,000 pounds, or 20,000 tons, of steel will be required for the main hotel building alone.

The machinery in the sub-basement necessary to run such a stupendous building as this hotel, will be equivalent to quite a large manufacturing plant. Besides the chief engineer and his clerks, there will be 75 employes. There will be seven large boilers, occupying a space of 60 by 160 feet, with a height of 40 feet. There will be bunkers for the storage of 800 tons of coal, and adequate coal-handling equipment. The engine room, with a floor area of 8,960 square feet, will contain, besides the engines, five large generators. In the pump room, besides air compressors and blowers, there will be eight large pumps, two of which will be reserved for use in case of fire. In the



Part of the East Façade of the Hotel, Showing One of the Steel Trusses That Are the Largest of Their Kind in the World

fan room there will be 16 supply fans, handling 600,000 cubic feet of air per minute, and 25 exhaust fans with a capacity of 700,000 cubic feet per minute.

Throughout the whole building there will be a system of pneumatic tubes for sending and receiving messages, and compressed-air outlets will be provided for cleaning purposes. On each floor there will be two pull boxes for sending an alarm to the city fire department, besides six gongs, for use by an authorized member of the hotel fire department.

In the annex or service building, at the first-floor level, there will be a driveway and receiving platform for provisions and all the hotel supplies, as well as for the guests' baggage, which by means of a chute will be conveyed to the basement in the vicinity of the service elevators. Besides these, there will be a truck elevator large enough to accommodate any automobile, for conveyance to the banquet hall on the second floor, or to the exhibition hall in the basement.

At the employes' entrance will be the service-building office. After traversing this, the employes will go down a stairway to a corridor which will lead directly to their locker rooms.

On the second floor there will be storage rooms of every description. On the third floor there will be the ice-cream and candy-making departments, besides the dish-washing rooms, and hot-water storage for the laundry. The entire fourth, fifth, and sixth floors, each with an area of 7,800 square feet, will be devoted to the various departments of the laundry, including 12 large washing machines, and everything necessary for drying, sorting, and distributing the washed articles. The seventh, eighth, and ninth floors will contain sewing rooms, carpenters' and painters' shops, besides general storage.

Relaxation and entertainment will be provided for the women employes of the hotel in a club-room, and a large lounge for reading, sewing, or dancing, all on the tenth floor. Similar accommodations for men, includ-



PHOTO BY COURTESY OF HOLADIAO & ROCHE, ARCHITECTS

Front Elevation of the Design for the Stevens Hotel, the Largest in the World, to be Built on Michigan Avenue, between Seventh and Eighth Streets, Chicago: The Main Entrance is at the Center, below the Middle Court. Behind the Hotel, Unseen, is the Large Annex, or Service Building

ing a billiard room, will be on the well taken care of as the guests in the
eleventh floor. Thus it will be seen that hotel. It is probable that erection will
the employes in the annex are to be as start next spring.

SAFETY CABLE ACROSS FERRY DRIVEWAY

Safety cables which are stretched across the driveway of ferries, just inside the usual gates, to prevent a motor car from plunging into the water should the driver lose control of the machine, have lately been introduced. The cables have a spring impact and recoil mechanism which, during recent tests, successfully withstood the impact of a five-ton truck driven at the greatest speed attainable in the short run on the ferry driveway, thus furnishing decisive proof of the efficiency of the barriers.

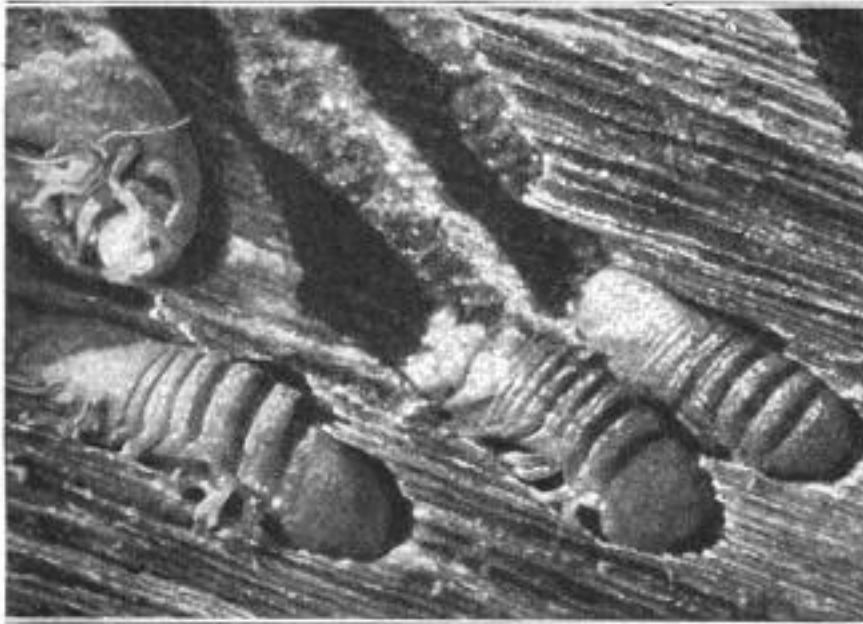


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One of the New Safety Cables Shown Stretched across the Driveway of a Ferry Landing to Prevent Motor Cars from Plunging Off into the Water

REMARKABLE PICTURE OF MARINE WOOD BORERS

A remarkable picture of Limnoria, or marine wood borers, which are so destructive to piling in the harbors on both the Atlantic and Pacific coasts, has just been secured and is shown herewith. These rapid-breeding pests come in contact with the piling through the medium of tides or by merely drifting in the water. Lodging on the surface of the wood or in crevices, they immediately begin eating the softer fibers, leaving the harder wood in rib-like ridges until, in time, the piling becomes so weakened that replacement is necessary. Experiments are now being conducted by the U. S. Forest Service for the purpose of finding a suitable preventive for the activities of these borers, which every year ruin a large amount of piling.

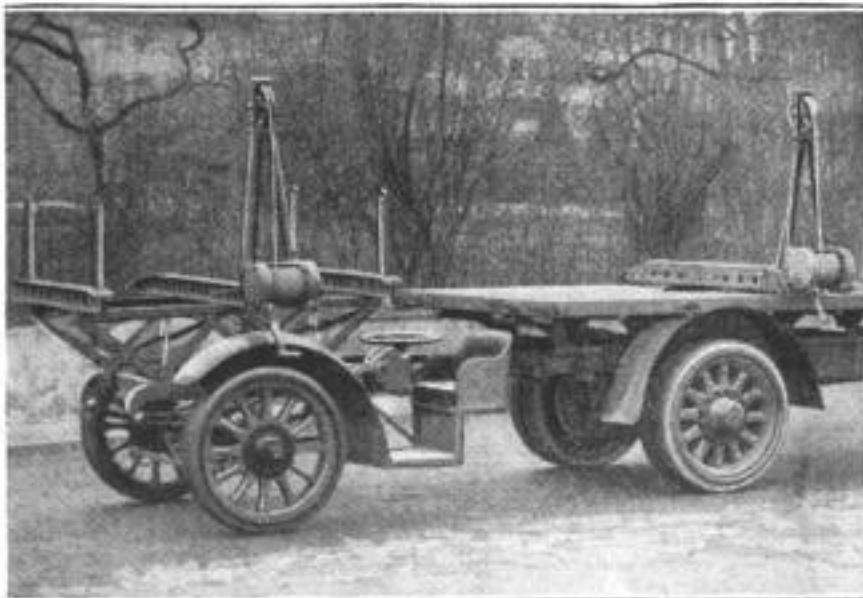


Remarkable and Greatly Magnified Picture of the Tiny Marine Wood Borers Which Are So Destructive to Piling in the Harbors on Both the Atlantic and Pacific Coasts, Showing Them in Action: The Largest of These Borers Are Only One-Fourth Inch Long

TRAILER FOR LONG LOADS STEERS INDEPENDENTLY

A two-wheel trailer that has its own steering arrangement, has been developed

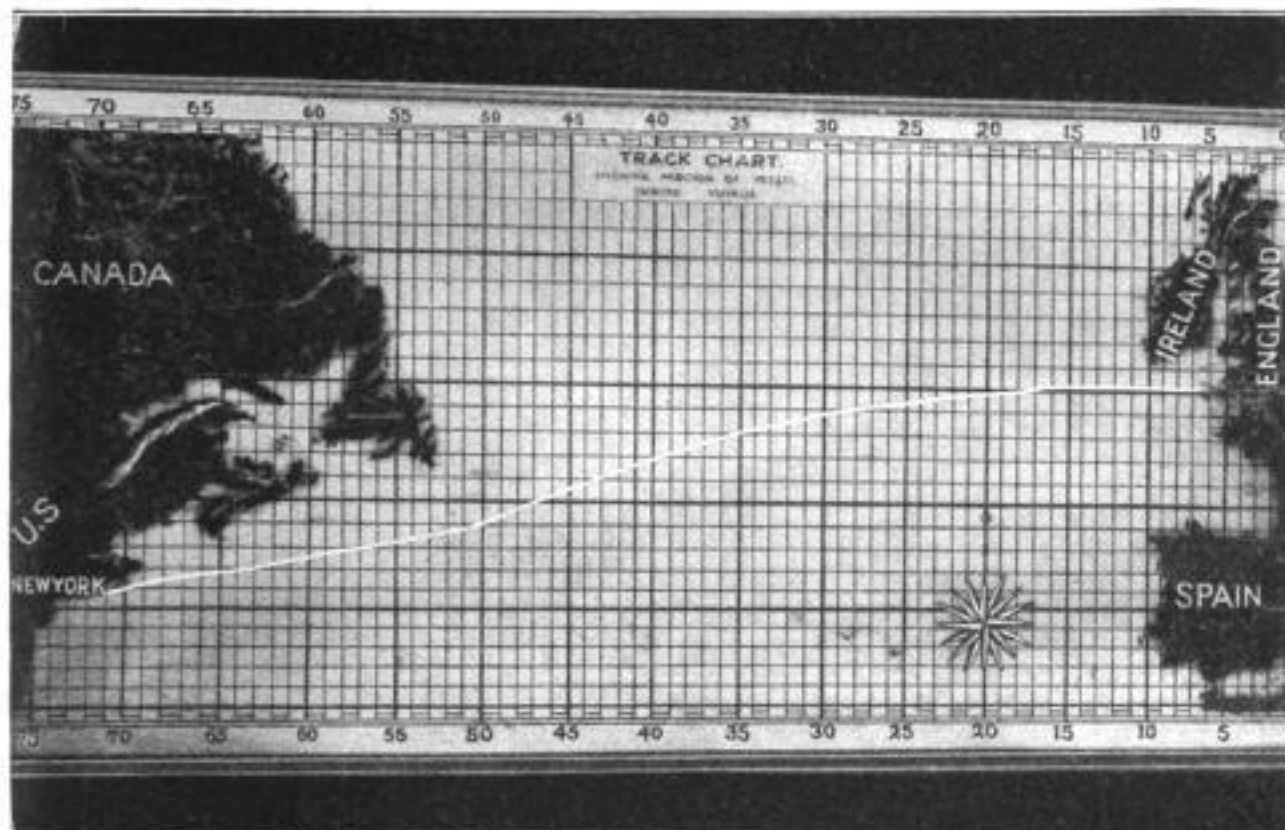
with steering knuckles that connect through rods to the steering wheel at the driver's seat, which is placed at one side so as to give an unobstructed view. It is especially adapted to the transport of long loads through dense traffic and around sharp corners. It is provided with a stay leg so that it can stand alone when not in use, or it can be turned about and coupled to the rear end of the truck.



Above: One of the New Two-Wheeled Trailers Which were Designed for Hauling Long Loads, Shown Coupled to the Rear End of a Motor Truck. Right: Trailer and Truck with Load of Poles



in Switzerland, for handling unusually long loads in connection with the standard motor truck. The rubber-tired wheels pivot on the axle and are provided



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Track Chart on the White Star Liner "Majestic" to Show the Exact Position of the Vessel at Any Moment during the Voyage between New York and Southampton: The Movable Model of the Ship, on an Exaggerated Scale, is Shown in the English Channel at the Extreme Right of the Chart

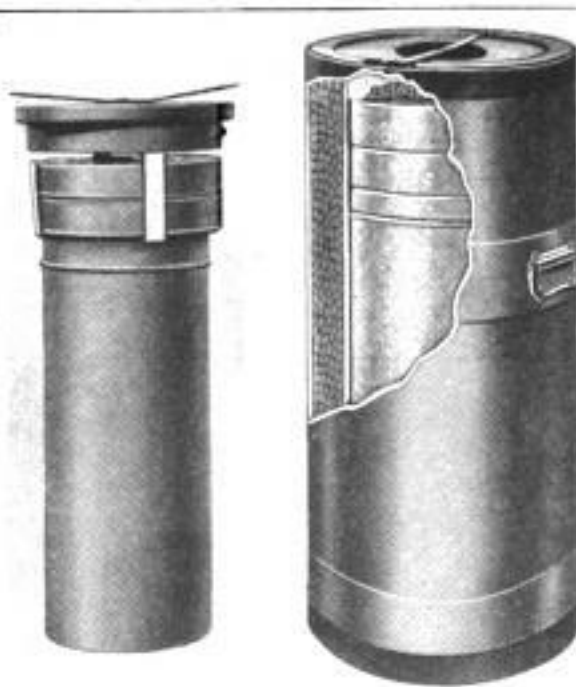
TRACK CHART SHOWS POSITION OF VESSEL DURING VOYAGE

To indicate the position of the ship at any time while crossing the Atlantic, a novel track chart, with a movable model of the vessel, has been installed on board the White Star liner "Majestic." The chart shows the Atlantic Ocean to scale between the United States and England, on which is plotted the course followed by the ship. The model is moved along this course so as to show at any moment the exact position of the vessel during the voyage between New York and Southampton. The chart is placed where it can be seen by all the passengers.

ICE CREAM MAY BE SHIPPED WITHOUT ICE AND SALT

Ice cream may now be shipped without being packed in ice and salt if a specially designed dry container is utilized. This container is a double-walled metal vessel which has 2 inches of cork composition between the walls, and a cork-insulated top that clamps firmly into position. After the ice cream is placed in the container, two metal disks filled with a cooling mixture that has been frozen to a solid state, are laid on top of the cream can, just under the tight-fitting cover. This outfit

is said to keep ice cream solid for periods of 18 to 36 hours, depending on weather conditions, in addition to elimi-

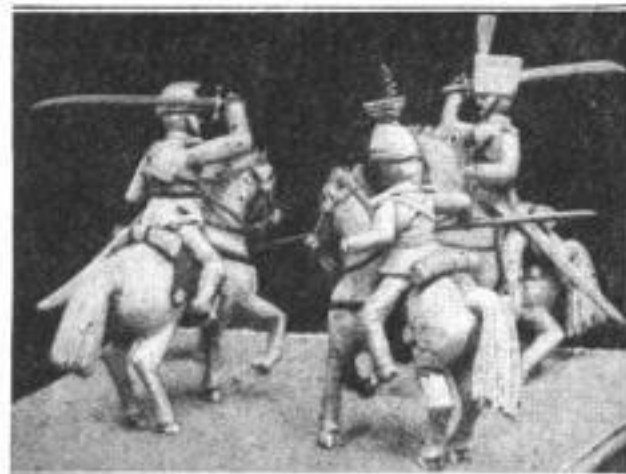


Dry Container in Which Ice Cream may be Shipped without Using Ice and Salt, Showing the Cooling Disks and Cork Insulation

nating the handling of the heavy, dirty, brine-soaked wooden "freezers" used heretofore.

GROUP OF CAVALRYMEN CARVED ENTIRELY IN CORK

That even cork may lend itself to the sculptor's art has been made evident by a

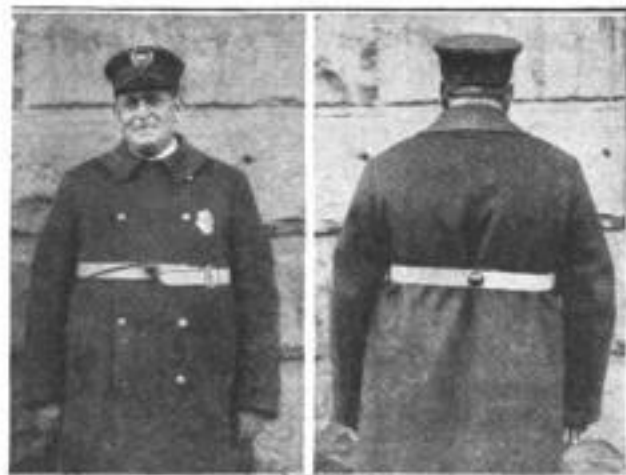


Only Cork was Used to Model This Group of Fighting Cavalrymen, Which, Considering the Material, Is Remarkably Lifelike

group of fighting cavalrymen recently modeled in that material. There are three figures, all mounted, facing each other in a triangular arrangement. Two of the men are flourishing large swords, while the third is about to lance the horse of his antagonist. The group has a pleasing variety of detail, and, considering the material used, would seem to be remarkably well executed.

RED SIGNAL LIGHTS ON BELT OF TRAFFIC POLICEMEN

Special belts, having red signal lights on the front and rear, are worn by the traffic police in Denver, Colo. Small batteries are carried in the officer's pocket. Thus, every crossing policeman becomes



Left: Front of Specially Designed Signal Belt for Traffic Policemen, Showing Light Attached. Right: Rear of Signal Belt

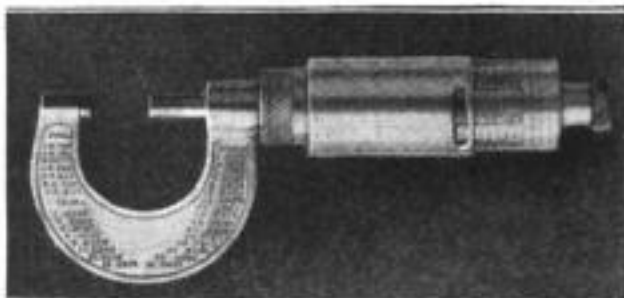
a semaphore, and when signaling the traffic to proceed, say, north and south, the vehicles approaching from the other directions are flashed the common red "stop" warning.

ELMIRA COMMUNITY SERVICE USES NOVEL STATIONERY

The commonly wasted back portions of ordinary typewriting stationery are used for advertising by the community club of Elmira, N. Y. Printed on the backs of some of the sheets is a table showing the many activities of the organization, while covering the backs of other sheets is an attractive layout telling the same story graphically. Significant details from the last annual report, such as "Water Sports—10,000 participants, 75,000 spectators"; and "Winter Sports—8,000 participants, 80,000 spectators," are printed under the illustrations.

DIRECT-READING MICROMETER HAS FAST MOTION

A new direct-reading micrometer caliper has several features to recommend it. The use of a screw with a considerably

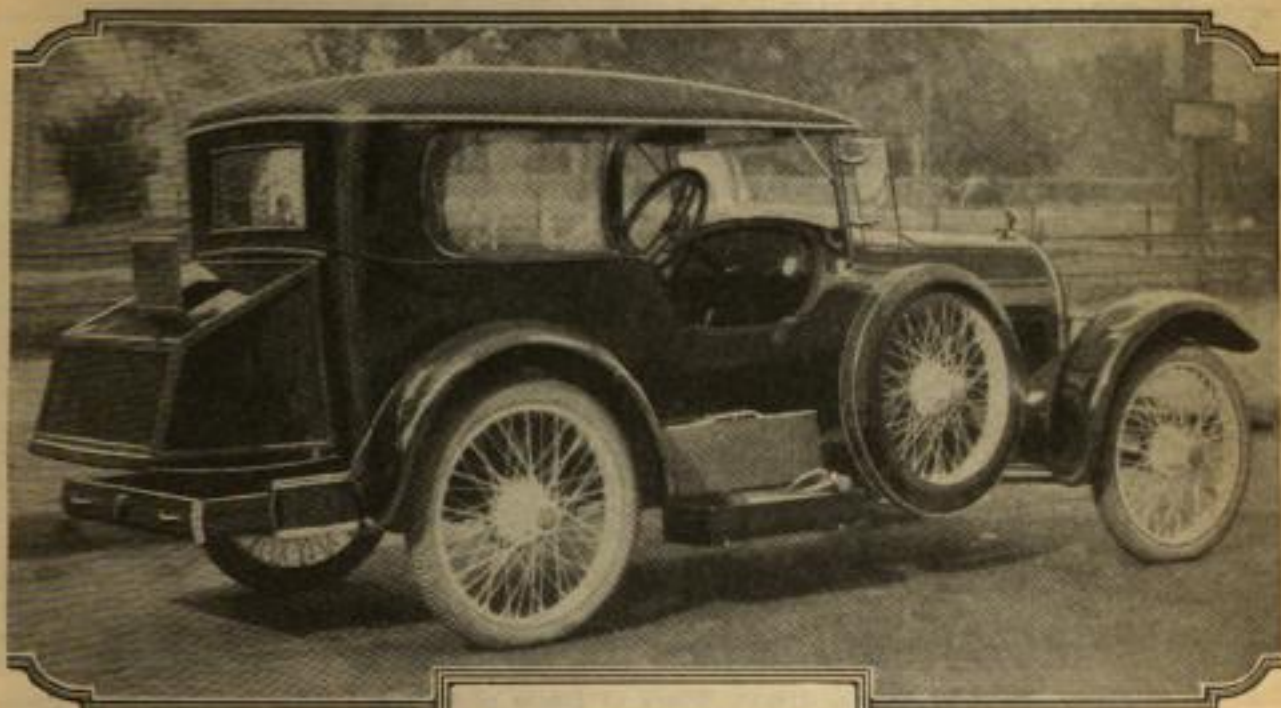


This Direct-Reading Micrometer Has a Screw of Relatively Coarse Pitch That Gives It a Fast Motion without Impairing Its Accuracy

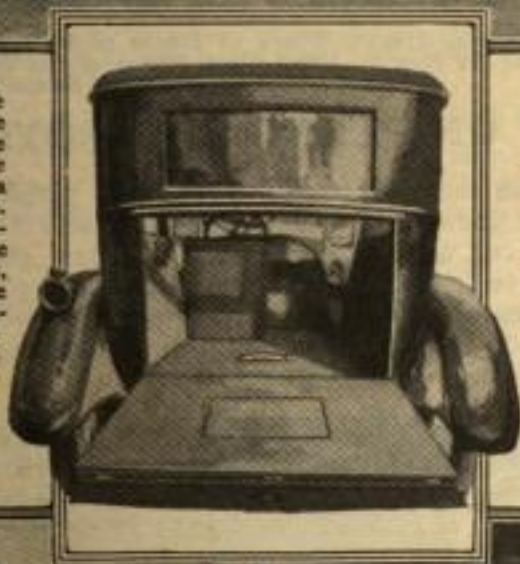
coarser thread than usual, makes it open and close faster than the ordinary micrometer. The graduations are placed in the form of a spiral of the same pitch as the screw, upon a thimble of relatively large diameter, which is encircled by a cylindrical shell, carrying the index mark, and is adjustable so that compensation for wear is possible.

¶ An outbreak of typhoid resulting in 97 identified cases and 14 deaths in Franklin Furnace, N. J., has been traced to a rusty check valve and an open gate valve on a forgotten connection between the domestic waterworks system and the untreated industrial supply of a zinc company.

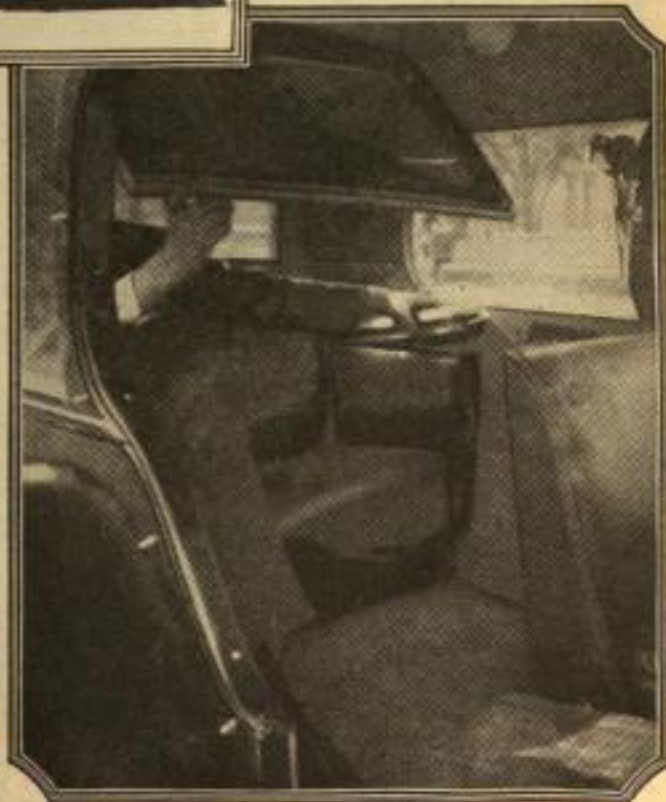
AUTO USED AS PLEASURE OR COMMERCIAL CAR

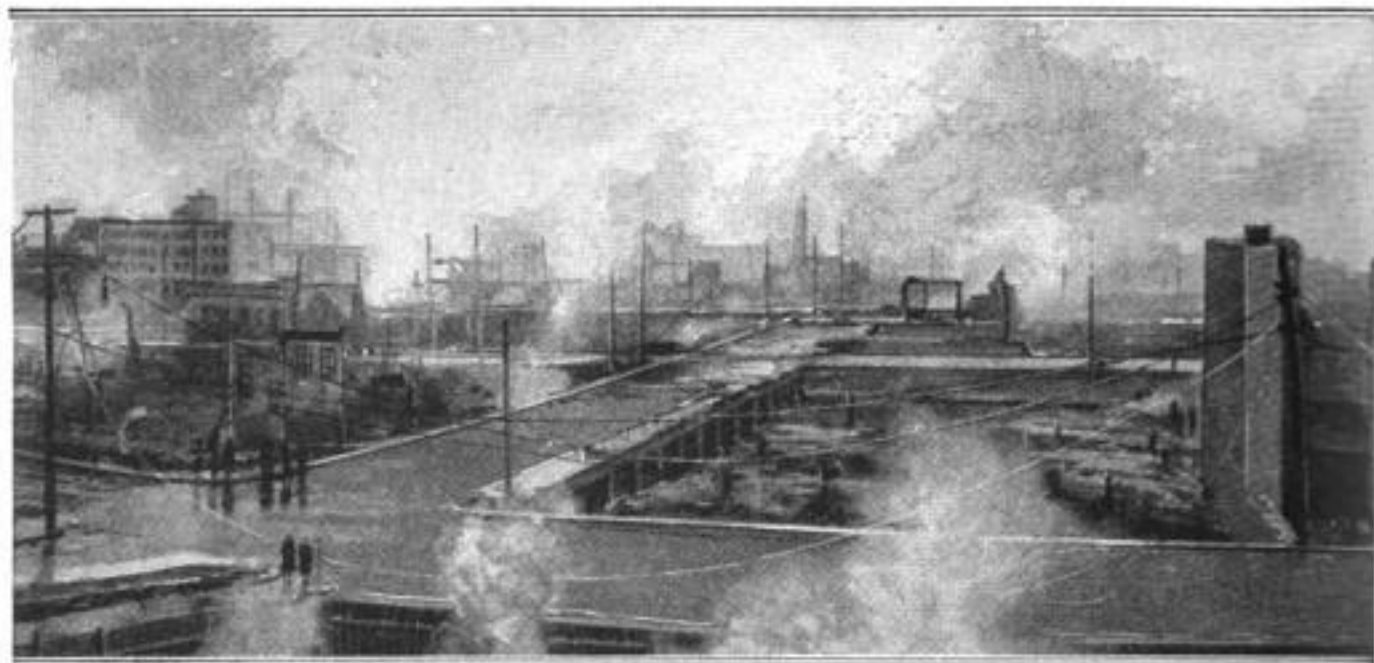


AN automobile which may be used either as a pleasure car or a commercial vehicle, the change from one type to the other being accomplished in a few minutes, is now available. In general appearance, the machine compares well with the modernly equipped automobiles, as may be seen from the picture at the top of the page, and accommodates five persons in individual seats, of which four are removable. In the center of the page is shown the double-purpose car with the rear lowered and seats removed so as to provide for the car-



rying of packages. The illustration at the left, below, shows the manner of lowering the rear of the machine and also displays the drawerlike compartment for holding tools or similar articles. At the lower right is seen the way in which the side curtains are pushed up into a compartment at the top of the vehicle, and also how the armrests may be removed to provide receptacles for holding books or magazines. This car will undoubtedly appeal especially to those who desire a pleasure car that successfully "camouflages" its other use.





Destroyed Business Section of Astoria, Oregon, Where 32 Blocks of Store and Office Buildings were Consumed by fire. It may be noted how blocks of the buildings burned many feet below the ground and collapsed into heaps of smoking ruins upon their flimsy

CITY BUILT ON PILING DESTROYED BY FIRE

The peculiar construction methods used in building Astoria, Ore., located at the mouth of the Columbia River, were chiefly responsible for the immense loss there by fire on December 8, last year. Built upon the mudflats along the river, it was found necessary first to drive piling as a sup-

port for a plank flooring upon which the buildings and asphalt pavements were to rest. When the fire started, it spread rapidly between the piles and underneath the plank flooring, transforming the buildings and tar-composition streets into virtual furnaces. So quickly did the



Looking over a portion of the residence district of Astoria at the burning business section, from which clouds of smoke are seen rising: Although the entire business part of the city was destroyed, the flames were brought under control before reaching the residences



Fire, the Fury of Which was Greatly Aided by the Peculiar Construction Methods Used in Placing the City Foundation Level of the Streets, and Some of the Flaming Structures are Seen Just Before They Underpinning of Piling, the Whole Causing an Enormous Loss

flames spread and so futile were the efforts of the fire fighters, that before a sufficient number of buildings could be dynamited to bring the fire under con-

trol, the entire business section of 32 blocks was destroyed. By heroic efforts the firemen brought the fire under control before it reached the residences.

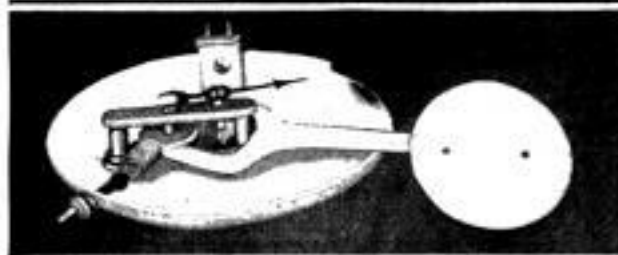
CULL LUMBER FIBERS FORMED INTO GOOD PANELS.

Panels made from hardwood fibers from which the sap, knots, and shakes have been eliminated to prevent splitting and checking, have been successfully made and used as a substitute for lumber. The fibers are prepared and arranged in layers to eliminate grain from the finished product and forced together by hydraulic pressure of 500 pounds per square inch. Panels which are built up in thicknesses of $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ inch can be worked like ordinary lumber. Its structural strength has been fully demonstrated by the variety of uses the new product has been put to, including sheathing for concrete forms.

SIMPLE DEVICE INDICATES AIRPLANE AIR SPEED

A new air-speed indicator of Italian design, which is of very simple construction, is actuated by pressure of the wind against a small plate. The plate is attached to a pivoted arm which carries a toothed sector that engages a small pinion mounted on the pointer shaft. The displacement of the lever, due to wind pressure on the plate, is resisted by

an adjustable spring, and the pointer indicates, upon a properly graduated dial, the speed of the airplane relative to the

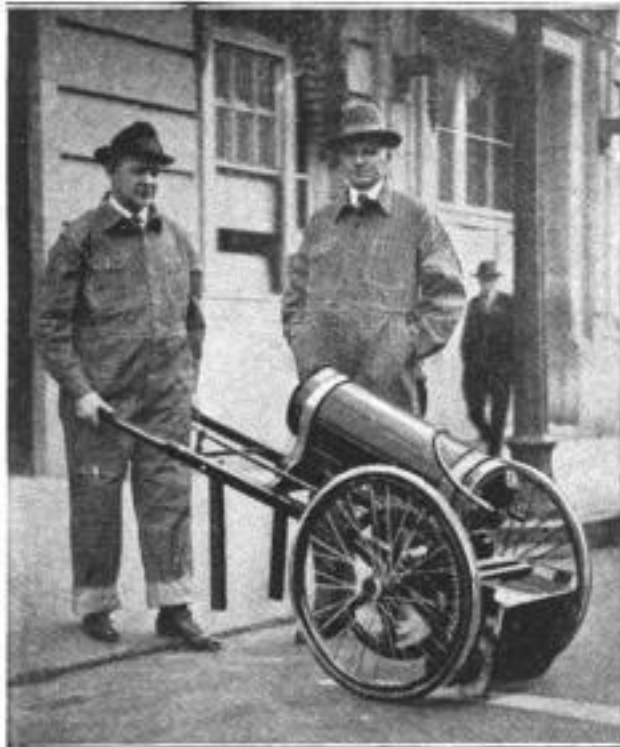


Top: Simple Device Used for Indicating the Speed of Airplanes. Bottom: Interior of Indicator, Showing the Simplicity of the Mechanism

wind, in miles per hour, or such other units as may be desired.

STREET MARKER CONSTRUCTED FROM BICYCLE AND STILL

Profitable use was made of a confiscated "moonshine" still and an un-



Street Marker Composed of a Confiscated "Moonshine" Still and an Unclaimed Bicycle: The Brushes and Gears Were the Only Parts That had to be Bought

claimed bicycle by ingenious members of the police force of Portland, Ore. With the wheels and other parts of the bicycle, they built a carriage on which was mounted the still. This was filled with a marking fluid, and the whole formed a handy machine for laying out the boundaries of safety zones and cross walks.

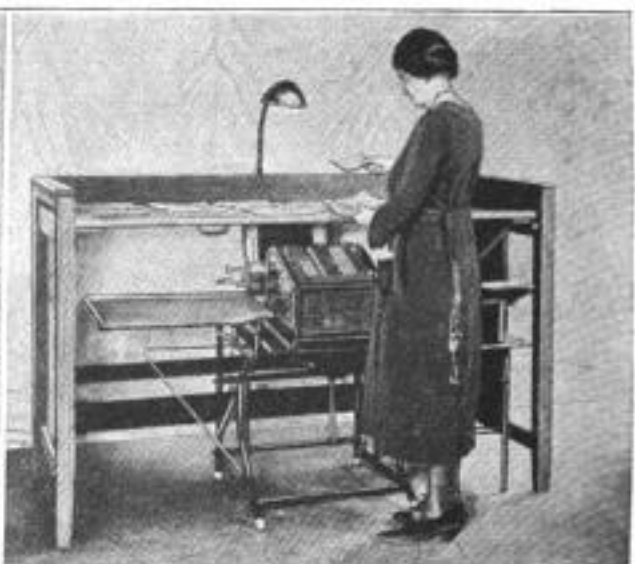
In connection with the machine were some gear-driven brushes—the only parts that had to be bought—so that the whole cost was only \$30 instead of \$400, the manufacturer's price for a similar marker.

NONFOULING TROLLEY SHOE GIVEN SERVICE TEST

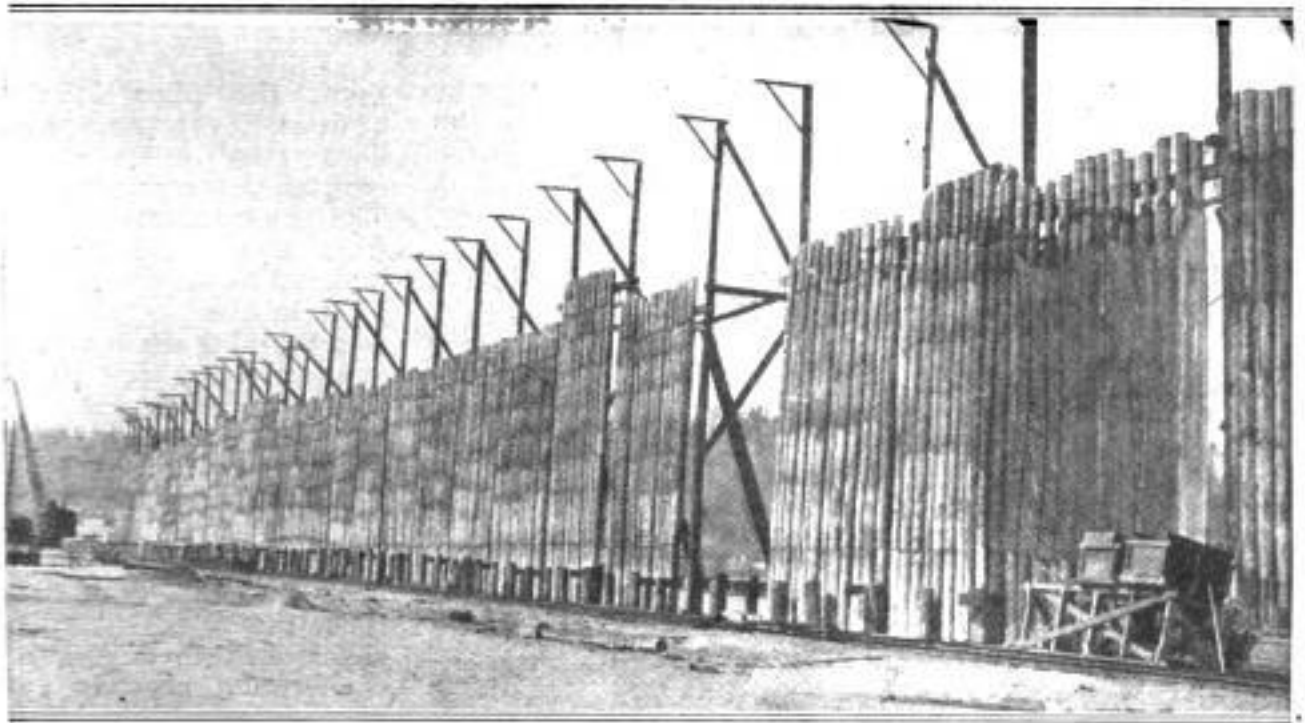
A new trolley shoe, designed from observations covering a long period of comparison of trolley shoes and wheels, was recently given a thorough service test on an electric railway in England. The new shoe, which is constructed so as to drop over the end of the trolley pole in the case of being run off the wire, practically eliminates fouling. Although the shoe showed slightly greater wear on the wire than a trolley wheel used in a similar test, it did not cause any of the markings on the wire produced by the arcking between trolley wheel and wire.

HANDY AND ATTRACTIVE DESK FOR BOOKKEEPING MACHINE

A high open desk built to inclose posting machines is one of the latest innovations in office furniture. The desk, made in various woods, is neat-appearing, and in addition to securing privacy for the operator, has a disappearing top shelf which may be used as a working space in sorting. This shelf, when not in use, forms the back and is pulled up into place over the machine only when it is desired to use a large area for clerical work. A lamp arranged over the center of the desk is another feature.



The Desk is Shown at the Left as It would Be When the Operator is Using It during Machine Posting. The Light, It will be Noted, is Placed Directly over the Machine. Right: The Desk with the Back Pulled Up into Place, for Sorting or Other Clerical Work



Cement-Coated Wooden Piles, Stacked in Racks for Air Curing: In Connection with Extensive Harbor Improvements at Tacoma, Washington, 1,450 of These Piles were Prepared by the Cement-Gun Method, at About Half the Cost of Reinforced-Concrete Piles

PILES ARE CEMENT-COVERED WITH GUN

BY CLEVELAND GAINES

EXTENSIVE improvements at the port of Tacoma, Wash., have made it necessary to coat with cement 1,450 fir piles for building a pier. It was found that the entire cost of the piles when thus treated, by the aid of a so-called cement gun, would be about one-half that of the ordinary reinforced-concrete piling. These piles run from 46 to 70 feet in length.

Along the edge of the new dock has been built a "shooting" rack, 1,100 feet in length. The piles, brought on rafts, are covered with a wire mesh and are then conveyed by a locomotive crane, one at a time, to the shooting rack. This wire mesh is held at a distance of $\frac{3}{4}$ inch from the surface of the piles by means of metal spacers.

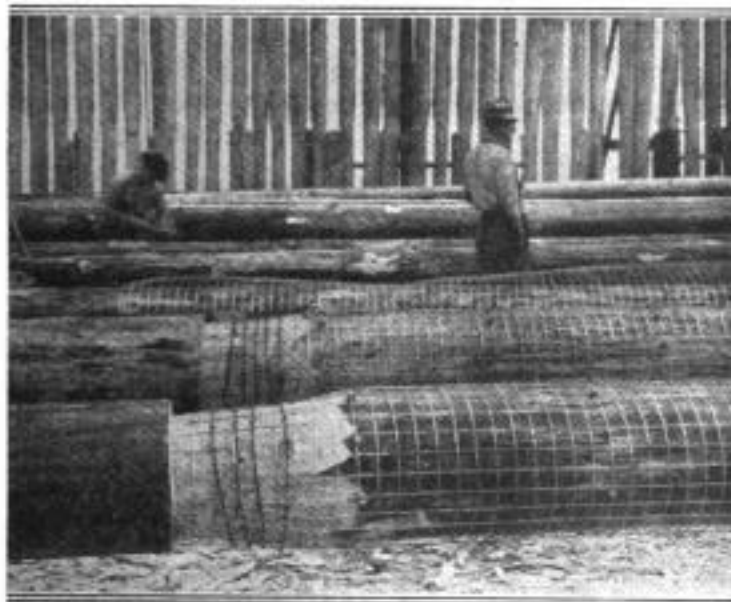
At the point where the lower end of

the cement is to terminate, a saw cut, 2 inches deep, is made around the pile. Then the pile is tapered down for 2 feet

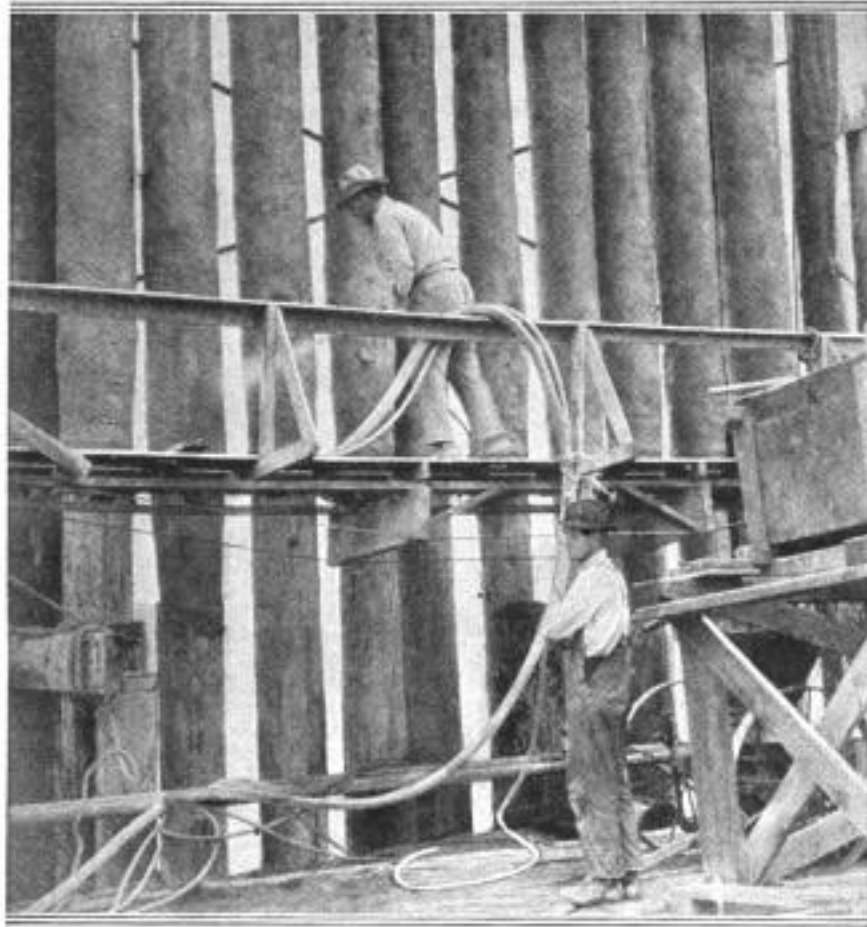
to the bottom of this cut. This method prevents the formation of a ridge where the cement begins, and also prevents the concrete shell from slipping up the pile while the covering is "shot" on. While the piles are still in a horizontal position, they are fitted at the lower ends with tapered iron tips that make it easy to

turn them while they are being coated in the rack.

The shooting rack is divided into bays, 20 to 25 feet long, depending on the distance between the supporting piles. A single turn of a rope at top and bottom holds each pile in place. Five men make up a crew. One man is stationed at the

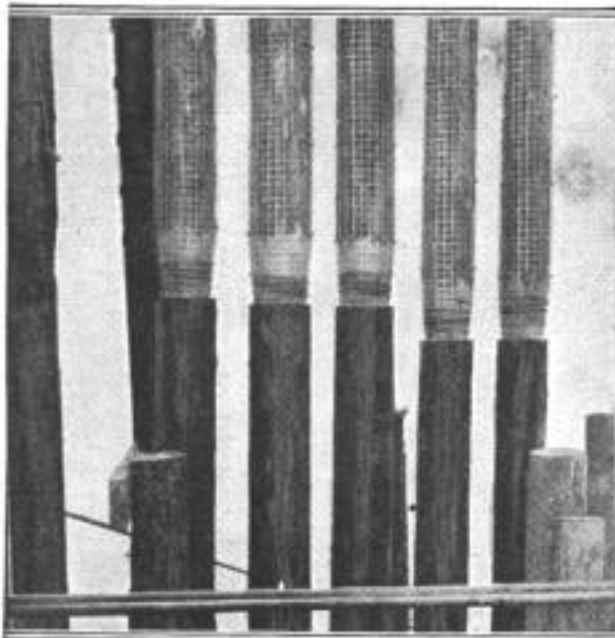


Picture Shows the Method of Putting in Place the Wire Mesh, Preparatory to Coating the Wooden Poles with Cement



Shooting Cement from the Gun on the Piles Placed along One of the Bays at Tacoma, Washington: Burlap was Hung on the Sunny Side of the Piles to Prevent Moisture from being Driven Off Too Rapidly While the Piles were Curing

bottom of the piles to turn them so that the cementing can all be done from one



Piles Prepared and Racked, Ready for Covering of Cement, Which was Applied in Two Coats at an Interval of Two Days

side of the rack. A second man, on a movable scaffold, adjusts the rope and

keeps the piles at the proper distance apart. Two men operate the gun, and one the nozzle. The nozzleman works from a scaffold that is lowered as he covers the piles in the section. It was found that with such a crew about 300 lineal feet of piling can be covered in one eight-hour working day.

In treating the piles by this new concrete process, they are gone over twice. The first time the mesh is just covered. Two days later the second coat is applied, making a thickness of nearly 2 inches. To keep the piles wet while they are curing, it is necessary to run perforated pipes along the top of the scaffold. The piles are sprayed for more than a week. To keep them moist in hot weather, big pieces of burlap are hung on the sunny side. Too rapid drying, which otherwise would be likely to occur in such a thin coating, would cause the concrete to crack and spall badly.

HIGHWAYS 360 FEET WIDE FOR NEW YORK

Tearing down row after row of buildings and opening combined "slow-moving" and "express" highways, 360 feet wide, is suggested as a solution of New York's traffic problem, by Dr. John A. Harriss, special deputy police commissioner. One of the first great cross-town boulevards, under this plan, would run from the Hudson to East River, somewhere in the district between 42d Street and 59th Street, and would cost the city about \$70,000,000. New York, in the year 2222, will have a population estimated at approximately 45,000,000 based on the present rate of increase.

☐ An American telegraph cable from New York to the Azores and an Italian link connecting with Rome are soon to be laid. Whether the cable will also be continued to the Near East has not been determined.



First All-Metal Airplane Which has been Accepted by the United States Navy and Which will be Used for Observation Purposes: This Machine Is of the Monoplane Type and So Constructed That It may be Mounted on, and Catapulted from, the Turret of a Battleship

NAVY'S FIRST ALL-METAL PLANE HAS NO BLIND SPOTS

After a series of successful tests, the Navy Department has just accepted the first all-metal airplane built for that branch of the service. It is intended for observation purposes, and in order to meet the requirements, was made of the monoplane type, with the pilot's seat back of the motor, from which point he has an unobstructed view forward, above, and on either side. The observer's cockpit is under the wings and the gunner is located midway between the pilot and the tail plane. At no angle could an enemy plane approach without being seen. The plane can be catapulted from the turret of a battleship and lifted on deck from pontoons alongside, by means of a derrick. Although the fuel supply is sufficient to last only three hours at high speed, the peculiar design of the plane will enable it to cruise along, at 50 miles an hour or less, for 9 to 10 hours.

TRAFFIC TOWERS OF BRONZE TO GRACE FIFTH AVENUE

The first of seven bronze traffic towers to be placed at busy points along Fifth Avenue, New York City, was recently unveiled at 42d Street. The tower, supported by steel braces, is in the form of a deep windowed box, and has, set in the section above the windows on the north and south sides, the three regular lights, while on each of the same two sides, but

below the windows, is also a clock. A large bell to ring out the hours is another feature. An organization, representative

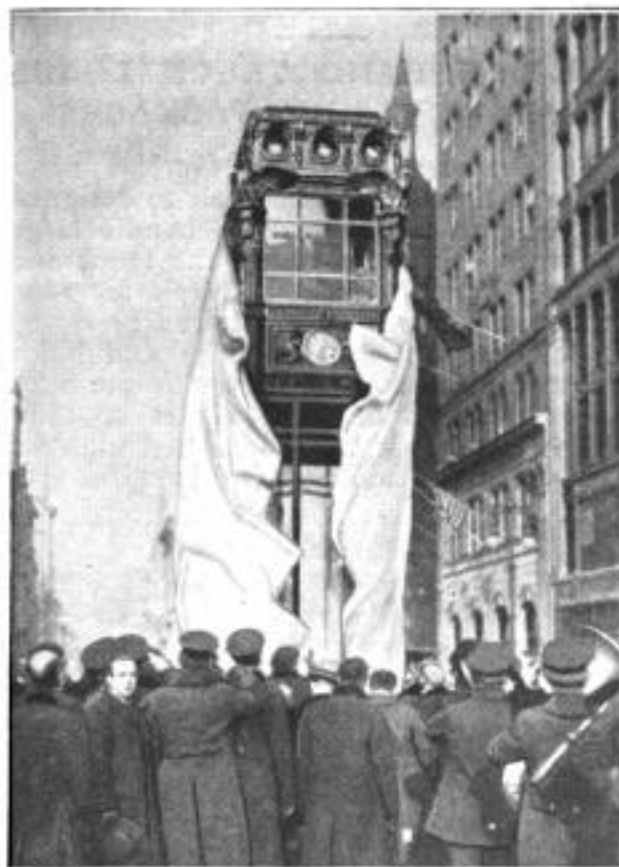
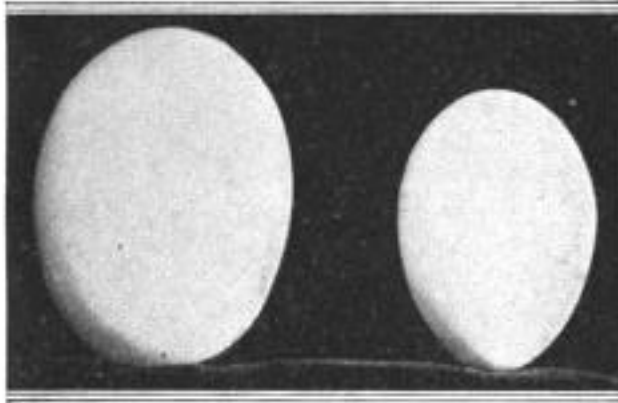


PHOTO BY CENTRAL NEWS PHOTO SERVICE
Unveiling the First Bronze Traffic Tower at 42d Street and Fifth Avenue: The Police Band is Playing the National Anthem

of the stores and business interests along the avenue, is presenting the towers to the city.

WORLD'S LARGEST HEN'S EGG OWNED BY AMERICAN

That he is in possession of the largest hen's egg in the world, is claimed by a California man who has obtained affida-

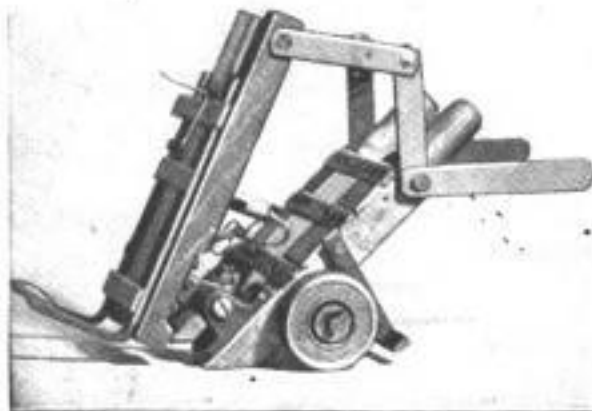


The Hen's Egg Pictured at the Left is Claimed to Be the Largest in the World. An Egg of Ordinary Size is Shown to the Right

vits giving the lengthwise circumference of the specimen as 7.87 inches and the circumference around the center as 6.75 inches. The diameter at the center is stated to be 2.15, the diameter lengthwise 2.81 inches, and the weight $4\frac{1}{8}$ ounces.

ONE-MAN HAND TRUCK LOADS AND MOVES BIG PACKAGES

To dispense with the services of a helper, a hand truck has been so designed that it enables one man to handle large packages. Swiveled above the truck and its two small wheels is a platform so arranged that one end of it can be raised or lowered by double levers and links. On the platform is a sliding frame with its end turned at right angles so that, when lowered, it can be pushed under a package, and when that end is raised and



Hand Truck That can be Loaded with Large Packages Single-Handed: The Upper Platform is Raised or Lowered by the Double Levers near the Truck Handles

the other end is lowered onto the truck, it is ready for moving. Behind the wheels is a metal bar adjusted to block the wheels during the loading.

FLOATING CONCRETE SLABS AS A DAM FOUNDATION

Novel engineering methods were adopted in the building of a large concrete dam across the Gila River, near Florence, Ariz. When borings were taken across the river, it was found that the river bed was really a filled-in cañon, the rock on both sides of the river extending only a short distance into the channel and then dropping down vertically more than 100 feet. The intervening space was filled with loose sand and silt, upon which it became necessary to build some sort of foundation rather than go down through the entire hundred feet of loose material. Consequently a huge slab of concrete was prepared, nearly 400 feet in length and over 200 feet wide. The slab rests directly on the sand and silt of the river bottom and is keyed to the rock on either side. On this enormous subfoundation, which really floats on the water-laden loose fill, the superstructure of the dam and spillway was raised nearly 40 feet in height. The slab is divided into four sections: the main slab, on which the dam rests; the rear apron, the fore apron, and the lower talus, or spillway foundation. The main slab is 56 feet wide and varies from 2 feet thick at the lower edge to 5 feet at the upper.

The rear apron is 16 feet wide, 1 foot thick throughout, and reinforced with steel rods. The fore apron is 70 feet wide and 2 feet thick, also completely reinforced. The lower talus, under the spillway section of the dam, is the so-called "articulated" section, and is divided into concrete blocks, 10 feet square, tied together with iron rods. Such dams have been built in India, but are seldom attempted in this country.

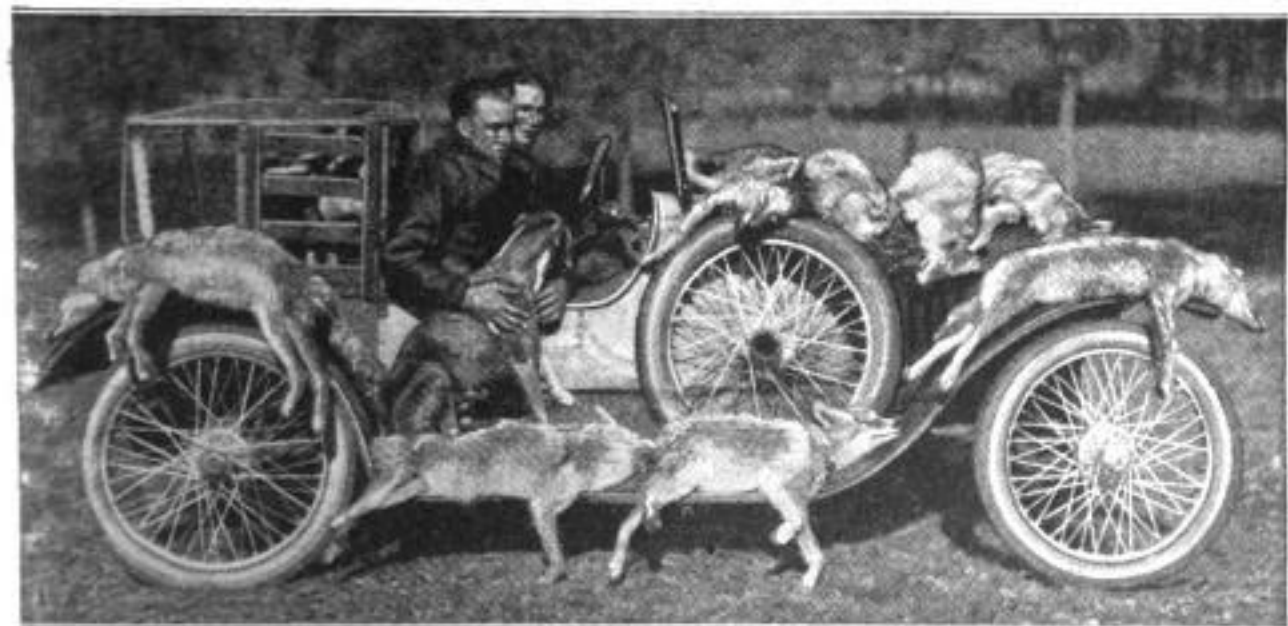
AUTOMATIC ROAD-ROUTE MAP FOR AID OF TRAVELERS

An automatic road guide, consisting of a roll map fastened to two spools, which are driven by a shaft geared to the wheels of the train or motor bus, is a recent development. With this arrangement, the passenger is easily enabled to determine his exact location at any time during a trip by merely consulting an indicator, or pointer, on the constantly moving map which is in full view of the travelers.



FOOT-POWER MILLS USED TO IRRIGATE JAPANESE RICE FIELDS

PRIMITIVE foot-power mills are commonly used in Japan for the purpose of irrigating the rice fields during the dry seasons. Throughout these periods, the farmers go to the fields regularly and for many hours patiently turn the large wheels with their feet. The well water is thus brought up to the surface of the ground and is then directed into narrow wooden troughs which carry it to all sections of the fields. As may be seen in the accompanying picture, the hard-working rice grower thoughtfully provided for his comfort under the intense rays of the sun by erecting an overhead protection.

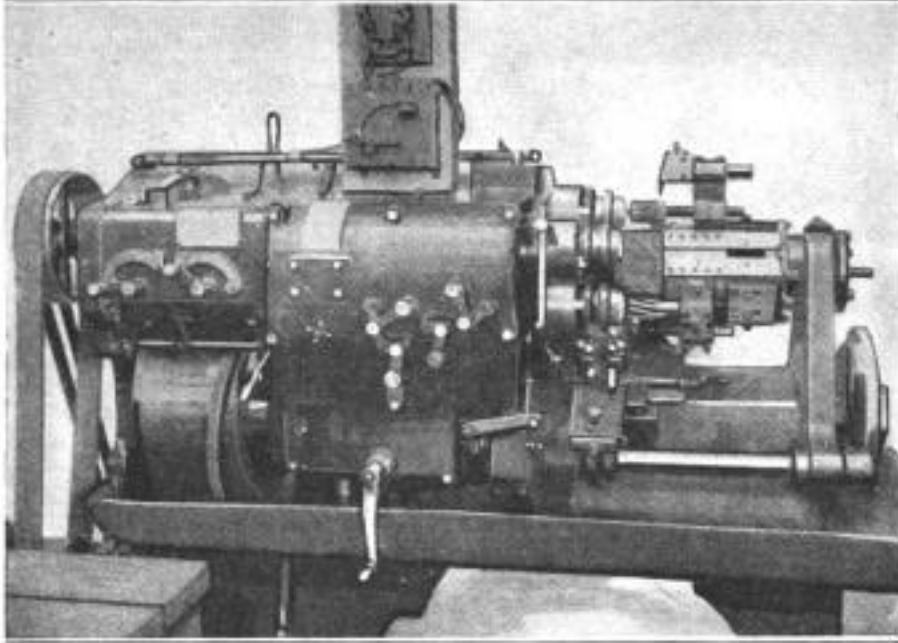


DOGS AND AUTO PROVE DEADLY COMBINATION FOR COYOTES

CATCHING, with the aid of a quartet of trained greyhounds and an automobile, as many as eight coyotes on a single trip, the two men in the car, Ed and Dick Gross, of Colorado Springs, have run up a high score in the hunting of this animal—300 bagged in three years. The method employed is unusual. They prowl over the prairie land until the "wolf" is sighted; spin after him at a fast clip, taking jolts and bouncing with good-natured indifference, until they come fairly close to the animal, then free the greyhounds to complete the job. The dogs seldom fail.

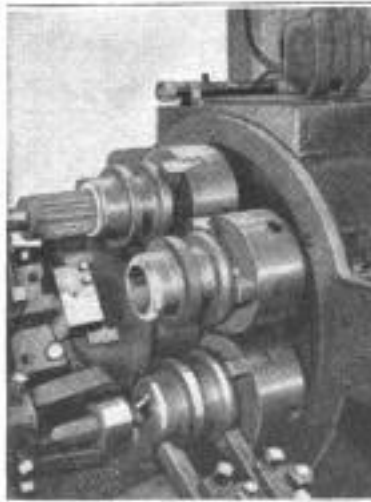
MACHINE CHUCKS SIX PIECES OF WORK AT ONE TIME

A six-spindle chucking machine that is equivalent to an automatic screw machine for short pieces, for it handles five pieces



Belt-Driven Chucking Machine Adaptable for Work Up to 6 Inches Long and 6 Inches in Diameter: The Spindles are Seen near the Center of the Machine

of work with 21 cutting tools in operation at one time, is particularly useful for work that requires a number of separate and distinct operations. The machine has six spindles, five of which are in an operating position, while the sixth is in an unloading and loading position. At the



end of one cycle of operations, when a finished piece reaches this position, the machine automatically stops for replacing the finished with an unfinished piece. The five spindles need not be stopped during this operation. The

machine can be arranged for either belt or motor drive.

Ⓒ A motion-picture film has recently been completed for the purpose of portraying the evolution of life on earth for an assumed period of 30,000,000 years.

MANAGING WITHOUT ICE IN SOUTHERN CHINA

Until very recently south China has had no ice, and, in fact, the need of this commodity, which we think so necessary for the transporting and preserving of our food supply, has never been felt there, for China has methods of her own. One of the common methods of preserving meats is to dry, smoke, salt or cook them. One may pass along the streets of Canton any time and see, hanging in a meat market, the entire carcass of a pig, fresh-roasted and still hot, or a dried duck pressed out flat and hardly recognizable. And even a person who had lost all but his olfactory sense could find the salt-fish markets.

In the large cities the animals are brought alive to the market. Boats from far away in the country come daily to these cities, bringing thousands of ducks and chickens. If a cook wants chicken for dinner he will go to the market early in the morning, pick out one of the liveliest from the cackling lot, and carry it home. Even when he gets it home, he will not kill it until he is almost ready to cook it. So, any time of day, one may see many other small animals being carried alive through the streets to supply the family kitchens. The larger animals, of course, must be killed before they reach the homes, but even they are not usually killed until they reach the market. Live pigs are shipped for great distances, sometimes by boat and sometimes carried in crates by coolies. In warm weather a pig may be carried by two men in a kind of sedan chair with a sun awning over it to prevent it from becoming overheated. This is pig travel de luxe.

But the supplying of fresh fish to the inland towns is quite another problem. It is solved by bringing them alive to the markets in tubs of water. No Chinese housewife would think of buying a fish unless it was alive, and even if it is in the least sluggish she will usually refuse it. In order to aerate the water and

keep the fish alive, the dealer has a barrel reservoir above his tub of fish, and a tiny stream from the reservoir constantly splashes down into the tub, thus replenishing the exhausted air. When a fisherman is taking his fish a long distance to the market, he slaps the surface of the water with a paddle, thus forcing the air down to his precious catch.

NEW TRANSATLANTIC RECORD MADE BY THE "MAJESTIC"

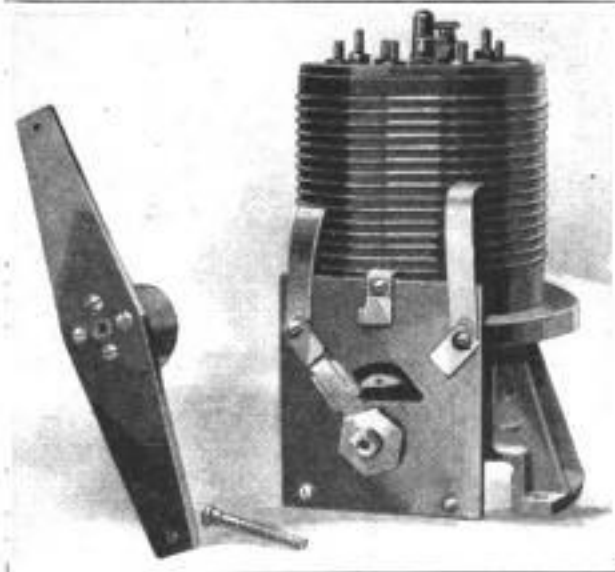
Running from New York City to Cherbourg, France, in 5 days 6 hours 13 minutes, the "Majestic" has established a new transatlantic record, according to the White Star Line. The former best time was that made by the "Mauretania" on June 12, last year, when it ran the same course in 5 days 8 hours 10 minutes. The average speed of the "Majestic" was 28.31 miles an hour.

RAILROAD EQUIPMENT MOVED BY TRUCK AND TRAILER

Moving a railroad was the rather onerous-sounding contract recently accepted by a motor-transport company of Los Angeles, Calif. In this case it involved the moving of dump cars, rails, and locomotive to a big flood-control project, some 20 miles distant. The equipment was too narrow to be operated over standard-gauge railroad tracks, and so the cars, each 26 feet long and weighing 10 tons, were loaded on rails laid across a motor truck and trailer.

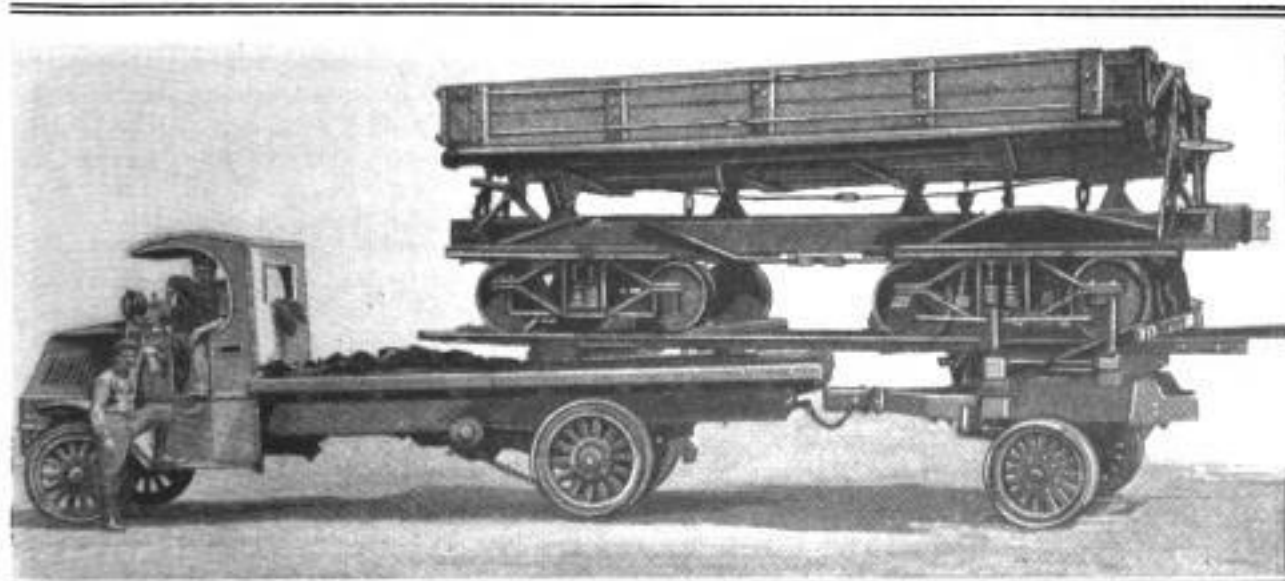
RADIO WAVE-CHANGER SWITCH HAS LOCK ATTACHMENT

A three-point wave-changer switch which has a locking attachment, is now available for radio generators. The switch



Radio Wave-Changer Switch Which Has Lock Attachment, Showing the Handle Removed, Displaying the Three Spring Contacts

arm is so arranged that when it is moved across the face of the appliance, it may be locked in either of three spring contacts. Each of these contacts gives the necessary connection for a different length of radio wave. By this method of securely fastening the arm in position on the contacts, there is no possibility of the arm jarring or vibrating out of place, thus making the outfit valuable for use on airplanes or in other locations where there is considerable vibration.



Motor Truck with Two-Wheel Trailer Used to Transport the Railroad Equipment of a Western Contractor, Who was Moving to a New Location Some 20 Miles Distant: The Outfit Here Carries a Dump Car 26 Feet Long, Weighing 10 Tons

SIGN WARNS "STOP" WHEN TROLLEY DOOR OPENS

When the rear door on street cars in Syracuse, N. Y., is opened, a sign with



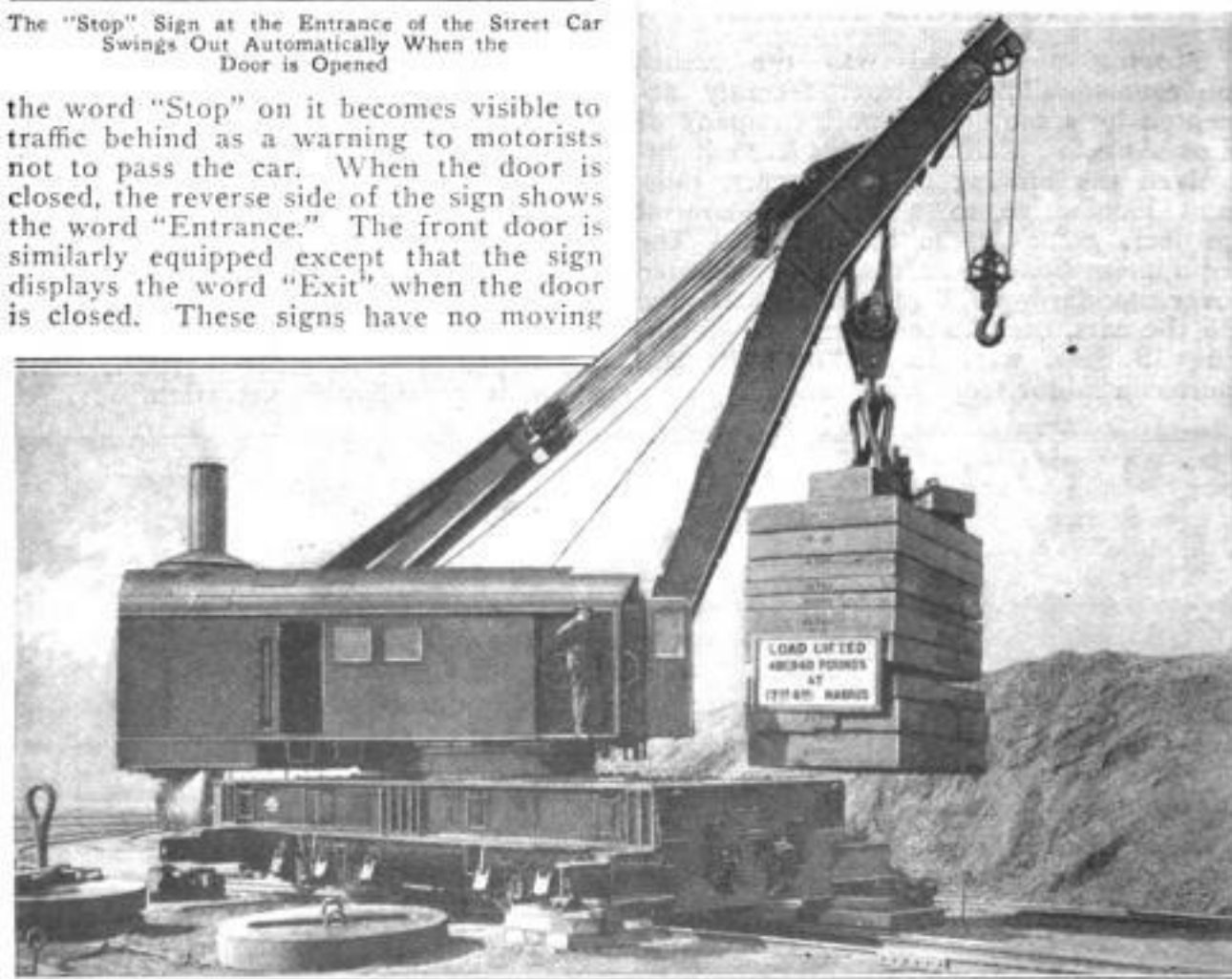
The "Stop" Sign at the Entrance of the Street Car Swings Out Automatically When the Door is Opened

the word "Stop" on it becomes visible to traffic behind as a warning to motorists not to pass the car. When the door is closed, the reverse side of the sign shows the word "Entrance." The front door is similarly equipped except that the sign displays the word "Exit" when the door is closed. These signs have no moving

parts, but are simply screwed to the doors. It is hoped that the signs will help prevent careless driving.

VIRGINIAN WRECKING CRANE LARGEST IN THE WORLD

There was recently shipped to the Virginian Railroad, for use on its lines, the largest wrecking crane ever built. This crane, at a radius of 17 feet 6 inches, has a capacity on the main hoist of 200 tons with all outriggers, of 100 tons with end outriggers only, and of 42½ tons without outriggers. The capacities on the auxiliary hoist are 45 tons at 24 to 30-foot radius with end outriggers only, and 30 tons at 24-foot radius without outriggers. The crane is mounted on a six-wheel truck, 34 feet long, with a total wheelbase of 26 feet 2 inches. On each wheel is an air brake that can be operated by the engineer of either the crane or the locomotive when hauling the crane.



Largest Wrecking Crane in the World, Recently Shipped to the Virginian Railroad, Shown Lifting a Load of 401,940 Pounds at a Radius of 17 Feet 6 Inches: The Extreme Height of the Crane Is 15 Feet 9 Inches, Its Greatest Width 10 Feet 6 Inches, and Total Weight 356,500 Pounds

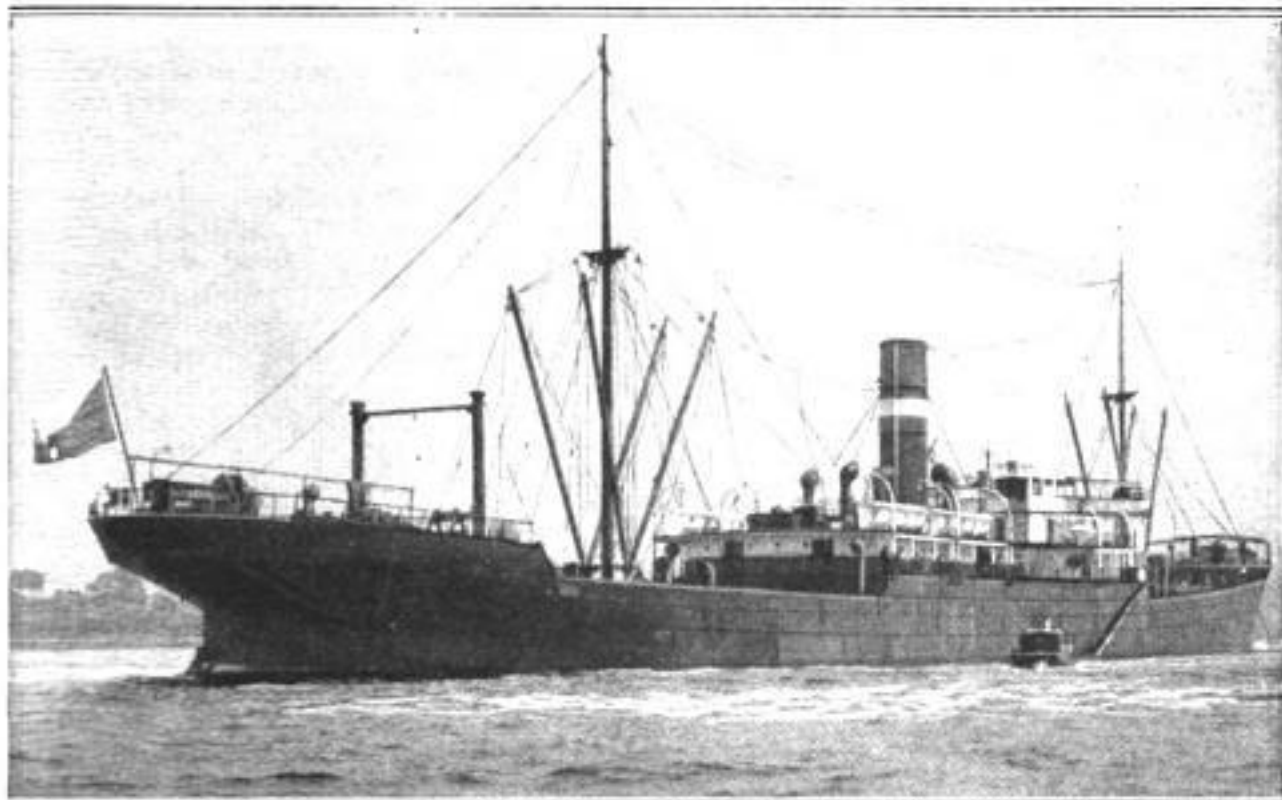


PHOTO BY COURTESY OF PROVIDENCE JOURNAL

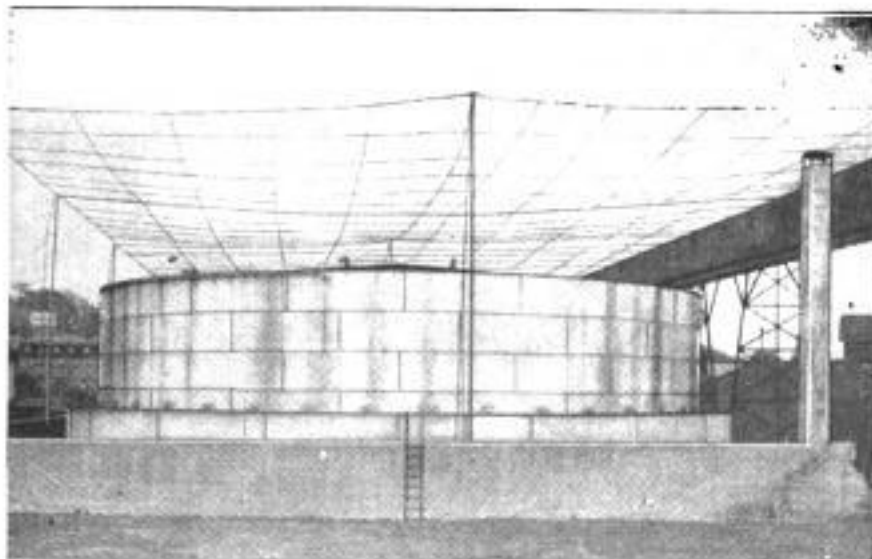
FIRST CZECHOSLOVAKIAN SHIP REACHES AMERICA

THE first steamship under the Czechoslovakian flag to enter American waters was the "Legie," which anchored recently at Providence, R. I., on its way to New York City with a cargo of soft coal. Czechoslovakia is landlocked, but by treaty with Germany is allowed the use of the port of Hamburg. The "Legie," built in Japan, is of 5,735 tons' burden.

GROUNDING SHIELD PROTECTS TANKS FROM LIGHTNING

Effective protection of oil tanks against lightning has been accomplished by the introduction of a grounded shield which is erected over the containers and has a 10-foot clearance. The shield consists of a gigantic network of heavy galvanized-steel wire, strung between $\frac{9}{16}$ -inch seven-strand steel guy cables. These cables are fastened to the tops of 3-inch iron pipes which are used as poles, and which are about 46 feet in height. All of the joints in the wires and cables are made mechanically secure and then soldered so as to be electrically perfect. The meshes of this huge network shield are approximately 9 feet square, the shield being grounded in four places by stranded copper wires, whose upper ends are soldered

to the steel cables, while the lower ends are soldered to copper plates buried below the ground-water level. By erecting a grounded metal protection above the tanks, they are made as safe from light-



Grounded Shield Which has been Erected over an Oil Tank as a Protection against Lightning, Showing How the Gigantic Network of Wires is Stretched between Poles of Iron Piping

ning, it is claimed, as though they had been buried completely underground, as is sometimes done with smaller tanks.

DISMOUNTED AUTO ENGINE USED IN CUTTING ICE

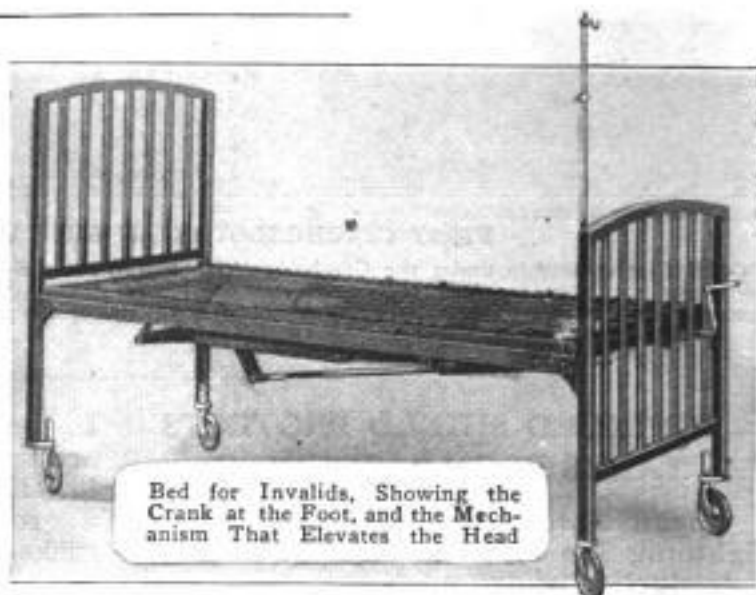


Ice is Cut and Grooved with This Rig, Driven by a Dismounted Auto Engine. The Large Lever is Used to Raise or Lower the Saws

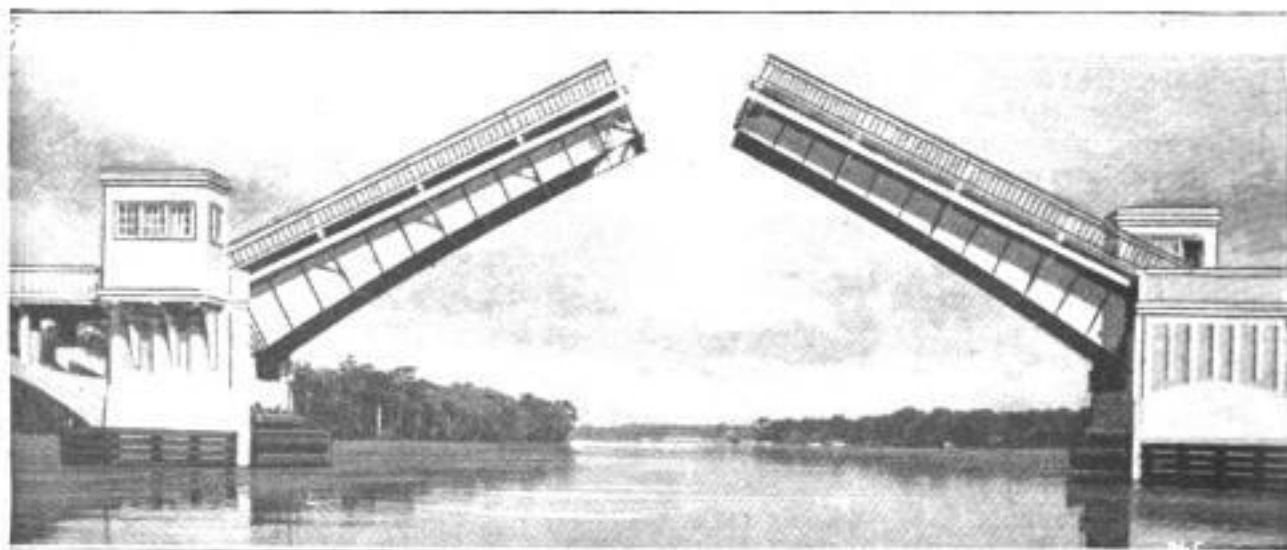
A dismounted automobile engine is utilized to groove and cut the ice on a big pond by two Boston men who like to harvest their own ice each winter. To the shaft of the engine are attached two strong circular saws. As the saws bite into the ice, the teeth slowly drive the machine forward, while an attachment on each side grooves the ice directly in advance of the saws. The same attachment also makes shallower grooves to one side, which serve as markers for the next saw cuts. A lever at the center of the axle raises or lowers the saws.

BED FOR INVALIDS IS EASILY ADJUSTABLE

Easily adjustable for the proper posture of an invalid, describes the essential feature of an iron-framed, rubber-tired bed now being distributed by a Chicago company. By means of a crank at the foot, the head half of the spring can be gently elevated until the patient is in the desired position. In addition to benefiting the sick person, the nurse is thus easily enabled to place the invalid in the proper position without straining her back.

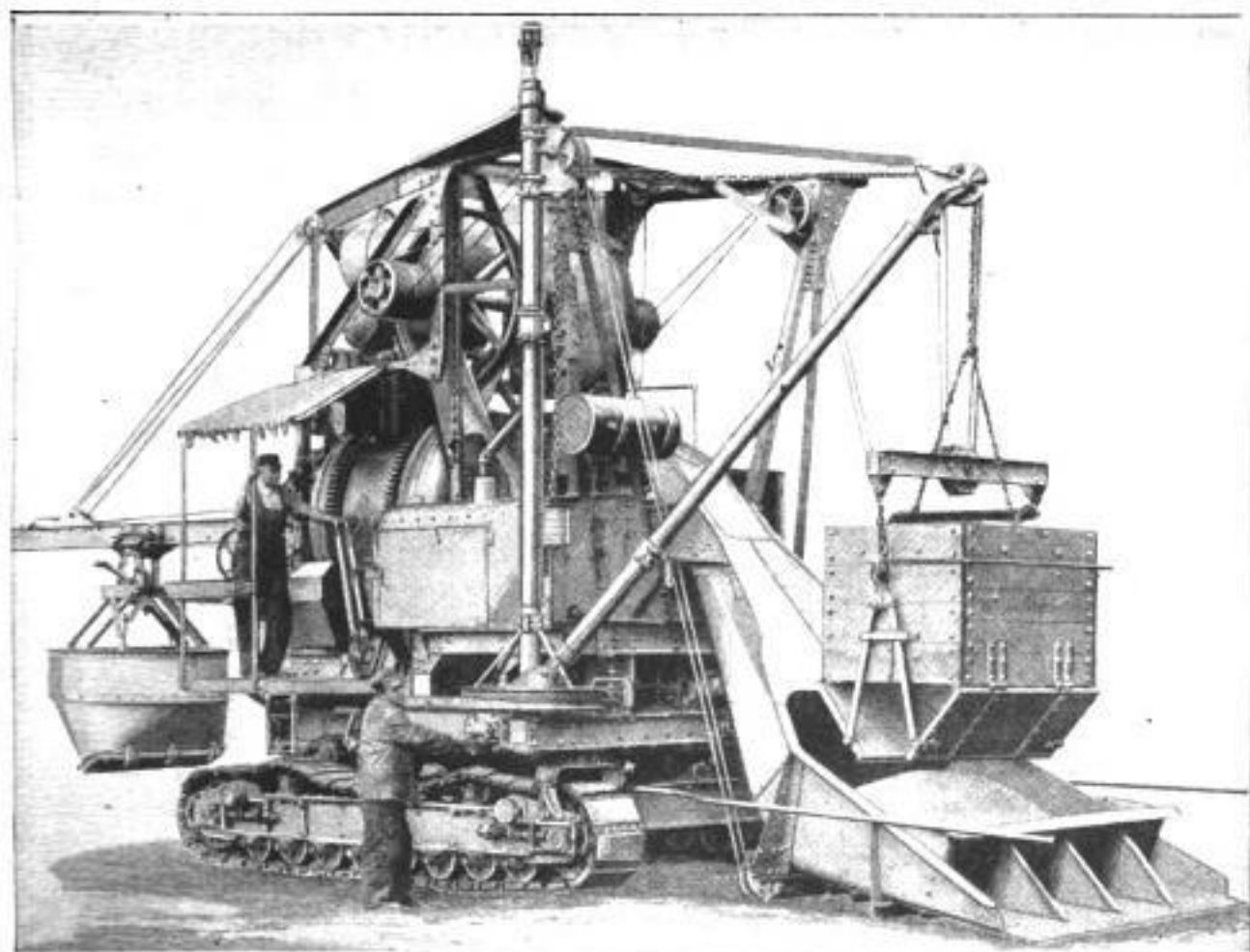


Bed for Invalids, Showing the Crank at the Foot, and the Mechanism That Elevates the Head



BASCULE BRIDGE OF SPANISH-MISSION DESIGN

OVER the Calcasieu River, in Louisiana, a bascule bridge has recently been completed that is designed to harmonize with the Spanish-mission style of architecture that is characteristic of old southern buildings. The bridge forms a link in the highway over the old Spanish trail through the state of Louisiana.



World's Largest Paver, or Mixer, Showing the Derrick Holding One of the Small Cars Which has Just Dumped Its Load into the Skip of the Machine: At the Rear of the Huge Machine can be Seen the Distributing Bucket Which Travels Out over the Steel Beam, Spreading the Concrete during Its Return

THE WORLD'S LARGEST PAVER

By E. H. LICHTENBERG

THE increasing construction of permanent highways has been paralleled by the designing and construction of automatic and highly efficient machines to build these roads.

The most necessary unit, and, one might say, the keystone of the highway-construction job, is the mixer. For this purpose a new type of mixer, called a paver, differing from the ordinary mixer used for building construction, has been developed. It is self-moving in both directions; flexible so that the unit may travel anywhere, and from one job to another; it charges the aggregate material into the mixing drum, and mixes and distributes the concrete onto the road with the least amount of manual labor.

The first machines were comparatively small, and mixed only about 10 cubic feet of sand and stone. As the highway-building program expanded, the size of the mixer unit increased until we have today the world's largest paver, weighing over 30 tons. It lays a mile of the ordinary concrete road in about four days; it mixes over 60 cubic feet of material

in a single batch, which makes 44 cubic feet, or about 3 tons, of concrete. This one batch covers about 4 lineal feet of an ordinary 18-foot road. It will be realized that a machine that lifts, mixes, and distributes such a heavy mass with such speed, must be heavily constructed and of large dimensions.

The operation proceeds as follows: A train of cars, each containing one single batch, pulls up alongside the paver. The derrick grapples the body of one car, and swings it over on the charging skip, where it automatically opens to drop its contents into the skip. The empty body is set back onto the train. The operator then throws the lever which raises the skip, thus discharging the aggregate into the mixing drum.

The skip is 12 feet wide and 20 feet long. When it reaches its charging position, it automatically throws on a brake so that it cannot drop. It also opens the valve which permits the right amount of water to enter the mixing drum, and starts a timing device that locks the discharge mechanism so that the material



Another View of the World's Largest Paving Machine, Showing the Skip Elevated and Depositing Its Contents into the Mixing Drum: The Derrick is Seen Putting the Empty Car Back on Its Truck, Which Forms Part of the Long String of Cars That Are Necessary for the Operation of the Equipment

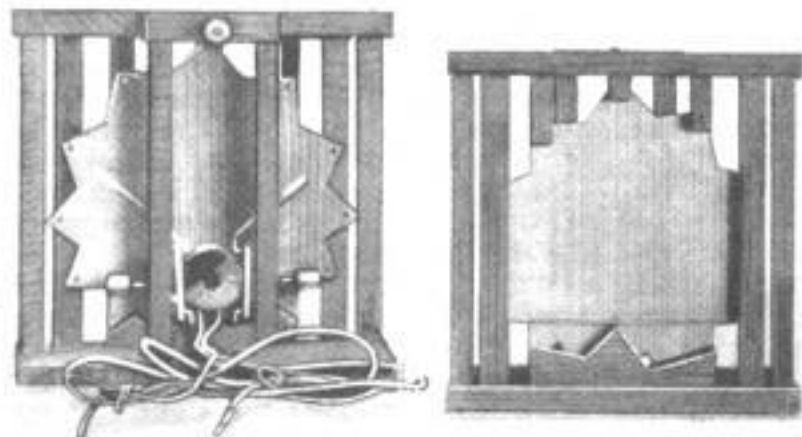
will be mixed for a full minute or more before the operator can discharge the mixed concrete. The same device also counts the batches. After the mixing time has elapsed, the concrete flows out of the drum into the distributing bucket, and the operator sends it to the point where he wishes to commence depositing the concrete. When this point is reached he reverses the bucket, and this action

automatically opens the bottom door, allowing the concrete to flow out as the bucket returns to the mixing drum. The speed of this return is so calculated that the correct amount of concrete flows out to make an ordinary 7 or 8-inch thickness of concrete road. As the grade is covered with concrete the machine advances, and 18 to 25 miles of road can be laid in one season.

WOODEN SOUNDING BOARD AS RADIO AMPLIFIER

A thin, leaf-shaped spruce panel, fastened by wooden pegs to a mahogany

frame, is the basis of a new radio amplifier, or loud speaker. The apparatus includes a small armature which is attached to the panel. In use, the ear cap and diaphragm of an ordinary radio-receiver phone are removed, the remainder of the phone being laid on the armature. The case of the phone is held by a clamp on the frame, and a thumbscrew arrangement is used to force the receiver magnets a slight distance away from the armature. Voice currents passing through the receivers, change the magnetic attraction between these and the armature, causing the spruce panel to vibrate and reproduce the tones in greater volume.



Left: Rear of Wooden Sounding Board Which has been Used as a Radio Amplifier, Showing a Telephone Receiver Clamped to the Spruce Panel. Right: Front of Wooden Sounding-Board Amplifier

WRECKING OF AIRPLANE INCREASES ITS VALUE

By JOHN EDWIN HOGG

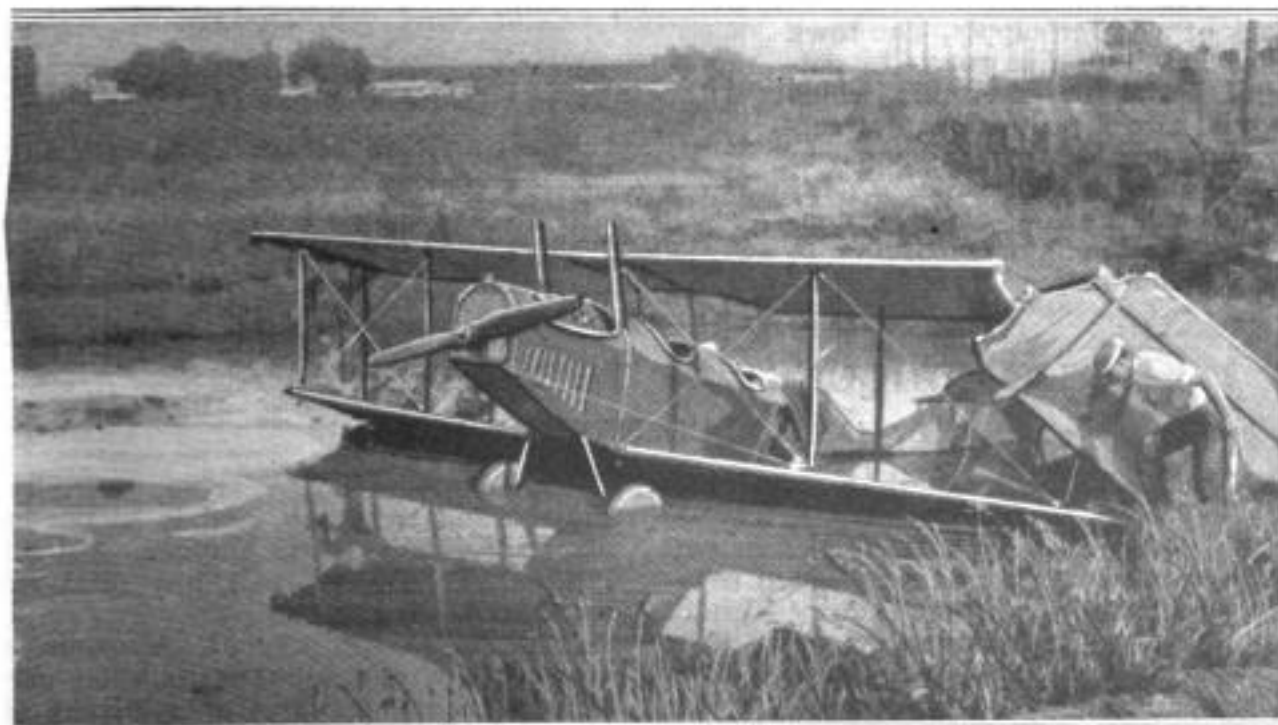
THAT an airplane which cost the government \$5,000 to build should be worth more after being smashed beyond repair, seems incredible. Yet, this was the experience of Clifton Moran, of Alhambra, Calif., a youth who saved up his hard-earned money to buy an airplane, to face bitter disappointment when the plane was wrecked two weeks after he took his first ride in it, and whose grief turned to joy when he made the discovery that the wrecked plane was worth more than he paid for it.

This is how it happened: For years Moran has been an aviation enthusiast. He saved his money, and purchased a training plane from the government for \$900. He bought the plane at Rockwell Field, on North Island, near San Diego, flew it home, and for two weeks had great sport. His ambition of years, however, was doomed to early grief, when, in taking off from the aviation field, the motor "went dead" just as he got about 100 feet in the air, and he was compelled to make a forced landing in an abandoned pit where a brick factory used to take out clay. The landing was a bad one, and the plane was wrecked beyond all hope of repair.

But his ill luck proved to be good fortune. As he climbed out of the pit from the scene of the wreck, an automobile drew up at the edge of the highway near

by. A man stepped out of the car, and approached the flier. "Is that your airplane?" he asked. "Yes," replied the pilot. "Very well then," said the motorist, extending his hand to the airman, "I am Mr. Soandso, property manager for the Blank-Blank Film Company. Our company is making a comedy film, and we need a wrecked airplane for the filming of part of it. When I saw you crash, I came over here to talk with you, thinking perhaps we might be able to use your wrecked ship for taking the scene." Additional conversation followed, during which Moran agreed to rent the wrecked plane to the film company, just as it stood, for the sum of \$1,000. A few days later, the film was made, and he received the film company's check for \$1,000—\$100 more than the airplane cost him. He immediately left for San Diego to buy another plane.

An interesting feature in the making of the film was that the scenario called for an airplane wrecked in a pond. The clay pit in which Moran's machine was wrecked was dry, but this little detail did not trouble the film company. It built an earth dam at one end of the pit, got a couple of old fire engines, and pumped water into the pit until the level was brought up to the desired point around the wrecked plane. Thus, it had the exact scene it wanted.

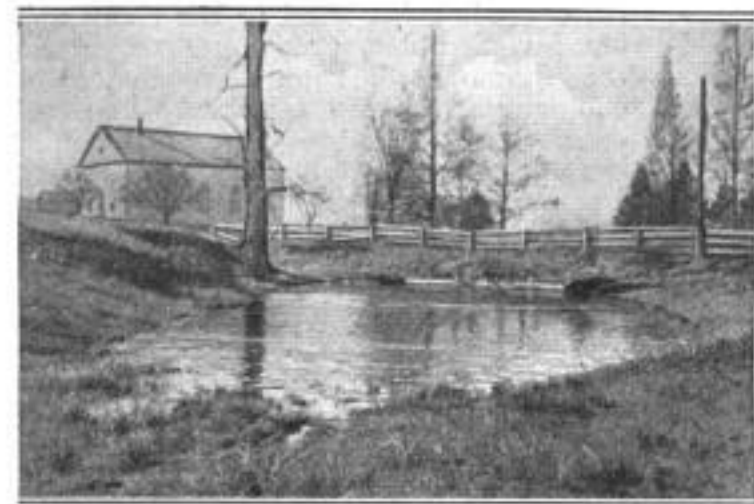


This Airplane was Valued at \$900 Before It was Wrecked, and, after the Crash, \$1,000 was Paid for It by a Movie-Production Company, Which Dammed Up the Pit and Filled It with Water to Gain the Desired Film Effect

DAMS GIVE FIRE PROTECTION TO FARMERS

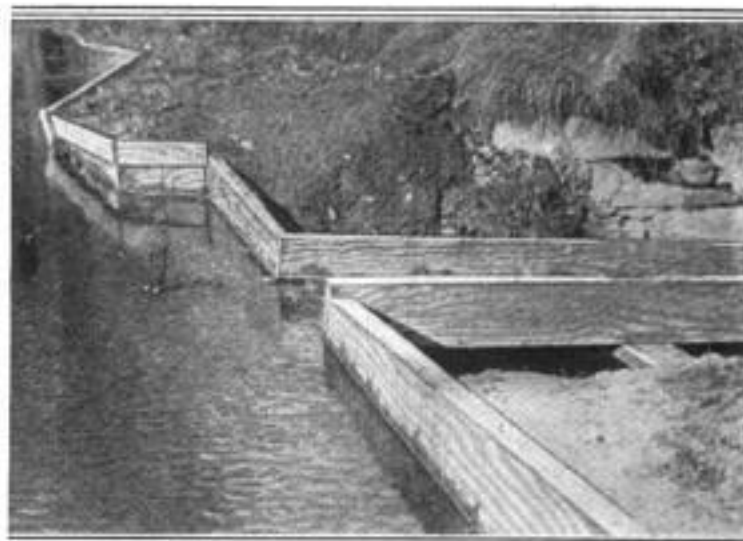
At the small cost of \$2,000, a Maine town has created a system of fire protection for its farming section which is be-

lieved to be the first of its kind ever put into operation. It consists of 11 dams constructed on small brooks, carefully selected with reference to their nearness to property. These dams have created small artificial ponds, which become reservoirs for the pumpers in time of fire, thereby overcoming the one great obstacle city fire departments have found in combating farm fires—lack of a water supply. The town also has built five roads to natural basins or reservoirs which would afford protection to a sufficient number of buildings to make them worth while.



One of the Small Artificially Created Ponds on a Little Brook near a Farmhouse: The Dam in This Case Is of Concrete

The dams are of wood or concrete construction, according to local conditions. Those of wood



Close-Up of One of the Wooden Dams Which were Constructed to Provide Small Reservoirs to be Used as a Source of Water Supply When Fire Endangered Farm Property in the Agricultural Section of a Maine Town

THE CONQUEST OF THE KHYBER PASS

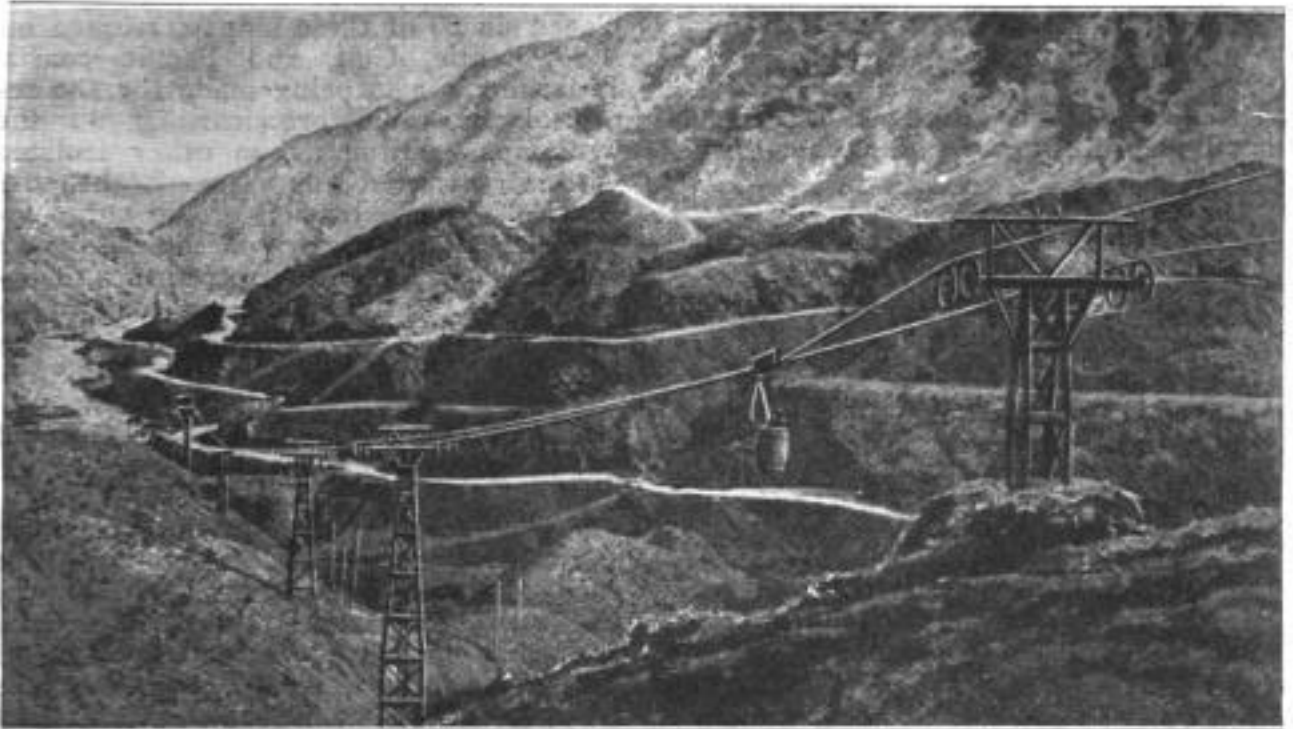
BY HAROLD J. SHEPSTONE, F. R. G. S.

ENGINEERS are now busy constructing a railroad through the Khyber Pass, the great highway that pierces two mighty ranges of mountains which separate Afghanistan from India. Strictly speaking, they are not carrying the rails through the whole of the pass, which is some 33 miles in length, but only as far as Lundi Kotal, where British influence ceases.

No highway the world over has been

the scene of such daring, chivalry, tragedy, and treachery, and is so important strategically as the Khyber. Yet for upward of 2,000 years it has remained unchanged.

Right up to the present, Afghanistan has been a closed country, its ruler permitting no ambassadors or ministers of other nations, or even missionaries, to reside in his kingdom. Occasionally he has permitted European engineers and



Historic Khyber Pass, at Ali Muijia, the Point Now Reached in Constructing a Railroad through the Pass: In the Foreground may be Seen the Monster Cableway Which has been Built to Assist in the Laying of the Track, While over the Different Elevations is Seen the Devious, Winding Roadway of the Former Route

doctors into Kabul when their services have been badly needed, but they have been subjected to a surveillance that has almost amounted to imprisonment. This is now to be changed, for the ameer has entered into a treaty whereby a British minister is to reside in Kabul, and foreigners are allowed to pass in and out of the capital. Furthermore, Afghanistan has joined the International Postal Union and apparently means to adopt more western ideas.

Although the country has been closed to the foreigner, caravans laden with all kinds of merchandise have and still are continually passing through the Khyber Pass. Those coming from India travel under a British guard as far as Lundi Kotal, where the caravan is taken over by an Afghan escort.

The railroad starts from Peshawar, a frontier town some $10\frac{1}{2}$ miles from the entrance to the pass. It has already reached Jamrad, the first stopping place within the pass. From this point an ingenious cableway has been built to assist in the laying out of the track. The track is a broad-gauge one and is being built by Afridi laborers. They are finding the work trying, as there is constant sniping by unfriendly tribesmen. The railroad follows the line of the cableway, but some eight to ten tunnels will be necessary, and these are now well in hand.

When the railroad is finished, merchandise will be carried right into the

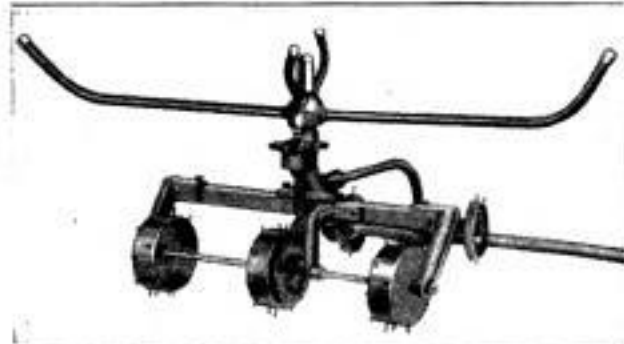
heart of the Khyber and dumped down on the very border line of Afghanistan. Many hope that the ameer will allow the engineers to continue and bring the railroad right through the pass to Kabul, which is about 200 miles from Peshawar. At present camel caravans take from 10 to 12 days to accomplish the journey, whereas by rail it could be accomplished in five or six hours.

Thus is the dreaded Khyber, the scene of many a conflict between the British and the warlike mountain tribes, being conquered. It was down through this pass that Nadir Shah, the Persian monarch, swooped upon India with his destroying legions in 1739. After sacking Delhi, he returned by way of the Khyber with a booty estimated at £32,000,000 and the great Koh-i-noor diamond. It was by way of the Khyber that Alexander the Great reached India. The pass varies in width from 450 feet to only 10 feet. The mountains on either side are in many places perpendicular walls of smooth rock, and can be climbed only in a few places. They vary in height from 1,400 to 3,370 feet.

☐ A typewriter company, which has been featuring an interchangeable type arrangement as one of the advantages of its machine, now has added to it a new improvement in a device that makes it possible to vary the spacing of letters or words on the same line.

TRAVELING LAWN SPRINKLER IS SELF-PROPELLED

Because he was tired of continually moving sprinklers over the greens of a



This Whirling Type of Sprinkler Propels Itself across the Lawn and Drags 100 Feet of 1-Inch Hose behind It

golf course, a Californian has worked out a whirling type of sprinkler that propels itself across the lawn and drags as much as 100 feet of 1-inch hose behind it. The sprinkler head, which is revolved by the water pressure, is geared down to drive the center one of three traction rollers. At the rear are two smaller spiked rollers that help to support the sprinkler and the hose.

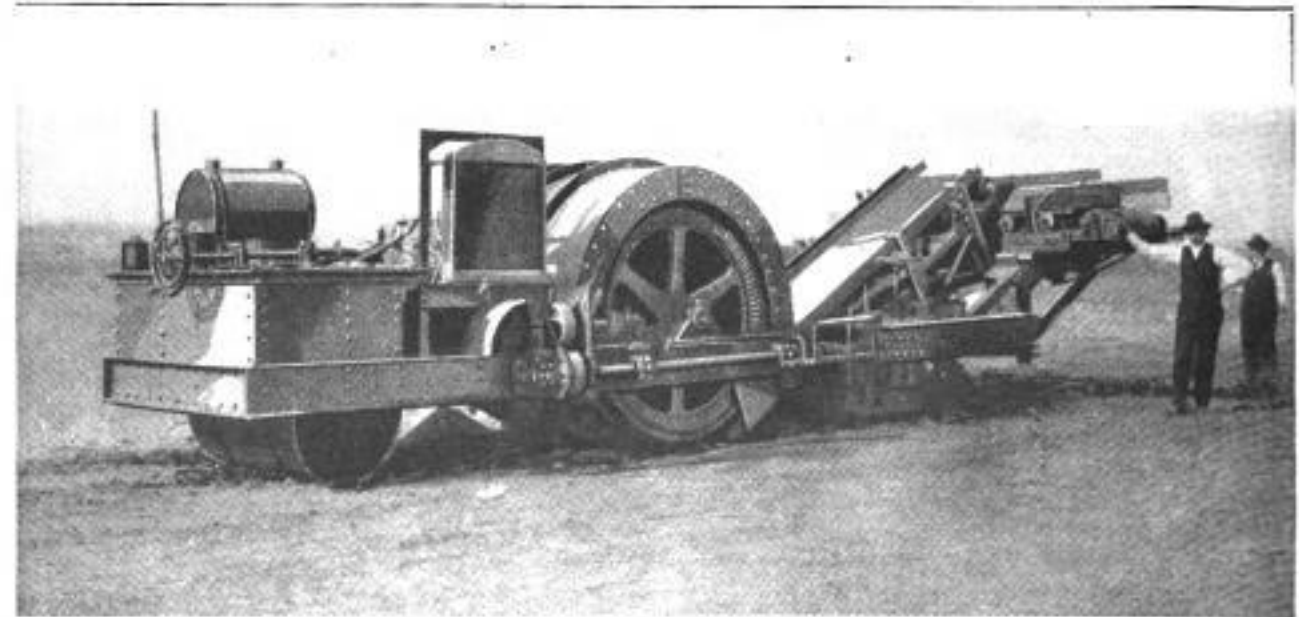
RADIO SHIPPING SAFEGUARDS HAVE BEEN EXTENDED

The radio fog signal and radio compass, when installed on lightships, have proved to be such a success in the safeguarding of shipping, that additional equipment of this character has been

placed on 20 of these ships stationed off the Atlantic, Gulf, and Pacific coasts. Provision is also being made for the reception of radio broadcasting on the lightships, as well as on other isolated vessels operated by the Lighthouse Service. This extension of the shipping-safeguard equipment will be of great value not only for the protection and operation of the lightships, but also in reporting the needs of other vessels in distress.

NEW ROAD-BUILDING MACHINE ROLLS AS IT GRADES

A new design of road-building machine, recently completed and tested, cuts the roadbed to the desired grade, delivers the excavated material to wagons or trucks, and rolls the surface as it proceeds, or can be used as a plain roller after the grading is finished. Two small rollers, equipped with an endless tread at one end and a larger roller at the other end, support a rectangular frame of channel iron upon which is mounted the excavating and loading mechanism, as well as the 65-horsepower gasoline engine. The excavating element consists of a drum 6 feet in diameter, which is located in the center of the frame and is provided with heavy 6-inch teeth that will cut to any depth from $\frac{1}{2}$ inch to $2\frac{1}{2}$ feet. It cuts a swath 6 feet 7 inches wide, making allowance for the crown of the road, and advances 6 to 10 feet a minute, depending upon the depth of cut and the nature of the roadbed.



Road-Building Machine, Operated by One Man, Which Cuts a Swath 6 Feet 7 Inches Wide, Digging Up the Roadbed from $\frac{1}{2}$ Inch to $2\frac{1}{2}$ Feet and Delivering the Excavated Material to Dump Wagons, as Well as Rolling the Surface as It Travels

BURN ONE-STORY BUILDING IN GOVERNMENT TEST

A one-story brick-and-concrete building fitted with discarded furniture was set on fire recently, for the purpose of a Bureau of Standards test of the fire-resistant properties of the walls and construction work. The flames swept through the building in 15 minutes, and temperatures taken at various intervals and in different parts of the structure ranged from 952° to 1,742° F. Practically everything of a combustible nature, including the contents of metal file cases, was destroyed. Papers in a specially insulated steel safe, however, were fully preserved.

BOBTAILED AIRPLANE HAS SPECIAL WING DESIGN

A novel biplane of French design is minus the conventional tail and uses ailerons on the lower wings, which not only give lateral stability when worked separately, but serve as an elevator when worked together. Sidewise motion is controlled by two rudders placed at the rear and at each side of the pilot's cockpit. Longitudinal stability is automatically obtained by the special shape of the wings, which are made with a front supporting surface having a positive angle of incidence, as in the normal plane, and with a rear extension that is arranged to have a negative angle of incidence. It is claimed the plane will not "spin" like the ordinary plane, and that it is unusually safe in flight. It is motored with a 9-cylinder rotary engine of 130 horsepower.



Tailless Airplane, in Which Longitudinal Stability is Automatically Obtained by Wings of Special Shape

AUTOMATIC STEERING GEAR USED ON U. S. SHIP

The first American passenger ship to be equipped with automatic steering gear, recently completed a successful return



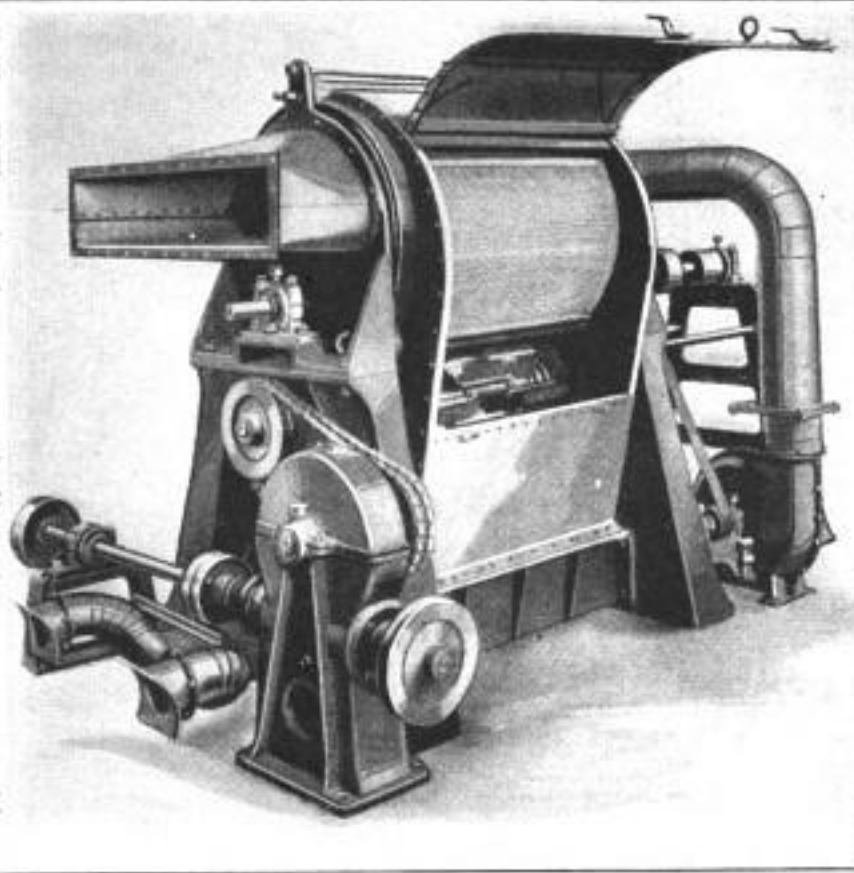
Gyroscope Compass, Which Automatically Makes Electrical Connections and Forms the Controlling Element of the Steering Gear for Ships

voyage to the West Indies, under the guidance of this apparatus, which does away with the necessity of a quartermaster continually at the steering wheel. The instrument consists of a gyroscope compass arranged to open and close an electric circuit controlling the stopping and starting of the rudder-operating mechanism. The instrument is capable of being set for response to different amounts of deviation from course, one case being noted where the departure from the true course was set as close as one-sixth of a degree. This ability to keep the ship so close to the central position with so few alterations of helm, contributes directly to the saving of fuel.

☐ The French government has given Canada 250 acres on Vimy Ridge, according to a report received by the chairman of the Canadian Battlefields Memorial Commission. The land will be used as a site for a memorial.

NOVEL METHOD OF OPENING AND CLEANING COTTON

A machine that embodies a novel process of opening and cleaning cotton by subjecting it to extremely rapid vibra-



Machine for Cleaning Cotton, Opened Up So as to Show the Perforated Drum and the Rotating Brush beneath It: To the Right Is the Blower Which Drives a Current of Air through the Drum

tion in a current of air, has been developed in England. The machine consists of a cast-iron base that supports a dust-proof sheet-metal casing with a semi-circular top, inside which a horizontal, perforated drum rests for its whole length upon a small rotating brush, which slowly revolves the drum, keeping its perforations clean. Inside and at the bottom of the drum there is a small and rapidly revolving rotor with a large number of right and left-hand spiraled blades, so that when the cotton fed into the machine falls on this rotor, it is kept in constant motion backward and forward and is thus thoroughly opened up, all dust adhering to it being removed. It then becomes so light that a current of air pumped through a pipe that penetrates one end of the drum blows the cotton through an outlet, at the other end, into a condenser to which the machine is coupled. The dust that is brushed off from the perforations of the drum is drawn from the casing by an exhaust fan.

BUFFALO HERDS IN CANADA MULTIPLY RAPIDLY

Twenty-five years ago the Canadian government purchased a small herd of buffalo and placed it in a national park at Banff. For several years the herd was regarded merely as an object of curiosity. Then a game preserve was decided upon, and the herd, together with other buffalo acquired from a United States rancher, was turned into the inclosure. The preserve is located at Wainwright, Alta., and extends over 162 square miles of sandy prairie which was considered unsuitable for agriculture. The buffalo, 709 in number, thrived from the start, and last spring the caretakers counted 6,146 of the animals. Although the 1922 "crop" cannot be counted until the bison are herded into their winter quarters, it is estimated that there will be an addition of at least 1,000 calves. Besides this herd at Wainwright, there are other buffalo in Canada in sufficient numbers to

bring the total up to approximately 9,000 head, and the government is preparing to kill about 1,000 of them every year to prevent the preserves from becoming overcrowded.

CONSERVATION OF RESOURCES TO BE TAUGHT IN SCHOOLS

The conservation of natural resources is soon to be taught in all the schools of Pennsylvania. The textbook for this course has been prepared by the Smithsonian Institution and covers conditions in that state only. It is to be used in connection with the work in the geography courses, and gives many concrete examples of waste. On the subject of coal, it states that, in 200 tests recently made, the average ash can was found to contain 50 per cent of coal. In an effective manner are also discussed water resources and flood prevention, and the conservation of oil, forests, iron, lime, glass, cement, stone, and clay.

IS RADIUM HEATING UP THE EARTH?

BY ROGERS D. RUSK

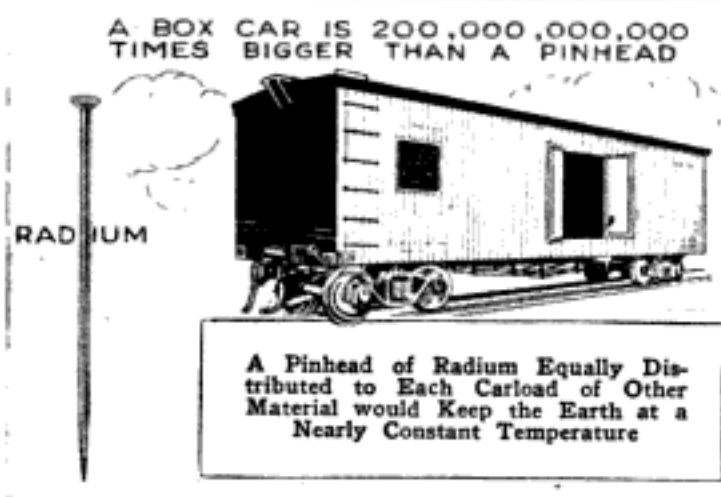
IS the earth growing hotter or colder? Old-timers often say we don't have the hard winters that we used to have. Scientists a few years ago believed the earth was a big heated sphere that is gradually cooling off, and that some time it would become too cold for man to inhabit. The discovery of the properties of radium throws new light on this question. Professor Joly, of the Dublin University, believes the earth may be actually growing warmer under the influence of radioactive forces. R. J. Strutt, F. R. S., of London, Eng., who is equally famous in his researches on radium, does not agree, but believes the amount of radium in the earth is insufficient to produce this effect. A middle view is that the heat produced by radium may balance the heat the earth loses, consequently keeping the temperature of the earth constant.

The span of life of an individual is, of course, insignificant in comparison with the age of the earth, and so judgments based on individual experience are worthless. Indeed, for as long a period of time as accurate observations of weather and climate have been made, there is no positive evidence of any change in the average temperature of the earth one way or another. Over long periods of time the averages are uniformly constant. Mild winters for the past two or three years have provoked some discussion of this point, which can only be settled by averages made over a longer period. Scientists have calculated that a regular and continuous decline of a single degree in the average temperature of the earth, no matter whether this decline took a century or a thousand years, would, in time, bring a return of the glacial period.

Radium will boil its own weight of water every hour. That is, an ounce of radium will raise the temperature of an ounce of water from the freezing point to the boiling point in an hour. It would raise the same amount of earth to five times the same temperature. Such a ra-

dium stove would last 2,000 years before losing half its energy, and if the supply of radium were replenished by the decomposition of uranium, the procedure would continue indefinitely. Professor Rutherford, the authority on radium, has calculated that if as much radium in proportion is distributed throughout the whole mass of the earth as exists near the surface of the earth, the heat generated would be many times more than the earth is losing, and hence would make the earth grow hotter. Professor Joly holds that radium exists throughout the whole earth, but Professor Strutt believes that it is present only in the surface layer, and that it cannot possibly exist in the intense heat of the earth's interior.

Very little is actually known of the interior of the earth. Man has pretty well explored the earth's surface, but he has penetrated little over a mile into the earth's interior. The deepest shaft in the world, at Morro Velho, Brazil, is about 6,400 feet deep.



It has been suggested many times that a shaft 5 miles, or even 10 or 12 miles, in depth, might be sunk in the interests of science. But with the most improved machinery it would take 25 years to sink a shaft 10 miles deep. Such a shaft, moreover, would only give information concerning the percentage of radium at that particular point. It would give interesting data concerning the earth's structure and internal temperature, but many difficulties would have to be overcome. Ventilation would be difficult; and the temperature of the air at the bottom of the shaft due to compression alone would be raised higher than that of boiling water.

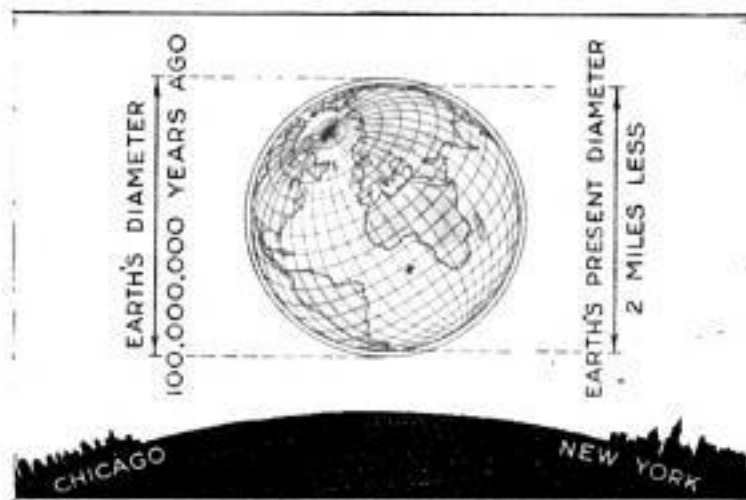
The earth is a poor conductor of heat and hence loses heat very slowly. Tait, the eminent Scottish physicist, who died in 1901, calculated years ago that the loss of heat might reduce the earth's temperature by only 10° C. (18° F.) in a hundred million years. This loss could be balanced by the effect of radium, or it could be balanced by the heat gained by

contraction, if the earth's surface is contracting. The seemingly constant temperature of the sun may also be explained in a similar manner.

For ages, men had believed that the sun is a flaming ball that is gradually cooling. Then

the great Helmholtz calculated that the shrinkage of the sun's surface would liberate enough energy to keep the temperature constant if the total shrinkage were only 300 feet in diameter per year. At that rate it would take 8,000 years before the decrease in size

of the sun could be detected by the most powerful instruments. As the earth radiates far less heat than the sun, it would have to shrink a comparatively smaller amount, which during a hundred million years might, by estimates, have been as little as two miles in diameter altogether.



A Shrinkage of Two Miles in Its Diameter in 100,000,000 Years will Keep the Earth's Temperature Constant, and would Shorten the Distance between New York and Chicago 1,000 Feet

Indeed, both radioactivity and contraction may be agencies in preserving the temperature of the sun and earth.

Recent theories indicate that the earth may not have been a hot molten mass at its birth, as the older nebular hypothesis

assumed, but that its temperature may have been little different from what it is now (planetesimal hypothesis). The three chief means by which it may have acquired heat are: (1) by contraction, (2) by collision and accretion of other bodies, and (3) by some molecular action such as

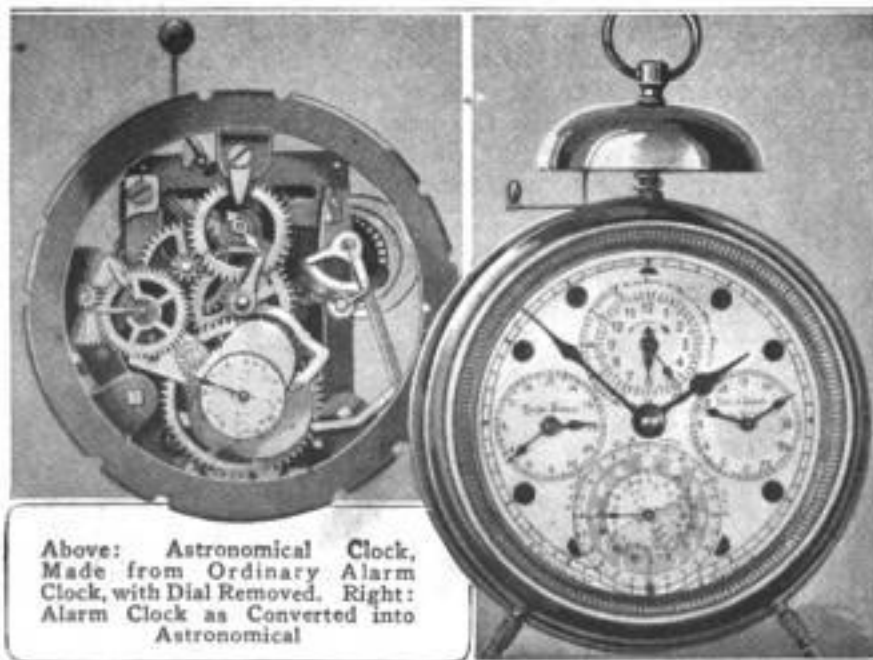
radioactivity. Rutherford calculates that the heat loss of the earth would be fully balanced by the heat gain resulting from the disintegration of radium if there is as little as one ton of radium for every 20,000,000,000,000 (twenty million millions) tons of earth.

ASTRONOMICAL CLOCK MADE FROM ALARM CLOCK

An ingenious clockmaker of Marseilles, France, has converted an ordinary alarm

clock into a very complete astronomical clock. Without altering the main functions and with slight additions, except for a new face, the clock has been made to indicate, on a small dial at the bottom,

the phases and age of the moon; the hours of its passage of the meridian; its position in the zodiac; the position of the sun in the heavens; its ascension and declination; the equinoxes, solstices, and seasons; and on the dial at top—ordinarily used for setting the alarm—he has added an arc upon which a special hand denotes the hour at which the sun passes the meridian; the hours of sunrise and sunset for all the days of the year, and the length of the days and nights, are given at the right, and sidereal time at the left.



Above: Astronomical Clock, Made from Ordinary Alarm Clock, with Dial Removed. Right: Alarm Clock as Converted into Astronomical



PHOTOS COPYRIGHT, HARRIS & EWING

House with 10 Rooms and Two Baths, Built in 17 Years, during His Leisure Hours, by the 70-Year-Old Carriage Builder, Samuel Siggins, Whose Portrait Is in the Inset: The Walls of the House Are of Stone, Quarried by Himself, and the Large High-Pitched Roof Is of Tile

HOUSE BUILT BY ONE MAN IN HIS LEISURE HOURS

As a result of 17 years of unremitting patience and perseverance, an attractive 10-room dwelling house, with stone walls, tile roof, porches, and veranda, has been built, during his leisure hours, by Samuel Siggins, of Fort Myer Heights, Va. Siggins, a 70-year-old carriage builder by trade, is an exceptionally clever craftsman, and every item of the work, from the quarrying of the stone to the last finishing touches inside and out, was performed by him single-handed. On the basis of his rate of pay as a carriage builder, which is 75 cents an hour, and assuming 20 leisure hours a week that he probably worked, his labor alone represents an investment of \$13,260, but to him it has been entirely a labor of love.

ALUMINUM LEVEL REDUCES SAG IN LINE

A new line level, made from $\frac{3}{8}$ -inch aluminum tubing, and hexagonal in shape

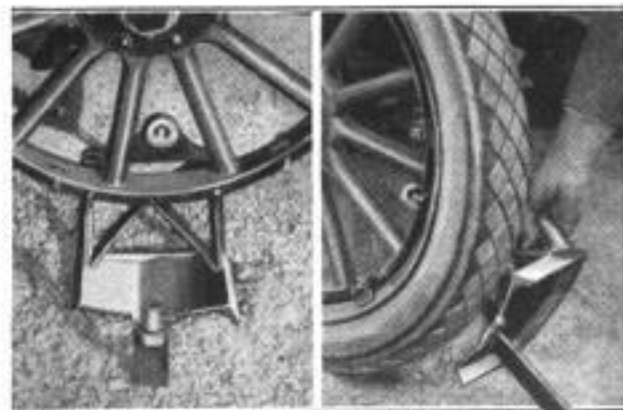


so that it can also be used as a surface level, weighs only $\frac{1}{2}$ ounce, so that it practically eliminates the sag in the masons' line to which it may be attached.

Specially formed slots prevent the level from dropping off the line, and it is furnished with a luminous bubble tube filled with a yellowish liquid.

COMBINATION JACK AND LOCK FOR AUTO WHEELS

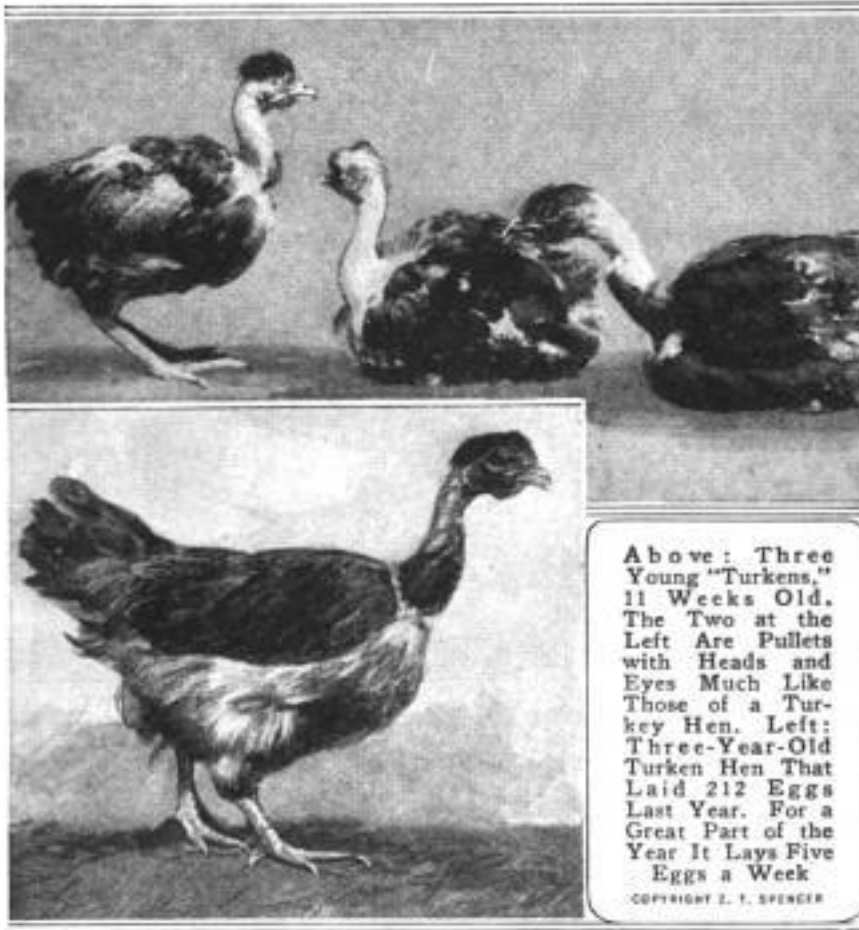
A new and simple device serves the dual purpose of a jack and wheel lock



Left: Combination Device Shown in Use as Jack under Auto Wheel. Right: Being Applied as Wheel Lock

for automobiles. It carries two pins that are inserted in holes in the rim and, by moving the car forward or back a few inches, the wheel is raised off the ground and supported by the jack. By means of a separate lever which has a key lock, it is quickly converted into a wheel lock that clamps around the rim and tire.

NEW FOWL CROSS BETWEEN TURKEY AND CHICKEN



Above: Three Young "Turkens," 11 Weeks Old. The Two at the Left Are Pullets with Heads and Eyes Much Like Those of a Turkey Hen. Left: Three-Year-Old Turken Hen That Laid 212 Eggs Last Year. For a Great Part of the Year It Lays Five Eggs a Week

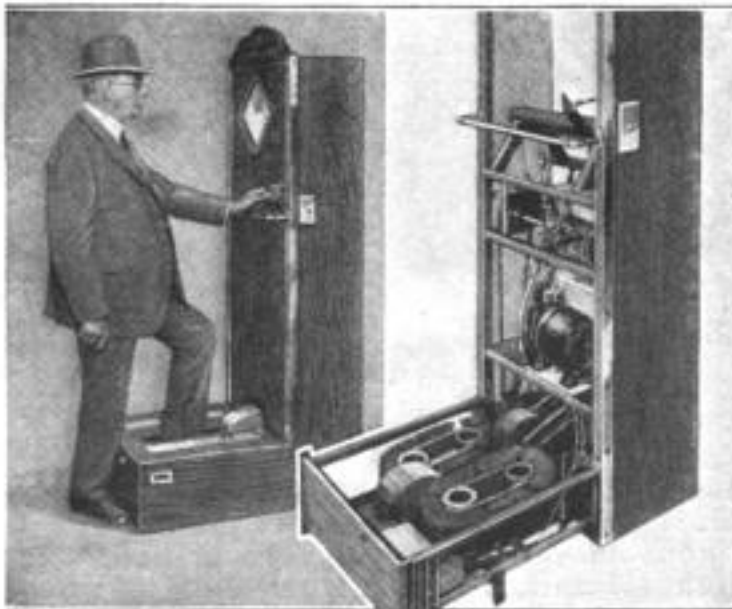
COPYRIGHT L. T. SPENCER

A new development in the poultry industry is the production of a fowl that is a cross between a turkey and a chicken. This hybrid has been propagated for four years by a California breeder. He has called the fowls "turkens," and has now quite a large flock of them. The male bird has a gobbler neck and other resemblances to a turkey. The female has a turkey head, but otherwise looks like a chicken. In color they are generally red, and when full grown, weigh from 9 to 14 pounds. Their eggs have the appearance and taste of those of Rhode Island Reds, and weigh 26 ounces to the dozen. Turkens, it is claimed, will lay 200 eggs each, per year, in flocks of any size. The eggs hatch in 21 days.

SHOE-POLISHING MACHINE WORKS AUTOMATICALLY

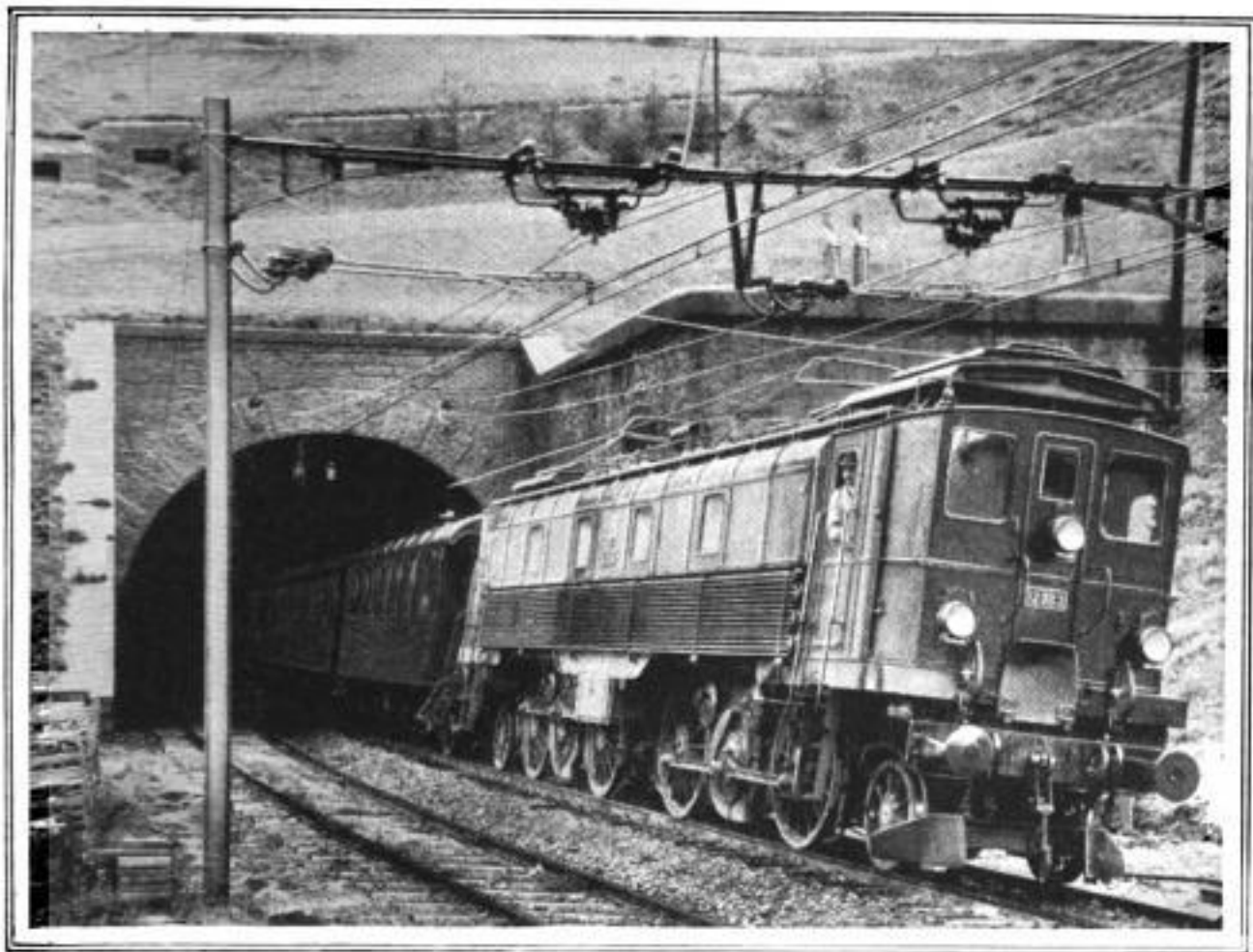
An electric shoe-polishing machine that shines both shoes automatically and in

only three minutes, has recently been developed. The appliance resembles the



Left: Automatic Shoe-Polishing Machine, Showing Customer with Foot in Position, Placing a Nickel in the Slot for a Shine. Right: Interior of Machine, Showing the Four Brushes and the Operating Mechanism

commonly seen slot machines for weighing, except that in place of the usual scale platform, there is a footrest. To operate the outfit, the prospective customer places his foot on the rest, drops a nickel in the slot, and then pulls down a small lever that switches on a $\frac{1}{4}$ -horsepower motor inside. This motor drives four brushes which first thoroughly clean the shoe and then, after polish has been automatically sprayed on the brushes, shines it efficiently. The brushes revolve for a minute and a half, after which the customer "changes feet" and pulls down the lever for a second time to have the other shoe polished. By thus providing an inexpensive shine and accomplishing the work in such a short time, the machine should be popular.



Electric Train Emerging from the Tunnel at Airolo, on the St. Gothard Railway in Switzerland: The Locomotive Weighs 108 Tons, and Is Capable of Hauling a Train 425 Tons in Weight

ALPINE RAILWAY ELECTRIFICATION

Elimination of Steam and Smoke Adds Greatly to the Charm of Alpine Scenery and to Comfort in the Long Railway Tunnels

BY HENRY S. WHITE

AT length the electrification of the St. Gothard Railway that crosses the Swiss Alps, and is one of the great arteries of European traffic, has been completed after about nine years of constant effort greatly impeded by the dearth of essential supplies resulting from Switzerland's complete isolation during the great war.

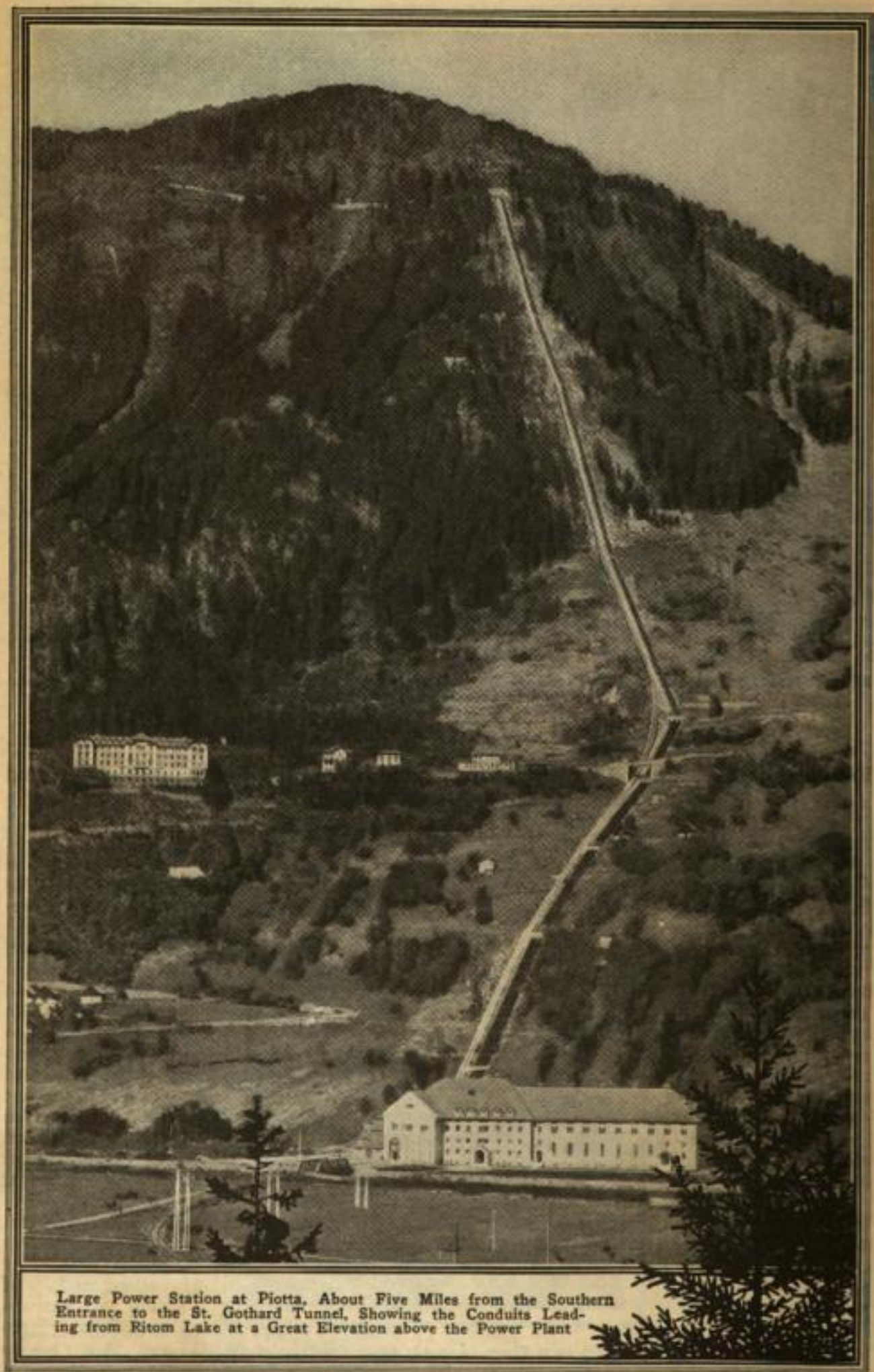
The result is a triumph of engineering skill, and stands as a monument to the determination of the Swiss to be ever in the van of progress. The undertaking in-

volved virtually a reconstruction of the whole railway line, for bridges had to be

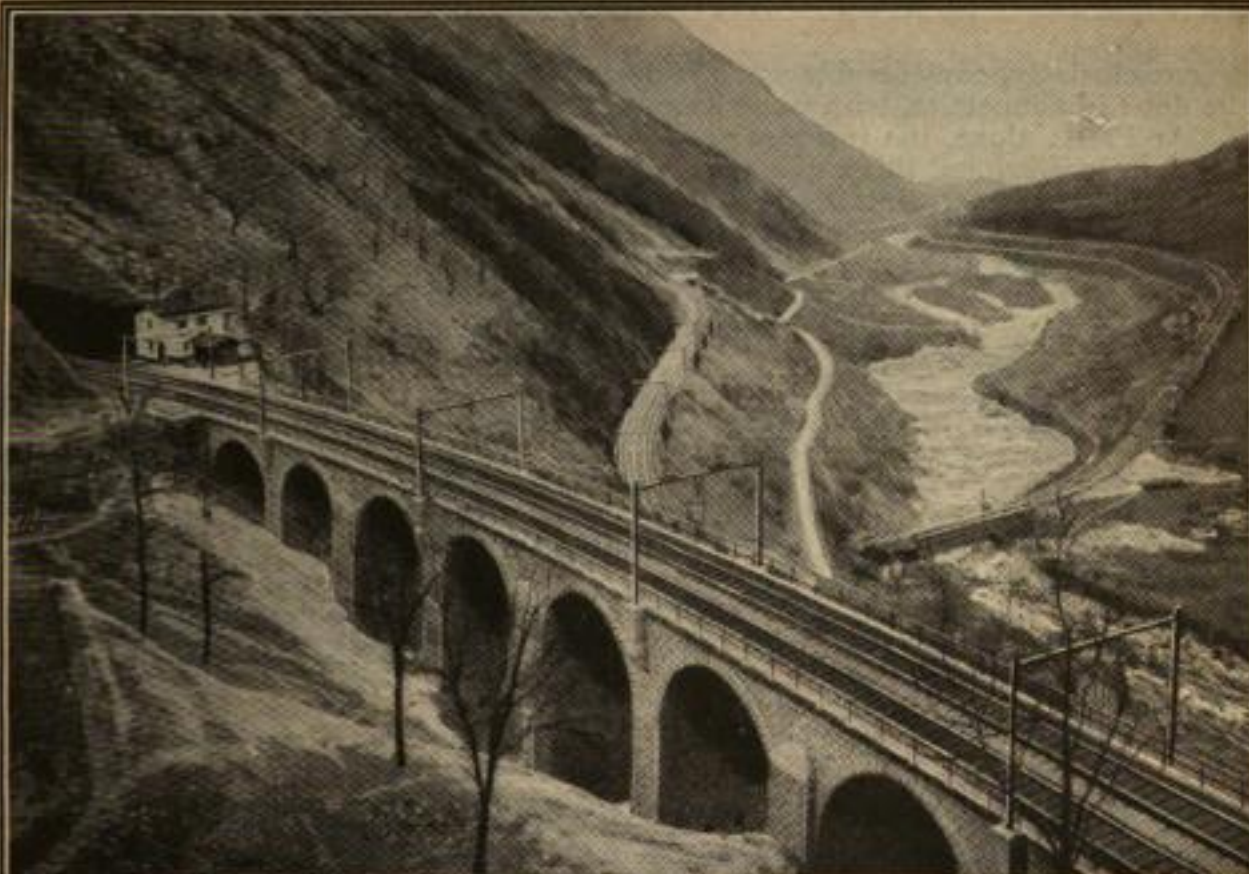
strengthened or rebuilt, telegraph and telephone lines had to be relaid, and repairing sheds and depots had to be extended. Two large power stations had to be built and equipped, one at Amsteg near the northern entrance to the tunnel, and the other at Piotta, about five miles beyond the southern entrance, with five substations for transformation of current at various points along the line. As these utilize hydraulic



Conduits from Ritom Lake, the Huge Reservoir of the St. Gothard Railway, to the Power Station at Piotta, Where There Are Turbines of 48,000 Horsepower



Large Power Station at Piotta, About Five Miles from the Southern Entrance to the St. Gothard Tunnel, Showing the Conduits Leading from Ritom Lake at a Great Elevation above the Power Plant



The New Stone Viaduct on the St. Gothard Railway near Giornico, in the Italian Alps: This Is a View of a Very Interesting and Mountainous Part of the Railway, Showing along Both Banks of the River How the Railway Has to Spiral along the Valley and through Tunnels in the Mountains



An Even More Rugged Section of the Railway in the Val Tremola, of the Swiss Alps, Where It Descends More than 3,000 Feet from the Southern Entrance of the St. Gothard Tunnel to Airolo, Requiring No Less than 40 Curves: The View Shows the Supporting Walls of Two of Them

power exclusively, considerable work had to be done in connection with water storage. At Piotta alone, the turbines are of 48,000 horsepower, and this capacity is to be increased by 50 per cent.

Electric passenger locomotives are in use, each weighing 108 tons, and capable of hauling trains 425 tons in weight. Freight locomotives, each weighing 128

tons, can haul loads of 860 tons. All the usual advantages of electrification have resulted from this enterprise, in particular the elimination of smoke and foul air in the tunnels. The whole St. Gothard route, besides being the most picturesque, with its ever-changing scenery, is now also, in every sense of the word, the most enjoyable in all Switzerland.

AUTOMATIC CAR-SIDE WASHER FOR TRAINS IN MOTION

Specially adapted for washing railway cars while they are in motion, a machine is constructed with a long vertical rotating brush, and on each side of it radially swinging squeegees, all arranged so that they move automatically out of the way of protruding parts on the car sides. One of these washers stands on each side of

discharged into the brush, followed by jets of fresh water. This is then wiped off by the squeegee that is on the side of the brush in the direction toward which the train is moving.

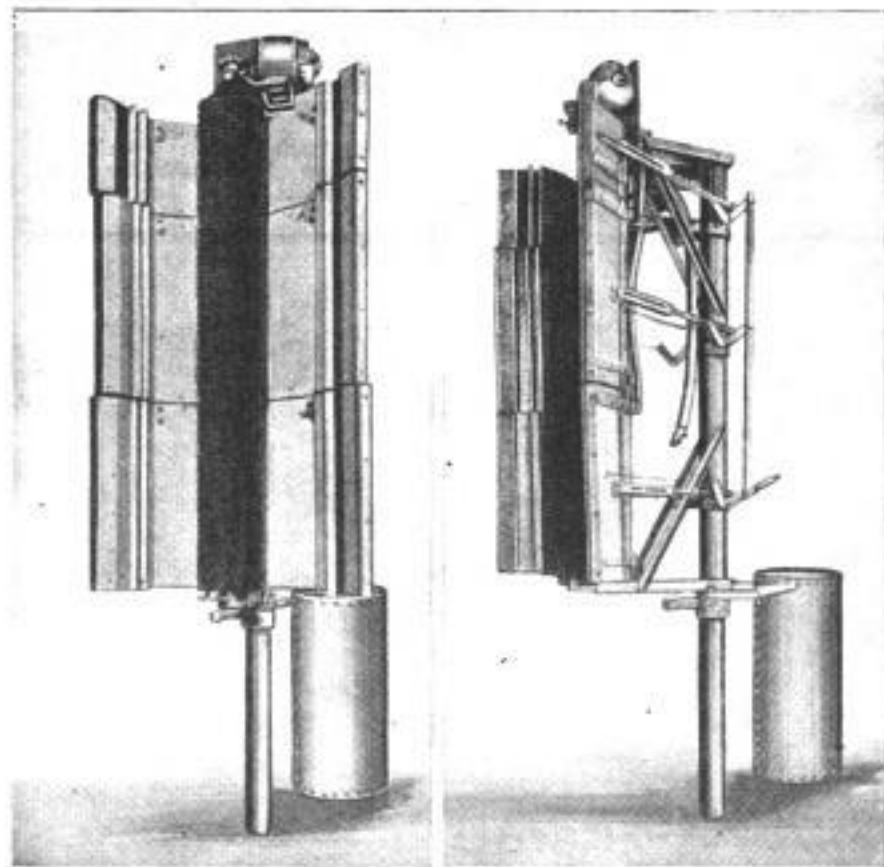
NEW INSTRUMENTS SIMPLIFY DEFENSE GUNNERY

Two new instruments, expected to mark a new era in coast-defense gun-

nery, have been constructed and will soon be installed to direct the fire of the big guns at the defenses of the Panama Canal. They are called the target computer and the battery computer, and are directed by two high-powered telescopes located at fixed observation stations, which in turn may receive airplane observations in case the distant enemy is hidden from land view by smoke screens or other causes. The observations are transmitted electrically to the instruments, which make all the computations involved in taking into account the distance, speed, and direction of travel of the target, as well as the direction and velocity of the wind, and the characteristics of the shell and powder; and the range is determined with much greater speed

and accuracy than has heretofore been possible.

☞ Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.



Left: Front View of Car-Side Washer, Showing Its Long Vertical Brush That is Rotated by the Motor Above. Right: Side View, Showing the Mechanism for Operating the Squeegees by Means of a Small Hand Lever

the railway track, and when the train approaches, the operator, by depressing a lever handle, opens out the squeegees, and as the forward end of the first coach reaches the washer, by releasing the handle, the brush and squeegees immediately come into contact with the car side and windows. The brush is rotated by an electric motor, and a cleansing fluid is



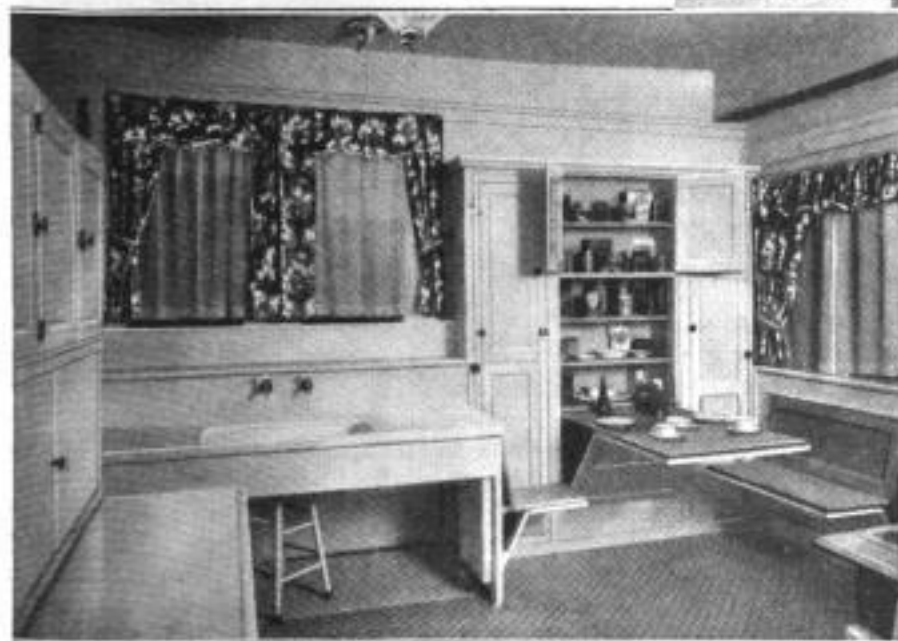
Left: Century-Old Windmill Which has been Remodeled into a Comfortable Three-Story Home, Showing How the Dormer-Type Windows have been Cut into the Structure. Above: Interior of Windmill, Showing the Dining Room

OLD WINDMILL IS REMODELED INTO THREE-STORY HOME

A century-old windmill, of the kind commonly seen in European countries, having four large sweeps or sails and an outside covering of shingles, has been remodeled into a three-story home at Lonsstrup, Jutland, in Denmark. After the huge grinding stones and shafts were removed from the interior, the three floors were divided into comfortable rooms having dormer-type windows. Nine persons are accommodated in the rebuilt structure, from which a beautiful view is to be seen, owing to the custom of erecting these mills on the highest hills to be found in that flat country.

BREAKFAST SET DISAPPEARS WHEN NOT IN USE

A breakfast set which may be folded completely out of sight when not in use, is a great space-saving outfit for the small kitchens invariably found in modern apartments. The set consists of a



Lower Left: Kitchen with Disappearing Breakfast Set Opened Up in Readiness for Serving the Morning Meal. Upper Right: Corner of Kitchen, Showing How Set may be Folded Entirely Out of the Way

table, and a single and a double seat. The single seat folds into a special compartment on the sink, and the double seat folds into the wall, while the table opens from a kitchen cabinet, which also contains lockers for an ironing board and a broom.

LANDSCAPE ARTIST'S HOUSE PARTLY SURROUNDS TREE

Seeking novelty and a picturesque effect, a landscape artist of Los Angeles,



The Base of This Tree Shows inside the House on the Lower Floor, While Some of Its Upper Branches are Partly Inclosed by the Wall at the Second Floor. Note, Too, the Winding Stairway

Calif., has built himself a rustic home with a large tree for a wall ornament. The building partly surrounds the tree or its branches in several places, both on the lower and upper floors, while outside a little stairway winds about it from a window near the ground to a door opening on the floor above. The house is of frame construction.

SIMPLE COMPUTING DEVICE FITS THE VEST POCKET

Disklike, and small enough to fit the vest pocket, a miniature adding machine,



when used in connection with a certain calculating system, will, it is claimed, do a large variety of mathematical problems very rapidly. The machine will add numbers, or subtract

any group of numbers from any other group without adding either group. In combination with the system it will also divide, and do many kinds of commercial calculations rapidly.

SING SING PRISONERS STUDY UNIVERSITY SUBJECTS

Thirty-one convicts in Sing Sing prison, many of them serving long terms, recently

completed a year's work in the extension course of Columbia University, and New York prison authorities seem to feel that the experiment has been a success. The Welfare League Association of New York City, which paid the tuition fees for the men, has, therefore, announced its intention of again granting scholarships. Meanwhile Cornell University is preparing to lend a hand, and educators throughout the country are becoming interested. The prisoners studied in their cells during off periods.

French, German, history, literature, philosophy, photoplay writing, navigation, foreign exchange, and scientific farming were among the subjects selected.

INSTRUMENT FOR MEASURING THE POWER OF LENSES

An instrument, by the use of which the effective power of lenses may be ascer-

tained, has been designed so that, although it will give accurate results, it is comparatively low-priced. The mechanism consists of an upright bracketed support carrying at one end a sliding tele-



scopic lens system and a seat for the lens to be examined. Projecting from the other end of the bracket is a triangular bar marked with a dioptric scale, upon which is mounted a sliding carrier, fitted with an illuminated target and a rotating axis dial. The target is mounted inside a rotating dial, which is graduated so that the axis of the lens being examined may be easily read.



This Magazine for High Explosives, Designed to Offer as Little Resistance as Possible in Case of Accidental Explosion of Its Contents, Allows the Explosive Action to be Dissipated into the Air, Thereby Minimizing the Danger to Adjacent Property

NEW TYPE OF POWDER HOUSE TO VANISH IF EXPLODED

There has recently been built for a mining company, at Eureka, Utah, a powder house of peculiar design. It is but natural to expect that a structure of this kind may be shattered by an explosion. To guard against great damage being done to adjacent buildings, the storehouse has been so designed that it will practically disintegrate in case of an explosion. It was built with a cross section in the form of a special curve that permits the use of the least possible reinforcing. If it should blow up, this concrete is supposed to scatter into pieces not larger than one-quarter of an inch. In mixing the concrete, one part of cement was used to six parts of sand.

LINE AND STRAIN INSULATOR IS ALSO CAR-STOP SIGN

A line and strain insulator, used to guy trolley wires, has been designed so that it may also be

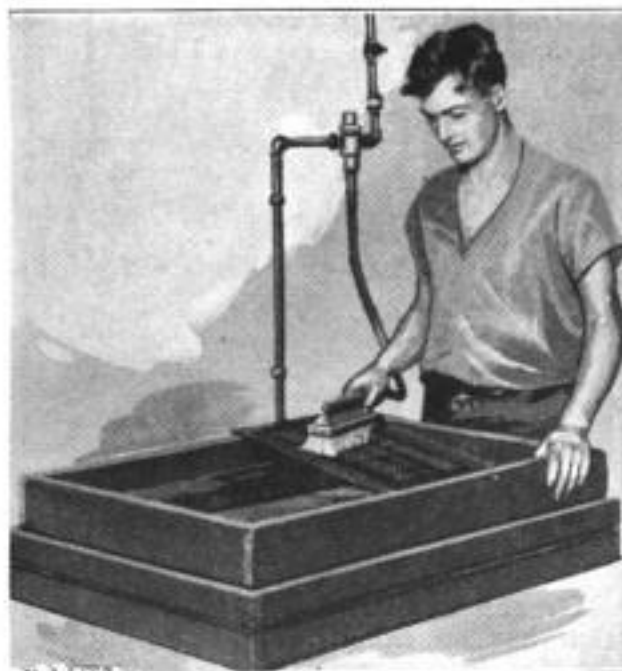


black lettering upon a highly glazed white surface to which soot or dust does not readily adhere.

utilized as a car-stop sign. The insulator is made of similar material to that found in high-voltage insulators, and has

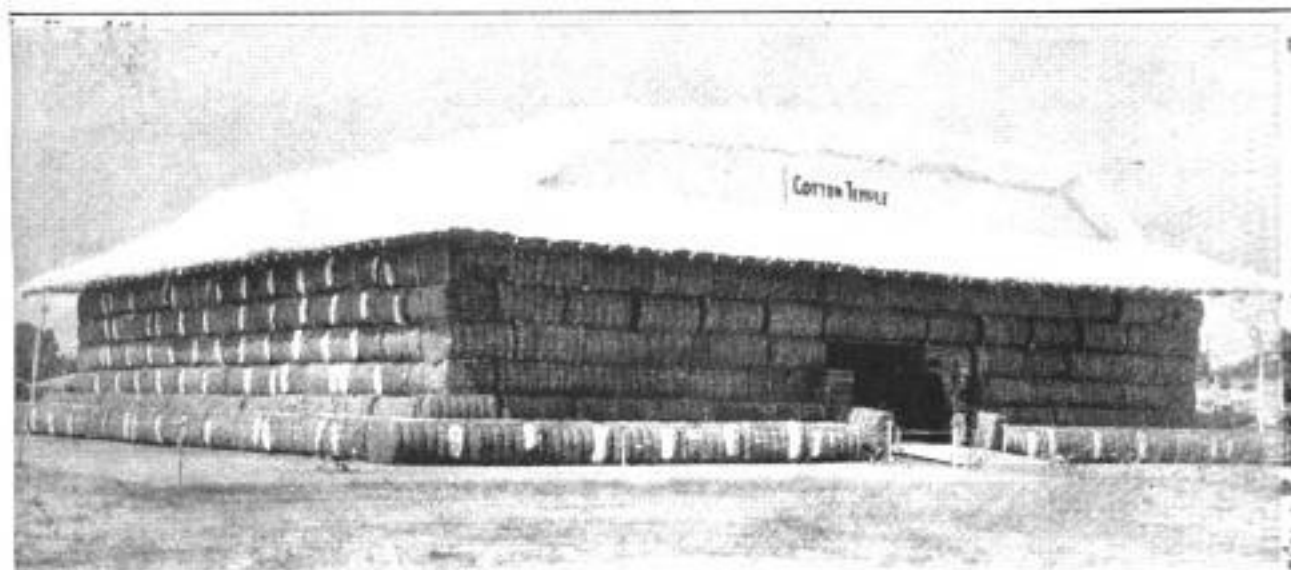
ELECTROTYPE-CASE POLISHER HAS SUCTION ATTACHMENT

A recently invented electrotype-case polisher provides the brush with a num-



A Suction Attachment on This Electrotype-Case Polisher Removes the Excess Polishing Material, Preventing Dust Nuisance and Waste

ber of suction inlets, among the bristles, that unite at the back of the brush and connect to a pipe leading to a filter bag, in which the excess polishing powder is collected. This suction arrangement, which is controlled by a suitable valve, removes the dust nuisance quite prevalent in electroplate foundries, and prevents the waste of polishing material.



"COTTON TEMPLE," SPEEDILY BUILT, IS FEATURE OF FAIR

A LARGE structure, built entirely of cotton, and called the "Cotton Temple," was an attractive feature of the Tri-State Fair held at Memphis, Tenn., recently. In constructing the temple, 510 bales of uniform size were used. The bales were made, hauled six miles, and the temple erected, all in a few days.

MODEL TOWN IN NEW LOGGING CENTER IN OREGON



Camp Number 1, Three Miles beyond Grande Ronde: This View Shows the Nature of the Country in Which Lumber Operations are being Conducted

Oregon has a brand-new town that has an excellent chance to develop into a model city. It is located in the heart of a great timber country that can supply enough logs to keep the sawmills running steadily for over 50 years. A few months ago the only buildings at this spot were a blacksmith shop and a general store. Near by were a few scattered farmhouses occupied by Indians, for this new town has sprung up on the fringe of the old Grande Ronde Indian reservation.

The town planners have laid out good wide streets and sidewalks, and have aimed to give the place many features of individuality. The hotel is commodious and is modern in every way. A model school has been erected, large enough to accommodate the rapidly growing population. From Willamina, the terminus of a Southern Pacific branch, a standard-gauge railway has been built to Grande Ronde, a distance of 9 miles, and then extended another 9 miles, deep into the standing timber. Much substantial trestlework was needed in the construction of this line.



Part of the Town of Grande Ronde in the New Lumber District in Oregon: The Large Building in the Center Is the Hotel. The View was Taken from the Railway Water-Tank Tower

PRIVATE RADIO LABORATORY BENEFITS PUBLIC

BY F. N. HOLLINGSWORTH

THE radio-broadcasting station at Round Hills, Col. Edward Green's country estate in South Dartmouth, Mass., has a tower equipped with several large loud-speaking horns for sending out music to the surrounding country. This tower, which looks like an old-fashioned New England lighthouse, has a gallery around the top, and on it, at equal intervals, are placed the large wooden horns, which are connected up with the studio near by, whence is sent the concerts. These horns can send speech and music a distance of $4\frac{1}{2}$ miles to all four points of the compass, and this is done every day during the experiments that are conducted by Colonel Green's engineering staff at the various stations. The sound is heard frequently far out on Buzzards Bay by yachting or fishing parties, with clearness and good modulation.

Colonel Green is spending considerable sums in experiments and development of the radiophone. Besides other apparatus, he is testing 18 different types of loop aerials. He does this, not for profit, but out of devotion for the science of wireless. He is now building a new 500-watt broadcasting station which will be in operation by next June, at 400 meters, and is already operating two such stations, one of 50 and the other of 100-watt power, besides which there are nine transmitting stations.

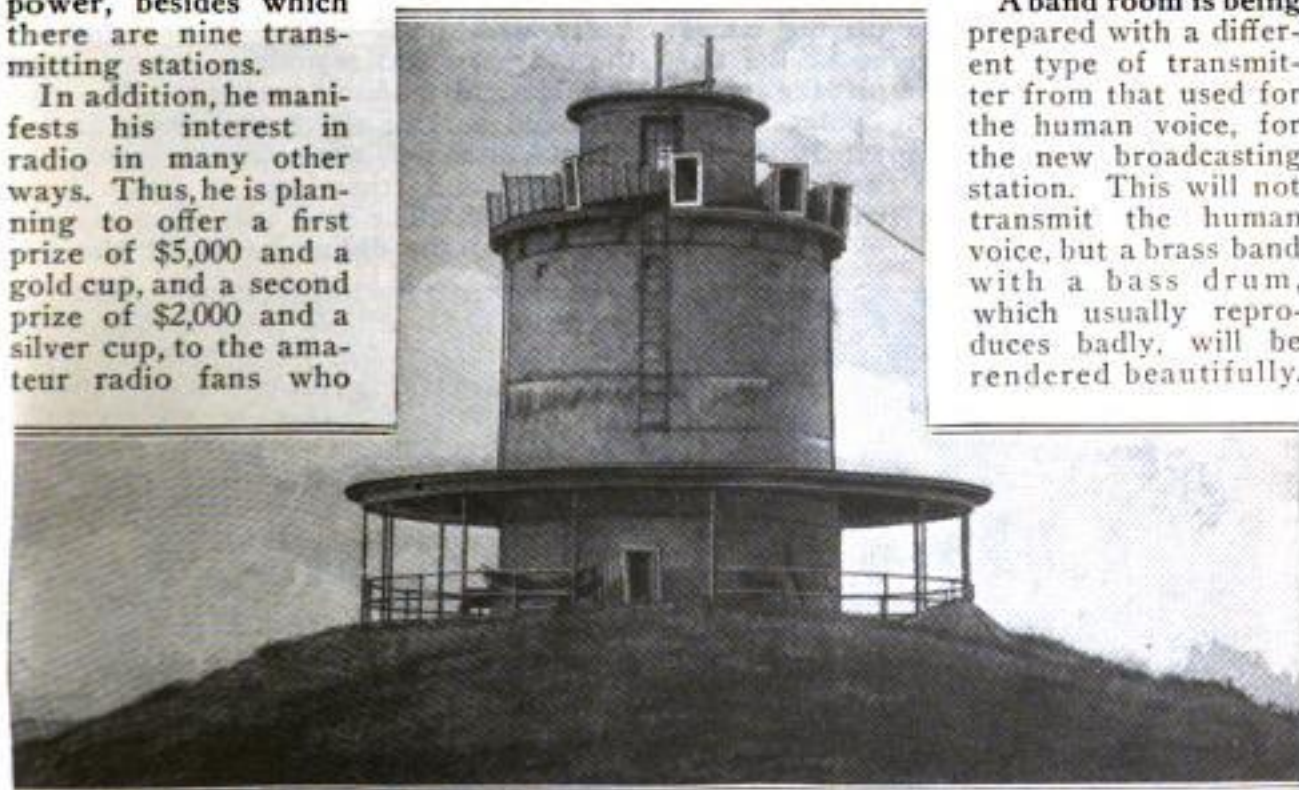
In addition, he manifests his interest in radio in many other ways. Thus, he is planning to offer a first prize of \$5,000 and a gold cup, and a second prize of \$2,000 and a silver cup, to the amateur radio fans who

have presented the best and second-best ideas for the development of radio during the previous year. In the spring a general call will be sent out to amateurs throughout the world to visit the Round Hills plant, with its huge laboratory, the largest private experimental laboratory for radio in the world, its broadcasting and transmitting stations, with its four 1,460-foot steel antenna masts, and its eight wooden masts, each 125 feet high, to experiment and consult with the big staff of engineers, experienced radio men, and trained workmen in carrying out any of their ideas that may seem feasible. A call will also be sent to radio instructors and professors to come there during their vacation time, submit their ideas, and have them worked out free of expense to themselves, with materials furnished by the owner.

A free school for amateurs and another for advanced radio students will be established, with the best radio men from all over the country on its faculty, teaching amateurs and others during the summer months.

Once a year the station will publish articles giving full details of all that has been discovered during the preceding year, and this will be available for the use of the general public.

A band room is being prepared with a different type of transmitter from that used for the human voice, for the new broadcasting station. This will not transmit the human voice, but a brass band with a bass drum, which usually reproduces badly, will be rendered beautifully.

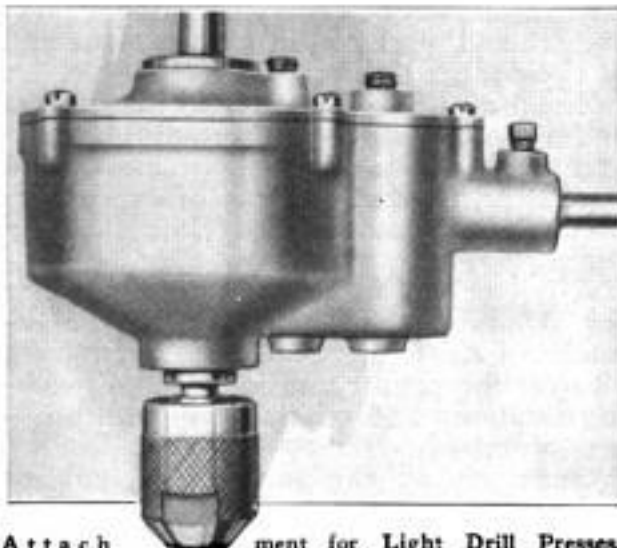


Private Radio-Broadcasting Station Owned by Colonel Edward Green and Erected on His Country Estate at South Dartmouth, Massachusetts: On the Gallery around the Top of the Lighthouse-like Structure, may be Seen the Numerous Loud-Speaking Horns Which Send Speech and Music $4\frac{1}{2}$ Miles

In addition, there will be a special microphone for each station, and each will have its special function—one for sending the human voice, another for the organ, and a third for band music; all for experiment, and without thought of profit.

ATTACHMENT FOR HIGH-SPEED SENSITIVE TAPPING

Sensitive thread tapping, without adjustment, coupled with high spindle speed, are the characteristics of an attachment



Attachment for Light Drill Presses, That Permits High Spindle Speed and Sensitive Thread Tapping by Regulation of the Press Lever

for light drill presses. The leather-lined cone clutch and cast-iron driving cones enable the tap to be entered at the desired speed by regulation of the press lever, and have a slipping point which prevents breaking the tap if it should stick or hit the bottom of the hole. The reverse cone operates at twice the forward speed.

HORACE GREELEY'S BARN MADE INTO HOME FOR DAUGHTER

During the illness that resulted in his death, in 1872, Horace Greeley expressed a wish, in talking with his daughter, that after he was gone and forgotten, his old barn would still be serving a useful purpose. Although the famous editor has been dead for half a century, his wish has been made a reality, and his daughter and her husband are living today in the house into which they transformed the old concrete barn.

Having a strong faith in the use of concrete and being one of the earliest advocates of this type of construction, Greeley, under the stimulus of agricultural experiment, erected this barn on his estate over 70 years ago. It was a huge three-story affair, with the basement fitted for live stock, the second floor for hay and grain, while the third floor was left to doves and other birds. The walls were 2 feet thick, built after the then prevailing method of making concrete, which consisted in imbedding native flat field stones in a thick mortar. The outside was coated with stucco, and it was no doubt restuccoed at the time of being converted into a residence.

Some years after the death of Greeley, fire destroyed all the frame buildings on the estate, and the family sought refuge in the old barn as an emergency home. Later, with the assistance of an architect, the old barn was remodeled into a comfortable and modern dwelling. The corners and part of the foundations are of recent masonry construction, and the chimneys and trimmings of brick have been added. The hall was formerly the cow stalls; the dining room, at the left



Left: Residence of Horace Greeley's Daughter, Which was Recently Remodeled from a Concrete Barn, Built by the Famous Editor on His Estate Over 70 Years Ago. Right: Another View of the Residence, the Hall of Which Was Formerly the Cow Stalls of Greeley's Barn

on the first-floor, is where the horse stalls used to be; the immense living room on the second floor occupies space that was once a haymow. Altogether there are now 14 rooms in the house.

NEW ELECTRIC-DRIVE SYSTEM FOR SHIP PROPULSION

In a recently patented system of electrical ship propulsion a number of variable-voltage generators, each driven by an independent internal-combustion engine, are used for energizing the propeller motors, to which they are connected by a series circuit in such a manner that the effects of the speed variations common to all internal-combustion engines are eliminated. There must be at least two driving motors in connection with the propeller shaft, and each of these will have two generators operated in series, so that the effect of speed and voltage variations will be compensated for, and there will be an equal distribution of

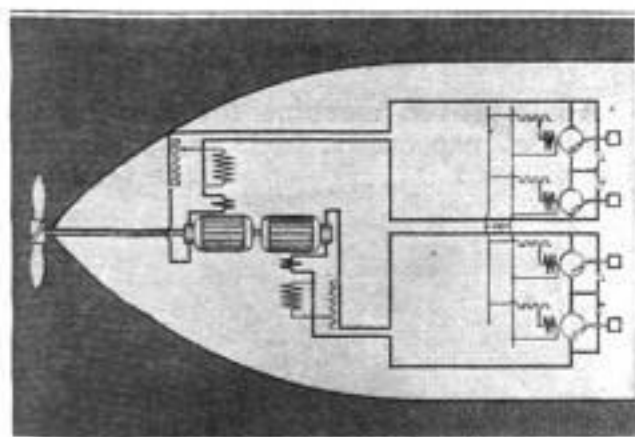


Diagram of the After Part of a Ship, Showing the Propeller Shaft Driven by Two Motors, Each Connected in Series with Two Engine-Driven Generators

the load. An important result of this arrangement is that, if one of the engines has to be stopped for repairs, or any other reason, the remaining generator, in connection with its motor unit, can be adjusted so that the motor runs at the proper speed.

"UPPER BERTH" IS BUILT ON MOTOR TRUCK

"Upper berths" are usually associated with railway sleeping cars or ships, but one of these has been built on the cab of a large motor truck. This truck is used by a manufacturing company to make deliveries at distances of 100 miles or more, and carries a crew of two men who alternate as drivers. By means of

the sleeping compartment, the company saves considerable time and money, as the men sleep in "relays," thus permitting

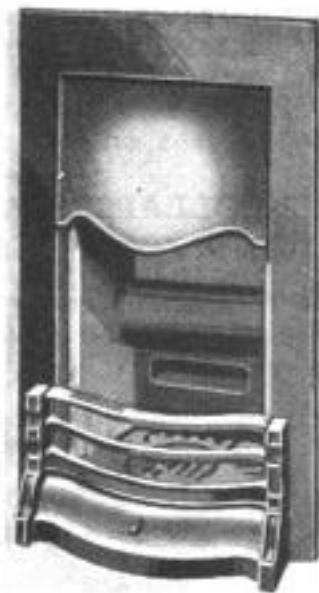


Truck Which Makes Long Hauls, Showing the Sleeping Compartment Built above the Driver's Seat for the Man off Duty

continuous operation of the truck, in addition to which the expense of lodging them along the route is eliminated.

RADIATORS IN CONJUNCTION WITH OPEN BOILER GRATE

An open boiler grate in conjunction with a hot-water radiator installation, in use in England, is said to be capable of heating the house with a continuously burning anthracite open fire at a minimum cost. The grate has a boiler at the back, an adjustable regulating canopy in front, and a shaking bottom grating. With a 16-inch fire, and about 60 square feet of radiator surface, it has a heating capacity of 5,000 cubic feet. With an 18-inch fire, and about 100 square feet of radiator surface, it has a heating capacity of 7,000 cubic feet.



REMOVABLE PAVING BLOCKS AROUND TRACK JOINTS

To do away with the necessity of ripping up the road paving in order to get

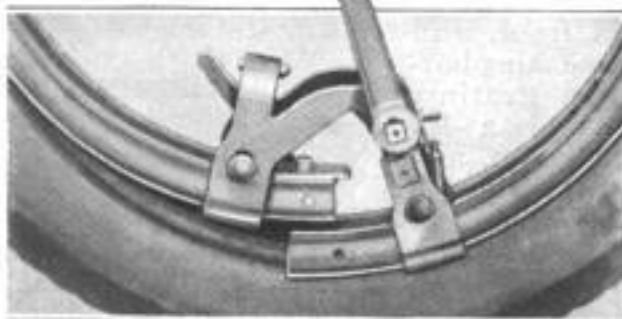


Special Paving Blocks Easily Removable and Replaceable around a Track Joint by Means of a Tripod, or by Hand without the Tripod

at a joint in a street-railway track, special paving blocks, made of concrete or wood, that are easily removable, are now in use in Canada. Six blocks are placed at each joint, three on either side of it, and they can be readily removed or replaced by hand, or with a small tripod and tackle. The bolt heads and nuts in the joint fit into grooves on the side of the blocks.

RIM COLLAPSER AND EXPANDER SIMPLIFIES TIRE REMOVAL

A tool small enough to fit into the ordinary automobile tool box and weighing but 7 pounds, has been designed for



With This Tool, Tires on Split Rims are Easily and Quickly Removed or Replaced

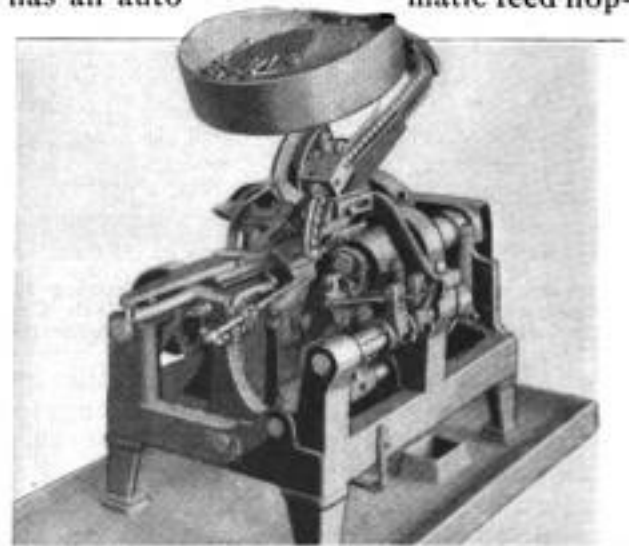
use with any split type of rim. It can be applied in less than a minute, and with a turn of the lever the rim is collapsed, allowing the tire to be easily removed. After the tire has been replaced, a reverse movement of the lever expands the rim, and the tire is ready for inflation.

SANTO DOMINGO EXPEDITION SECURES MANY SPECIMENS

The expedition sent to the Island of Santo Domingo last July by the American Museum of Natural History, mention of which was made in this magazine, has recently returned. The object of the trip was to obtain, if possible, specimens of the giant tree frog and the rhinoceros iguana, the latter being of the lizard family. Over 200 living specimens were secured, in addition to the preserved material, all of which will be installed in the new hall of reptiles now under construction in New York City.

AUTOMATIC BOLT MACHINE HAS IMPROVED FEED HOPPER

An improved machine for shaving the heads of capscrews, bolts, and the like, has an automatic feed hop-



The Feature of This Machine, Which Shaves the Top and Underside of Bolt Heads at Once, Is the Unusual Feed Hopper

per of unusual design. It is set at an angle so that the surplus parts slide back from the top of a stationary groove that accommodates only one bolt or screw at a time, and has a revolving bottom provided with steps that catch the heads of the bolts which are carried in a steady single-file stream to the shaving operation. Both the under and top sides of any style head can be shaved simultaneously.



Main Entrance of a New Retail Market in Oakland, California, Which Houses More than 100 Booths, a Nursery, Women's Restrooms with Magazine Racks and Telephone Facilities, and the Branch of a City Bank: A Parking Space for 1,000 Autos is Provided Outside

RETAIL MARKET IN OAKLAND HAS UNUSUAL FEATURES

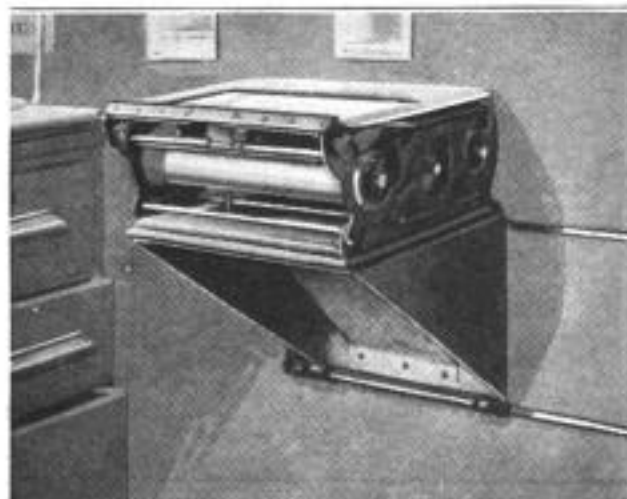
Covering an acre and a quarter of land in Oakland, Calif., a retail market that houses more than 100 booths has a number of unusual features for a building of this character. The interior is done in white tile, and the offices of the management and women's restrooms with magazine racks and telephone facilities, occupy a mezzanine floor near the entrance. Here, too, is provided a nursery where children may be left while their parents shop. The branch of a city bank, located in one of the stores of the building, is another convenience. Outside is a parking ground for 1,000 autos.

SAFETY STARTER PROTECTS MOTOR AND OPERATOR

Protection is provided for the operator as well as for the motor, in a safety starter which is so arranged that the door of the starting box cannot be opened while the switch is in a "live" position. The appliance is manufactured for alternating-current motors up to 15 horsepower, containing special thermal cut-outs, or relays, which automatically open the circuit when damaging overloads are experienced, and also no-voltage release coils as a safeguard against voltage failure.

WALL SHELF ON ROLLERS SLIDES OUT OF WAY

A roller shelf which can be slid out of the way when the registering machine it supports is not in use, is a handy home-made appliance introduced in an office. The framework of the shelf is constructed of galvanized iron. Two round iron rods are fastened horizontally to the wall by means of brackets, the four grooved rollers of the framework operating on these rods. The rollers at the top bear against the inner side of the rod, while those at the bottom thrust inward, thus holding the shelf securely on the rods.



Wall Shelf Which Supports Registering Machine and is Mounted on Rollers That Run on Iron Rods, Seen at the Right

ELECTRIC-SEMAPHORE POSTS FOR TRAFFIC CONTROL

As part of the new traffic-control system in Detroit, designed and installed by members of the city police department,



electric- semaphore posts are now being erected at all prominent intersecting streets on Woodward Avenue from the river to the city limits. They will require no attention whatever from the traffic officers, and will be automatically controlled by the operator in a "master" tower, such as was described and illustrated in the June issue, 1921, of this magazine. Mounted on a concrete base, 5 feet in diam-

eter, the semaphore post is 11 feet high. It is painted black and white, and is surmounted by a cupola containing red and green stop-and-go flashlights. At the ex-

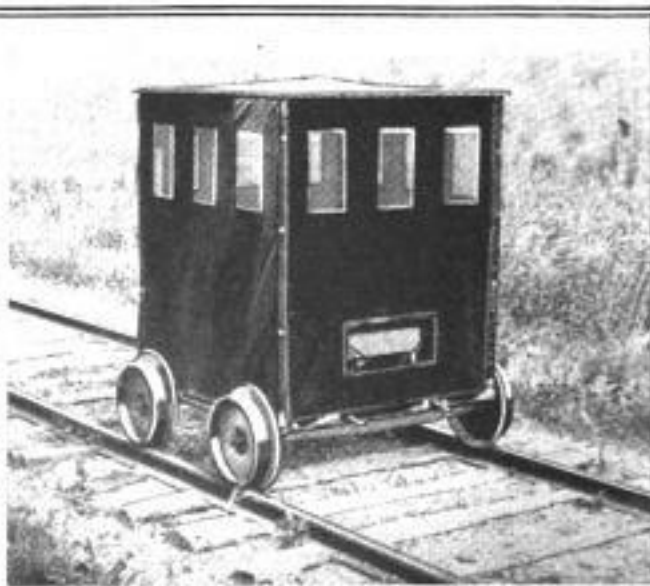
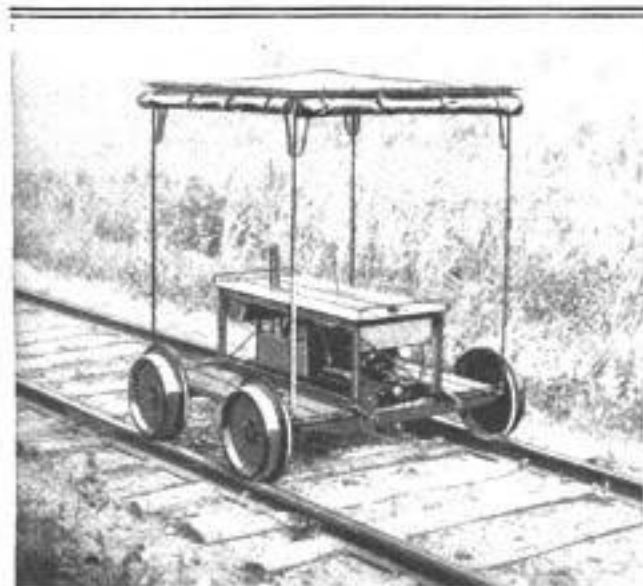
treme top is an amber light, flashed to indicate that a change of signals is about to occur. Beneath these colored lights are also illuminated printed signals.

REMARKABLE ENDURANCE TEST OF SMALL TRACTOR MOTOR

A remarkable endurance record was recently established by a small tractor, the motor of which ran for 15 days, furnishing power for the operation of a pump at a Terre Haute Water Works Company's test well. The pump was belt-driven by the motor of the tractor, which was anchored to large timbers. The motor ran without a single stop, even while changing the lubricating oil in the crankcase, which was done once a day; 6,716,400 gallons of water were pumped by the motor, with an average daily consumption of 32 gallons of kerosene and one-half gallon of lubricating oil. At the end of the run the motor seemed to be in as good condition as at the beginning.

PAYMASTER'S CAR HAS ALL-WEATHER TOP

"Private cars" are usually provided for railway paymasters although these vehicles differ from luxuriously equipped coaches. A paymaster's car on an eastern road has a 4-horsepower gasoline engine and is similar to the ordinary ball-bearing outfits used by track inspectors. A frame of small iron rods supports a canvas roof and a set of curtains with mica windows, so that the car can be completely inclosed in inclement weather.



Left: Gasoline Car Which was Constructed for the Paymasters of an Eastern Railroad, Showing the Framework of Small Iron Rods and the Curtains Rolled Up. Right: Car in Readiness for a Trip over the Road in Inclement Weather, Showing the Mica Windows in the Tight-Fitting Curtains



OX TEAM USED IN CHINA TO PULL RIVER BOAT ACROSS SHOALS

THIS strange scene is from a river in China during a dry season, when the water level has dropped to such a low point that traffic is considerably hindered by boats, frequently running aground in the shallower places. A team of bullocks is being used to haul the heavily loaded craft into deeper water.

STEAM ROLLER RUNS AMUCK DOWN STEEP GRADE

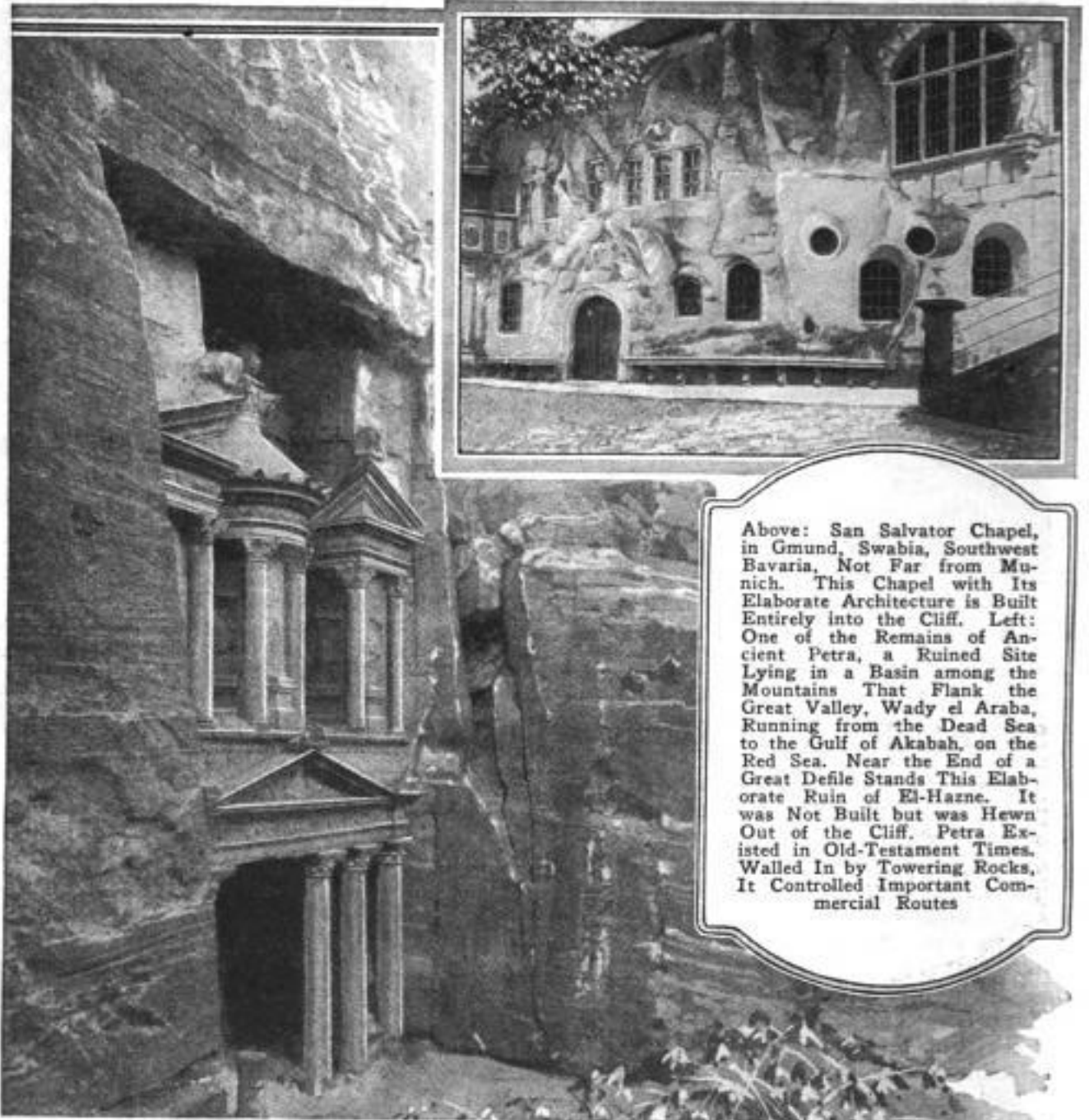
General confusion and considerable damage resulted when a large steam roller recently ran down a steep street in Portland, Ore. Swerving and skidding in its wild course, the heavy machine mowed down telephone and electric-light poles as though they had been mere toothpicks. The driver frantically applied all the brakes, but to no avail. The irresistible mass of wheeled steel dashed on until it swung up over a curb, losing a rear wheel and the helpless driver, who landed unhurt at the same time, and finally came to rest of its own accord, to the great relief of persons who were in the immediate vicinity.

☞ To cope with a smallpox epidemic in and near London, England, there has been established near Dartford, a smallpox hospital with 2,090 beds, which can be reached only by water. The patients are conveyed there on river-ambulance steamboats, from which they are disembarked on a landing stage at some distance from the river bank, to which it is connected by a viaduct.



Steam Roller Which Ran Amuck down a Steep Grade, Finally Coming to Rest of Its Own Accord After It had Jumped the Curb and Lost One of the Rear Wheels

CLIFF AND CAVE BUILDINGS USED



Above: San Salvator Chapel, in Gmund, Swabia, Southwest Bavaria, Not Far from Munich. This Chapel with Its Elaborate Architecture is Built Entirely into the Cliff. Left: One of the Remains of Ancient Petra, a Ruined Site Lying in a Basin among the Mountains That Flank the Great Valley, Wady el Araba, Running from the Dead Sea to the Gulf of Akabah, on the Red Sea. Near the End of a Great Defile Stands This Elaborate Ruin of El-Hazne. It was Not Built but was Hewn Out of the Cliff. Petra Existed in Old-Testament Times. Walled In by Towering Rocks, It Controlled Important Commercial Routes



Left: Cave Fitted Up with an Altar and with Pews, and Used as a Church. It is Situated in the Little Mountain Village of Wildkirchlie, in the Canton of Appenzell, Switzerland. The Cavern Is in the Alps at an Elevation of 4,845 Feet above Sea Level. It Is near the Lake of Constance, and the Inhabitants of This Part of Switzerland are Mainly Devoted to Embroidery

BY ANCIENT AND MODERN PEOPLES



Above: Church Wholly Built into the Cliff, Only the Façade Being of Masonry, in the Vicinity of Matero, a City of Basilicata in Southern Italy, and about 1,312 Feet above Sea Level. In the Neighborhood Are the Troglodyte Caverns of Monte Scaglioso, Still Inhabited by Some of the Peasantry. Right: Front Entrance to the Last Occupied Cave Dwelling in Germany. It Is in the Village of Langenstein, near the City of Halberstadt, Saxony. This Dwelling has Been in Existence for Centuries and Quite Likely may have Served as a Hiding Place for Refugees of the Almost Continuous Wars That Once Ravaged Middle Europe



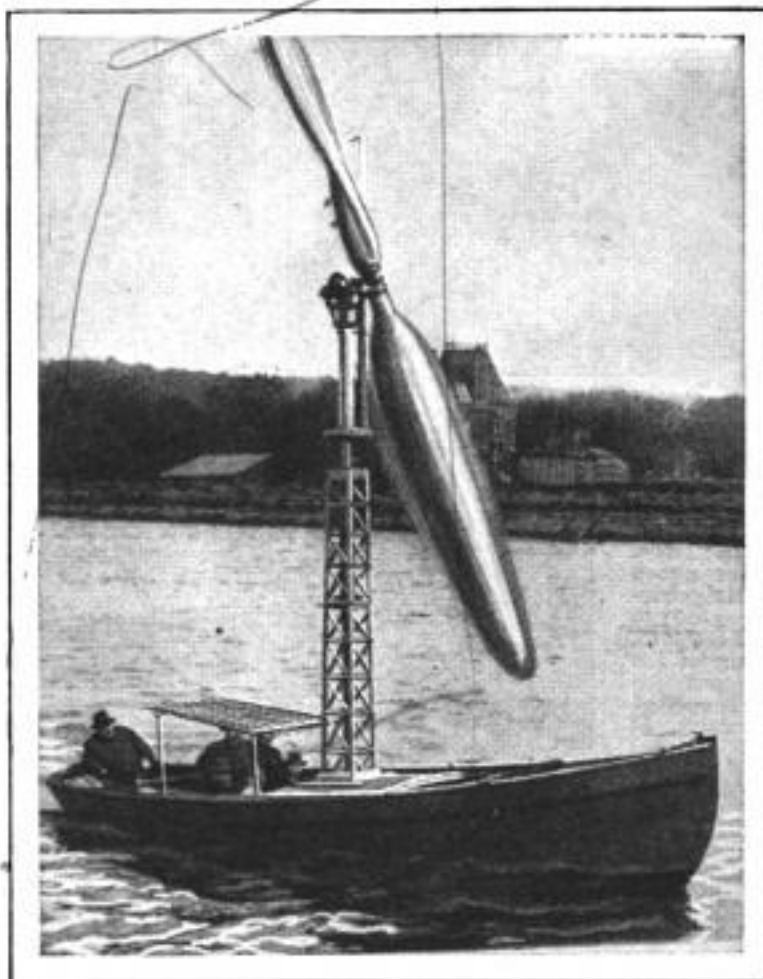
Right: Cave Dwellings of the Bisharin Tribe, of Mixed Arab Descent, Who Dwell in the Eastern Part of the Nubian Desert, between the Upper Nile and the Red Sea Coast. Here They Graze Their Camels in the Mountainous Districts. Nominally They Are Mohammedans, but They Exhibit Traces of Animal Worship, for They Never Kill the Serpent, Regarding It as Sacred



BOAT TRAVELS AGAINST WIND THAT DRIVES IT

A wind-driven boat, that traveled at the rate of about 4 miles an hour against the current and a wind of 14 miles an hour, recently made its appearance upon the river Seine in France, where it is looked upon as having considerable practical value aside from the interest that attaches to the scientific aspect of the development. It is the result of over 20 years' investigation. Located in the middle of the boat is a steel mast that carries an aerial propeller connecting through a train of bevel gears and shafting to the water propeller at the stern of the boat.

The aerial propeller is mounted so that it can be turned to face the wind, and its blades are adjustable, as are those of the water propeller, which is of the reversing type.



Wind-Driven Boat That is Said to have Made Four Miles an Hour against the Current and a Breeze of 14 Miles an Hour, on the River Seine

CURTAIN FORMS A PROTECTOR FOR AUTO RADIATORS

A protector for automobile radiators that can be raised over the front of the

radiator, or lowered from it, by the driver without moving from his seat, is about to be placed on the market. A curtain made of air-tight fabric, that folds into a series of narrow pleats, is installed inconspicuously across the bottom of the radiator. Two small pulleys, one below each end of the curtain, are mounted at the bottom of the radiator, and directly above them, two double pulleys are mounted at the top of the radiator. Between the latter another double pulley

is connected to a rod that extends back to the driver's seat. By means of a system of cords in connection with the pulleys, the driver, by turning this rod, can raise or lower the curtain.



Above: Removing the Carriage from the Typewriter without the Use of Tools. Left: The Easily Separable Frame, and Type-Action Units

EASY TO CHANGE BASIC UNITS OF NEW TYPEWRITER

Easy separation into three standard units is the feature of a new typewriting machine. Either the carriage, the frame, or the type action may be simply removed without the use of tools, and interchanged with similar units of any other machine of the same make; or, of course, new units may be substituted. The particular benefit derived from this arrangement is that it is no longer necessary to purchase an entire new machine when one or the other unit wears out.



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Clearing in the Forest of Compiègne, Showing the Commemorative Slabs Marking the Position of Marshal Foch's Train, at Left, and That of the German Envoys, at Right, with the Inscribed Slab in the Center Where the Armistice was Signed: In the Background Is the Armistice Crossroads with Memorial

PLACE OF ARMISTICE SIGNING MARKED BY MEMORIALS

The historic spot in the forest of Compiègne, where the armistice that ended the World War was signed on Nov. 11, 1918, has been cleared, and several impressive monuments have been established to commemorate the incidents of that historic event. A granite slab, inscribed "Le Maréchal Foch," has been laid on the exact spot where the train conveying Marshal Foch halted on the military railway, and at some distance from it, a similar slab, inscribed "Les Plénipotentiaires Allemands," has been laid where the train conveying the German envoys halted. Midway between these two slabs, a third one, larger and with a fitting inscription, marks the spot where the armistice was signed. At the end of an avenue leading from the main clearing to the Armistice Crossroads, a monument has been erected to the memory of the soldiers of France, presented to the town of Compiègne by a Paris newspaper.

FOUR-FOOT HANDSAW CUTS ROLLS OF PAPER

What is believed to be the largest handsaw in the world was recently made to meet specifications requiring a saw that would cut through rolls of paper 24

inches in diameter, wound on 2-inch brass tubing with walls $\frac{1}{16}$ inch thick. The strong sweep of the 48-inch blade easily



Four-Foot Handsaw Which was Specially Designed to Cut Rolls of Paper 24 Inches in Diameter

cuts through the tightly rolled paper and the brass tubing. The blade is twice the size of one in an ordinary saw, and has teeth of a special form.

FRUIT JUICE EXTRACTOR ON NOVEL STAND

A handy device for extracting the juice from limes, lemons, and oranges consists of a small stand upon which there is a beveled hole and blade



This Little Stand for Extracting Fruit Juice Has, from Left to Right, a Press, a Cutting Device, and a Conical Squeezer

for slicing, a conical squeezer, and a press. The opening for slicing is in the middle, and has a sliding guard to hold small-sized fruit. The cutting is done by razor blades. To the right of this is the conical squeezer, made with holes, through which the juice runs into a glass below. On the opposite end is a press for squeezing the rind.

HANDY ACETYLENE TORCH AID TO AUTOISTS

A convenient acetylene torch, intended primarily to serve as a source of illumination to autoists when making roadside repairs on dark nights, has recently been



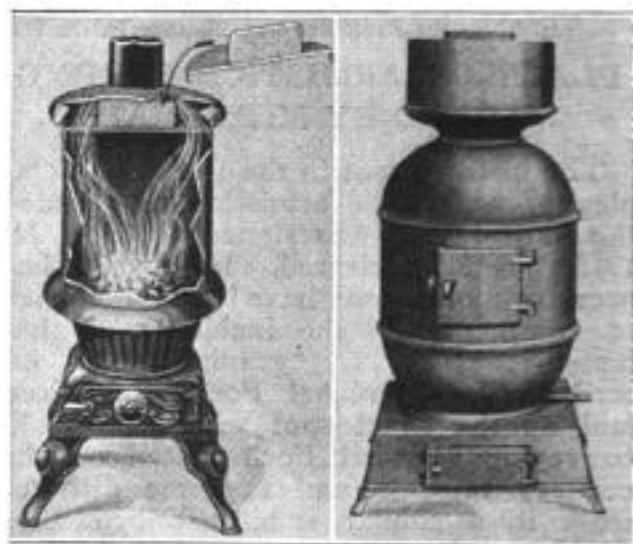
Handy Torch for Autoists, That is Easily Stuck into the Ground and Holds Enough Dissolved Acetylene to Last for 1½ Hours

placed on the market by a French concern. The torch consists of a tube, 20 inches long by 1.4 inches in di-

ameter, one end being fitted with the burner, while the other end is tapered and terminates in a steel point that can be easily stuck into the ground. The tube is filled with sufficient dissolved acetylene to last for 1½ hours of continuous lighting, and is lighted by means of a match, after turning the cock.

HEATING STOVE MADE HOTTER WITH COOLER SMOKE PIPE

In the ordinary base-burning heating stove the flames from the coal assume a conical shape in the center of the stove and remain at some distance from its side walls. It is obvious that if the flames could be spread so as to come directly into contact with the sides of the stove, much more of the heat would be imparted to them, and much less would be drawn directly into the smoke pipe and the flue. This is now made possible by an attachment in the form of a drum placed on top of the stove. The drum contains a



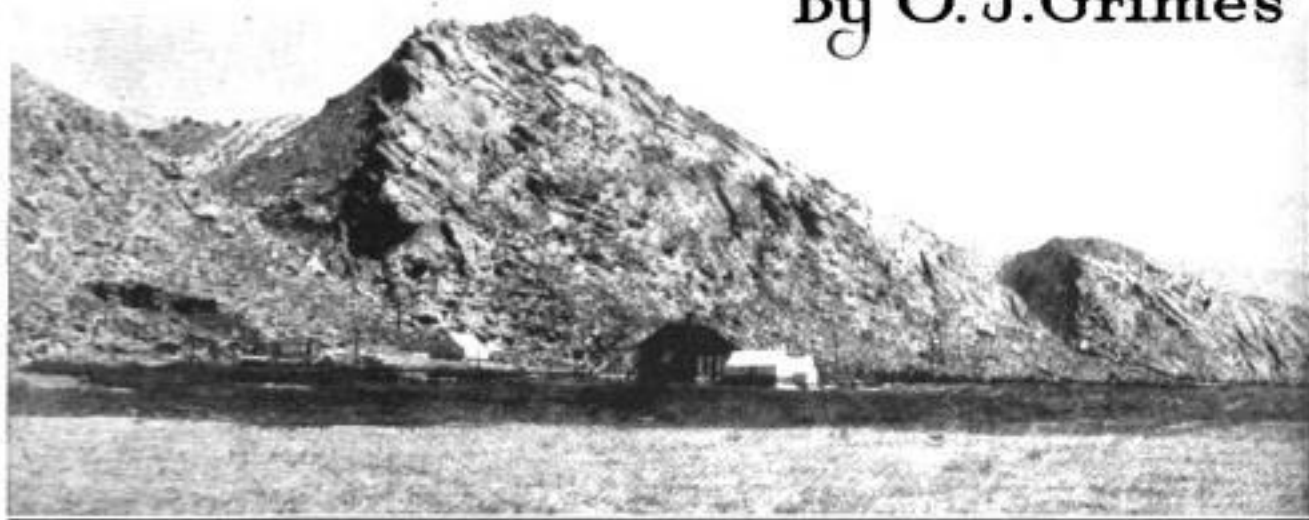
Left: Section of a Household Heating Stove, Showing How the Flames are Spread by Means of the Attachment on Top. Right: Stove for Use by Railroads

means of so directing the draft that the flames and hot gases assume a cylindrical form and remain in direct contact with the entire surface of the walls of the stove. With this attachment the stove itself absorbs much more of the heat from the flames, while the smoke pipe and flue remain much cooler. These stoves are particularly suitable for use by railroads where large rooms have to be heated, but they can also be used to advantage in the home.

☛ A paste now made from fresh-picked mushrooms is put up in glass jars and used not only as a sauce and for flavoring, but also in making mushroom soup.

QUARRYING FOSSILS IN UTAH

By O. J. Grimes



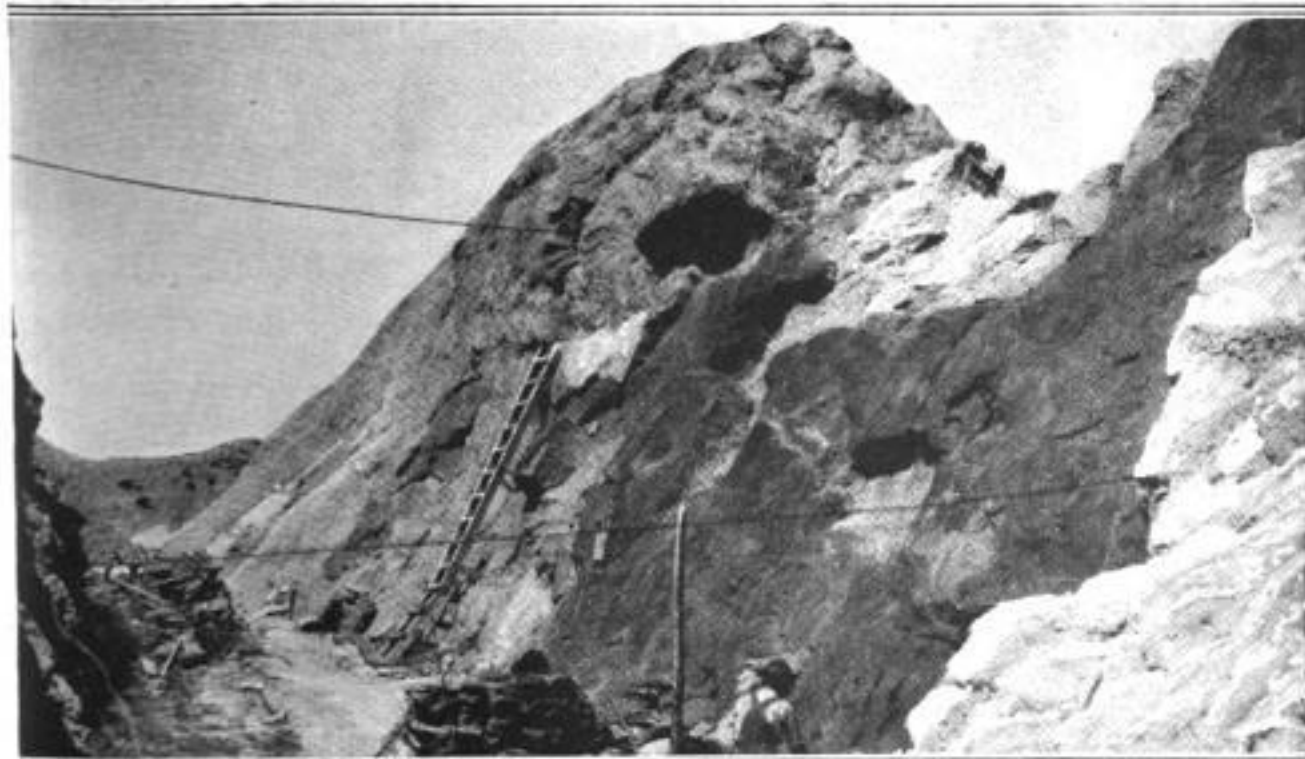
Above: Typical Upturned Rocks, in Which the Bones of Some Prehistoric Animals have Quite Recently been Found Well Preserved

PROBABLY the most remarkable and extensive deposits of prehistoric animal remains yet discovered are situated in northeastern



Left: Some of the Bones of Prehistoric Animals Excavated from Rock Formations in the Northeastern Part of Utah

Utah, and are included in the United States Government withdrawal designated as the Dinosaur National Monument. No other rocks in the



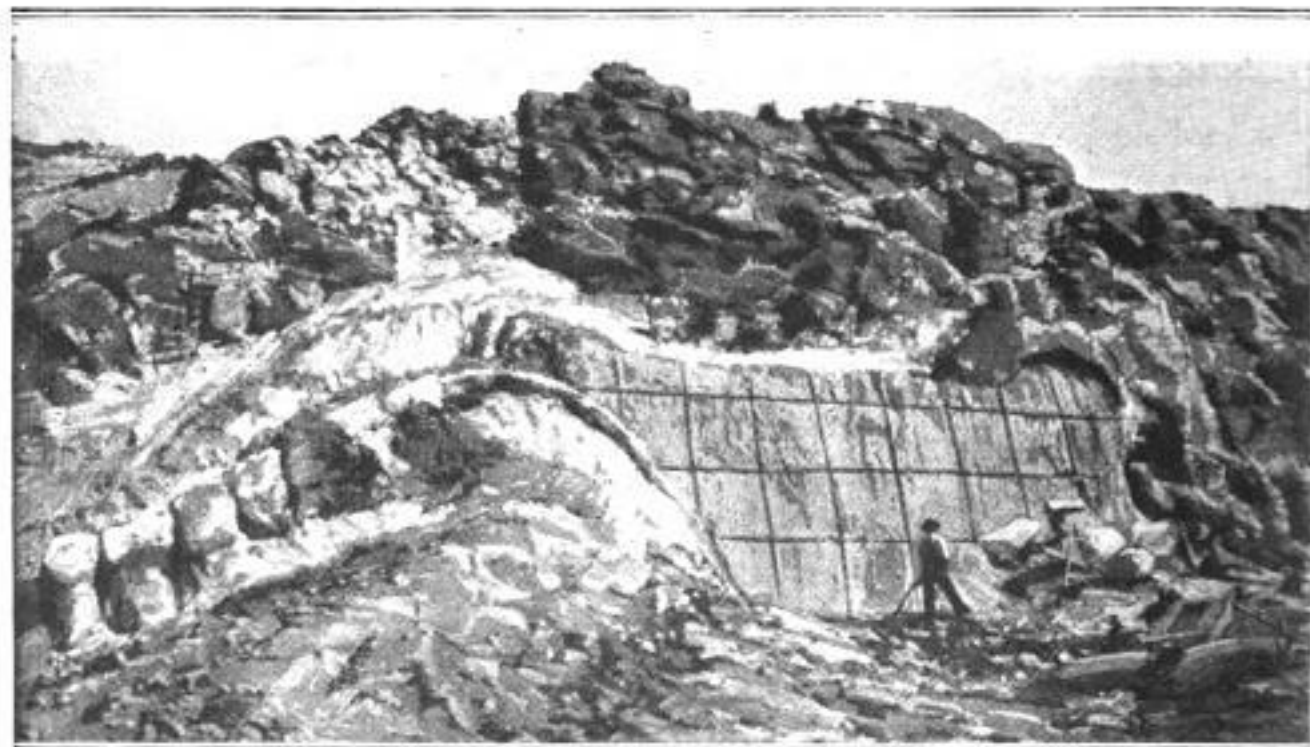
General View of the Pit from Which All the Bones So Far Found have been Taken: The Wall at the Right Shows How, in Some Upheaval of the Earth's Crust, the Rock at That Point was Thrust Up from the Horizontal

world have yielded such an abundance of remains of fossil animals like those of this district, and no other region has yielded such an abundance of nearly complete skeletons of dinosaurs.

Practically all the exploration work in the district so far has been done under the direction of the Carnegie Museum, which has had a crew in the field for a number of years. Although thousands of bones of prehistoric animals have been recovered, about all the district systematically explored as yet is represented by a trench through the crest of a minor uplift, the trench being probably 100 yards long and of an average width of about 30 feet.



The bones are found imbedded in sandstone and are picked and chiseled from the rock. To prevent decomposition from atmospheric action, each bone is treated with a composition as quickly as it is freed from the sandstone, and then incased in plaster of paris for shipment. The scientist in charge of the work of excavation examines each bone as it is exposed and designates its character. Each animal is given a number by him as well as a classification, and the bones of that particular animal are given the number assigned to that animal. The importance of this method is indicated by the fact that bones so far recovered belong to about



Above: A View of the Pit, Showing Men at Work Excavating the Bones of the Prehistoric Animals. Below: Another View of the Quarrying Operations in What has been Designated as the Dinosaur National Monument, from Which More Bones of Prehistoric Animals have been Taken than in Any Other Spot in the World. The Bones of Each Animal Removed are Numbered and Classified

300 different animals. Nearly all the bones of a few individual animals have been recovered, but in most instances only a comparatively few bones of each specimen have been excavated, and are awaiting the recovery of others

before the skeletons are put together. At the rate the work now is being conducted, a hundred years or more probably will be required to fully explore the field.

The indications are that the deposit is in or near the bed of a prehistoric river.

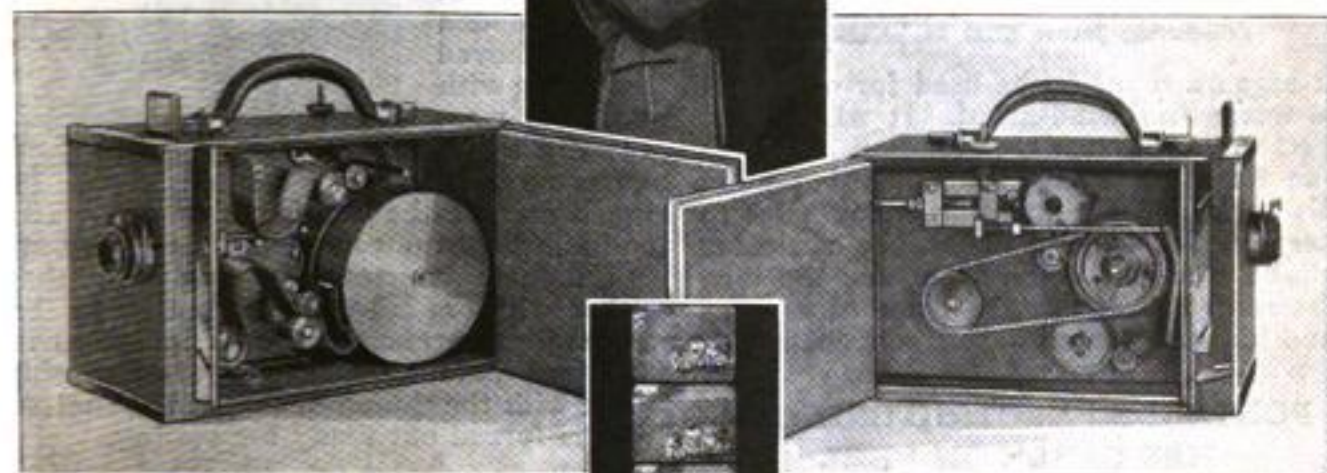
NEW MOTION-PICTURE CAMERA HAS UNUSUAL FEATURES

Instant changeability from standard-size moving pictures to double-size still pictures, through aperture and shutter control; adaptation of the intermittent movement, replacing the customary claw movement; reduction in size, increased capacity, daylight loading; wider range of utility, with elimination of tripod, if necessary, are features of a new moving-picture camera designed by a Seattle war veteran who served as aviation

operator require a tripod. The camera may be rested upon some steady object, and it has taken satisfactory moving pictures when held upon the operator's knees.

A spring motor is incorporated in the camera for operating the shutter in taking snapshots, and functions for taking a short strip of moving-picture negative. This motor is wound up with a detachable crank arm.

Great reduction in size of the camera is obtained by placing the magazine and take-up spools on the same shaft,



Upper Center: Moving-Picture and Rapid Snapshot Camera, Showing How It is Sighted and Operated by the Thumb: Left: Interior of the Camera, Showing Film and Magazine

Above: Interior of Camera at Rear, Showing Mechanism and Shutter Control at Lower Right-Hand Corner. Bottom Center: Prints from a Film Taken with the New Camera

photographer in France for fourteen months.

The new camera can be carried about and used for snapshot or still pictures like an ordinary hand camera. Used in this manner, it has a capacity of 3,200 pictures, either standard moving-picture size, $\frac{3}{4}$ inch by 1 inch, or double size, $1\frac{1}{2}$ inch by 1 inch, which latter can be enlarged with sharpness up to 8 by 10 inches. About 200 snapshots can be made in the time consumed in taking six with the ordinary roll-film camera. This is, perhaps, the most important feature of the new camera.

Changing from still pictures to motion pictures is made by simple adjustments of aperture slide and shutter. Nor does the

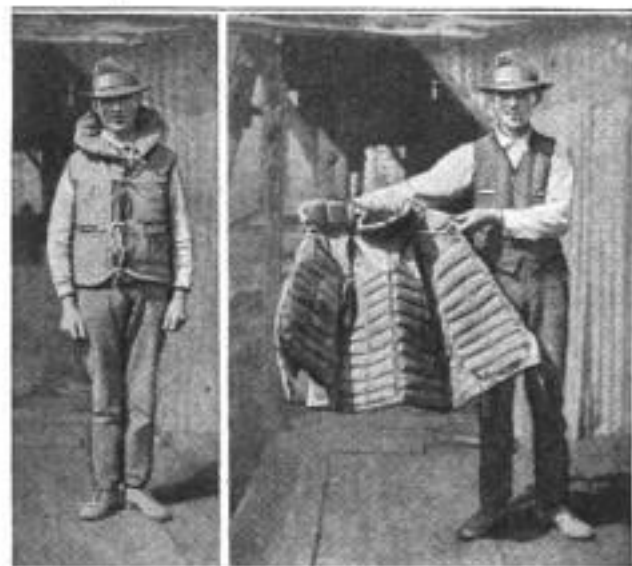
film being carried from the magazine to the offset spool by looping it around a steel spindle.

Ingenious light traps are provided on the magazine and take-up spools, making it possible to load and unload the camera in daylight, which effects an important saving in time.

If desired, two different lenses can be used, by attaching them to the same head. As the lens is set off center, the extra lens can be set in the position exactly opposite the working lens, and a simple shifting arrangement makes it possible to use either one. Owing to its adaptiveness and flexibility in operation, this camera should prove to be popular among amateur photographers.

NEW LIFE PRESERVER LOOKS LIKE SLEEVELESS COAT

A recently patented life-saving jacket looks and fits like a sleeveless coat, and

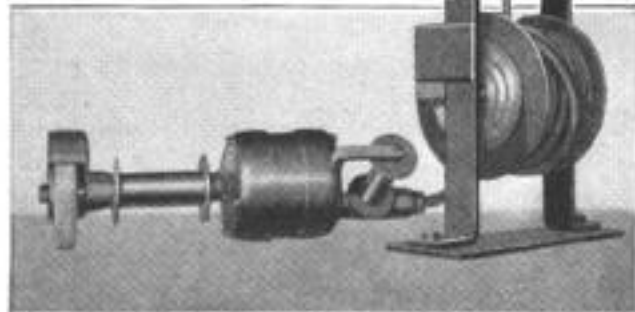


Left: Man Wearing New Life Preserver That Fits Like a Sleeveless Coat. Right: Inside View of Life-Saving Jacket That Is Wind-Proof

it may on occasion be used for one, as it is warm and wind-proof. It will keep a person in an upright position while in the water, or support one floating upon his back, and the standing collar helps to keep the head up. The absence of sleeves allows free use of the arms, and the tape fastenings that take the place of buttons and buttonholes, make for convenience.

PORTABLE ELECTRIC GRINDER HAS CABLE ON REEL

A portable electric grinder which has its four-wire cable on a spring reel, so that the slack is always automatically wound up and thus kept off the floor, is now available. The cable is



At the Left is Seen the Portable Electric Grinder, While on the Right is Shown the Four-Wire Cable Wound Up on the Spring Reel

35 feet in length and, with the reel centrally located on the ceiling or on a

column, a room 60 feet square may be served by one grinder. Three of the wires in the cable are used for the three-phase current necessary to operate the motor, the fourth acting as a ground wire from the grinder, so that the user runs practically no risk of receiving an electric shock.

LETTERS AND PAPERS SEALED BY ELECTRICAL OUTFIT

Sealing letters and papers with great rapidity is possible with an electrical appliance of foreign manufacture in which a resistance



coil is used to heat a small cylindrical wax container, of which there may be one or two. The container, whose wooden top is removed for filling with ordinary wax, rests in a circular cavity in the center of the heating element. The coil is brought out at the base of the outfit in three contacts, or plugs, so that either 110 or 220-volt current may be utilized. A pressure valve is included in the wax holder, and by operating this valve with the thumb or finger, the melted wax is forced out ready for sealing.

ITALIAN WAR TRACTORS SERVE PEACEFUL PURSUITS

An Italian tractor, originally developed during the World War for carrying ammunition and hauling field guns over rough, mountainous country, is being redesigned here so as to meet the agricultural and industrial requirements of American users of tractors. The war machine, equipped with tractor wheels, had a speed of about $6\frac{1}{4}$ miles an hour and a capacity of $2\frac{1}{2}$ tons. As adapted to peaceful purposes, it is equipped with solid-rubber tires and has a speed of 10 miles an hour. The most pronounced feature is the freedom with which the two axles tilt in independent planes so as to permit all four wheels to have good traction regardless of the contour of the ground. Diagrammatically it is represented by two axles, each connected to a



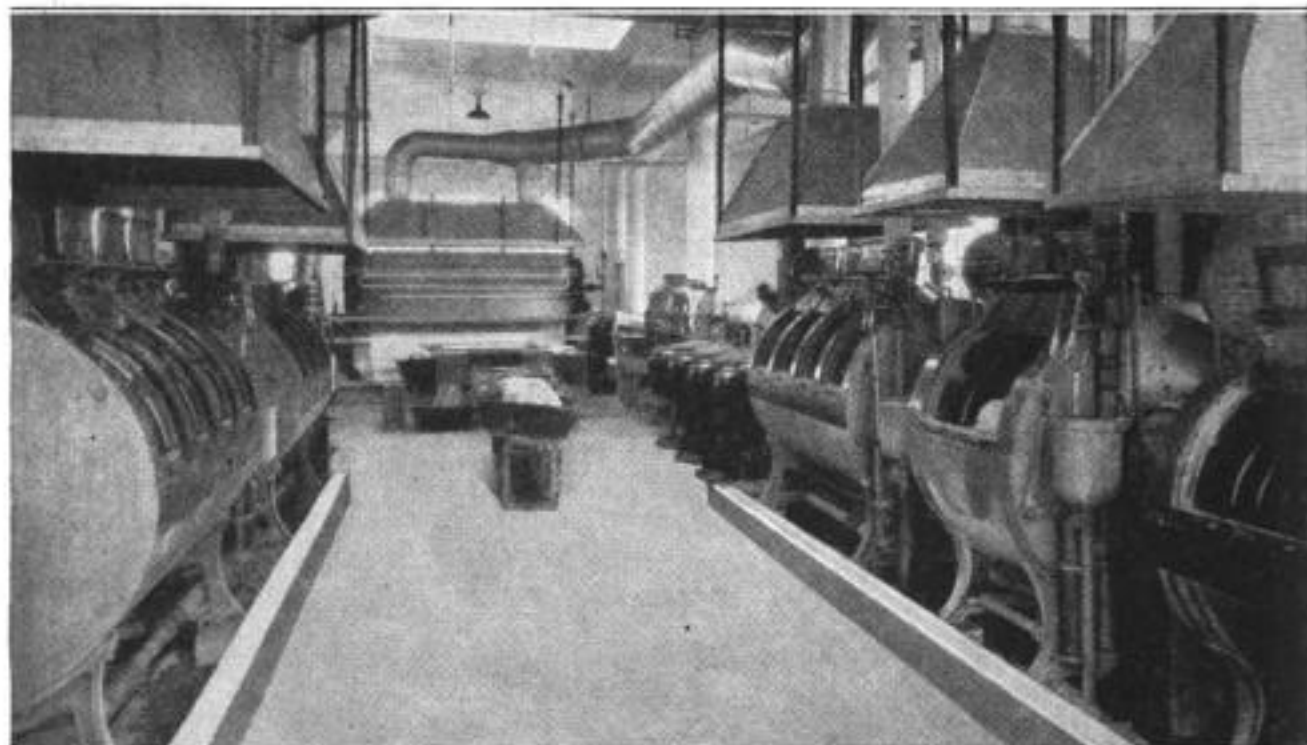
Italian War Tractors of This Type are being Converted into Truck Tractors for Agricultural Purposes. Note the Angle of the Front Axle as Compared with the Rear Axle, Made Possible by the Swiveled Action between the Two Frame Sections

section of the frame, which is made in two sections capable of swiveling with respect to each other. The wheels of both frame sections respond, at the same time, to a combined steering gear attached to a tubular underframe on which the sectional frames pivot. Parallel to this tubular frame is the universal joint that transmits the power from the front-axle group to the rear-axle group. A two-cylinder engine, developing 25 horsepower

and governed to run at 900 revolutions per minute, furnishes power. The total weight of the tractor and body is $3\frac{1}{2}$ tons, and besides carrying $2\frac{1}{2}$ tons, it is capable of hauling from 8 to 10 tons over any kind of ground or road. Two speeds—2 and 10 miles an hour—are provided, and the machine can be easily turned in a radius of 14 feet, owing to the fact that the wheels of both axles assist in the turning movement.



One of the Italian War Tractors of a Type That has been Lately Modified to Suit More Peaceful Pursuits, Shown Carrying Ammunition, and Hauling a Piece of Field Artillery over Rough Ground: All Four Wheels Respond to the Action of the Steering Gear



Laundry Containing Modern Equipment, Showing Three Eight-Pocket and Two Single Washing Machines in the Foreground, While in the Background may be Seen a Large Flat-Work Ironer: Some of the Individual Baskets in Which the Wash is Handled during Its Trip through the Laundry Are Also Visible

CLEANER FOR WINDSHIELD SIMPLE AND EFFICIENT

A simple and efficient cleaner which is fastened to the windshield and has a wiper on each side of the glass, is operated only when the driver pulls on a strap hanging near the steering wheel. The wipers then make a sweep, forward and back, after



which they are stationary until the strap is pulled again. The driver's line of vision is thus quickly cleared without the annoying continuous movement of automatic cleaners.

MODERN LAUNDRY EQUIPMENT EFFICIENT AND SANITARY

Modern laundry equipment includes a number of efficient appliances which aid in the rapid and thorough cleansing of soiled clothing in a sanitary manner. For instance, in the "family washings," each particular batch of clothes is placed in an individual metal compartment of a machine which may contain as many as eight of these compartments or pockets.

By this method, no two washings come in contact, nor is the water from any pocket intermixed with that of another. During their entire journey through the washers, ironers, or other accessories of the laundry, the clothes are always handled in separate baskets.

GOLF-CLUB HANDLES OFFERING MINIMUM AIR RESISTANCE

Heretofore the handles of golf clubs have been made round in cross section, and now a golf club, recently patented, has the handle with a cross section that has a contour offering far less resistance to the air, while making a stroke, than a handle with a circular cross section. This principle of streamlining is applied not only to the stick of the handle but also to the head of the club, as far as is possible without detracting from its other functions. The same principle may be applied to all golf clubs,

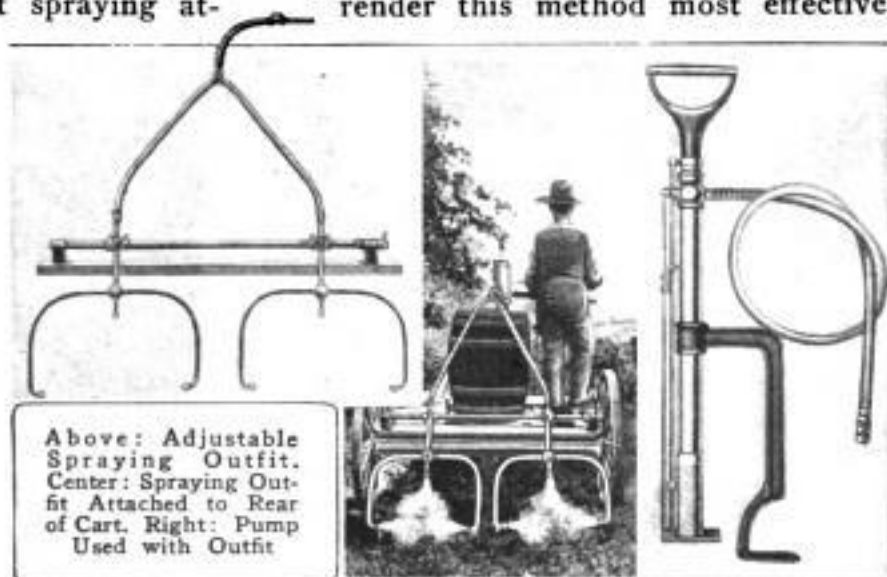


but is of course most suitable for the driver, while its application to the putter would be of little use.

SPRAYING ATTACHMENT HAS ADJUSTABLE ARMS

Adjustable arms constitute the essential feature of an efficient spraying attachment. These arms permit the nozzles to be adjusted according to the height of the plants and the width of the rows. Two rows may be sprayed in one operation. Each plant receives a fine mistlike bath from three nozzles—one coming from above and two from the sides—the entire outfit being designed for use with any reliable spray pump and easily attached to the rear of a cart or wagon. The flexibility of the nozzle ar-

rangement and the multiplicity of sprays, render this method most effective.

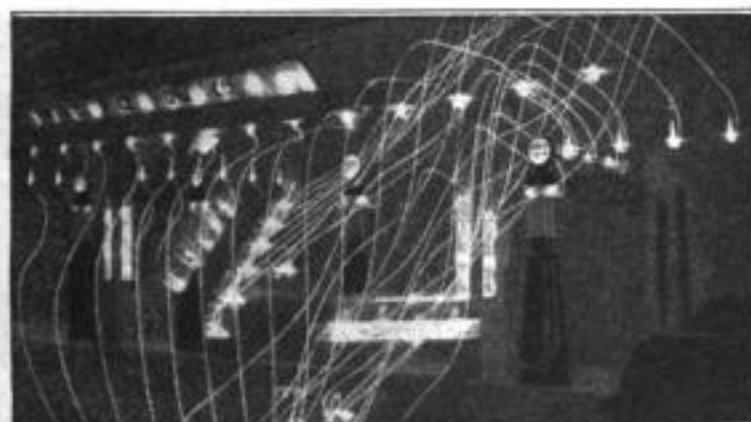


Above: Adjustable Spraying Outfit. Center: Spraying Outfit Attached to Rear of Cart. Right: Pump Used with Outfit

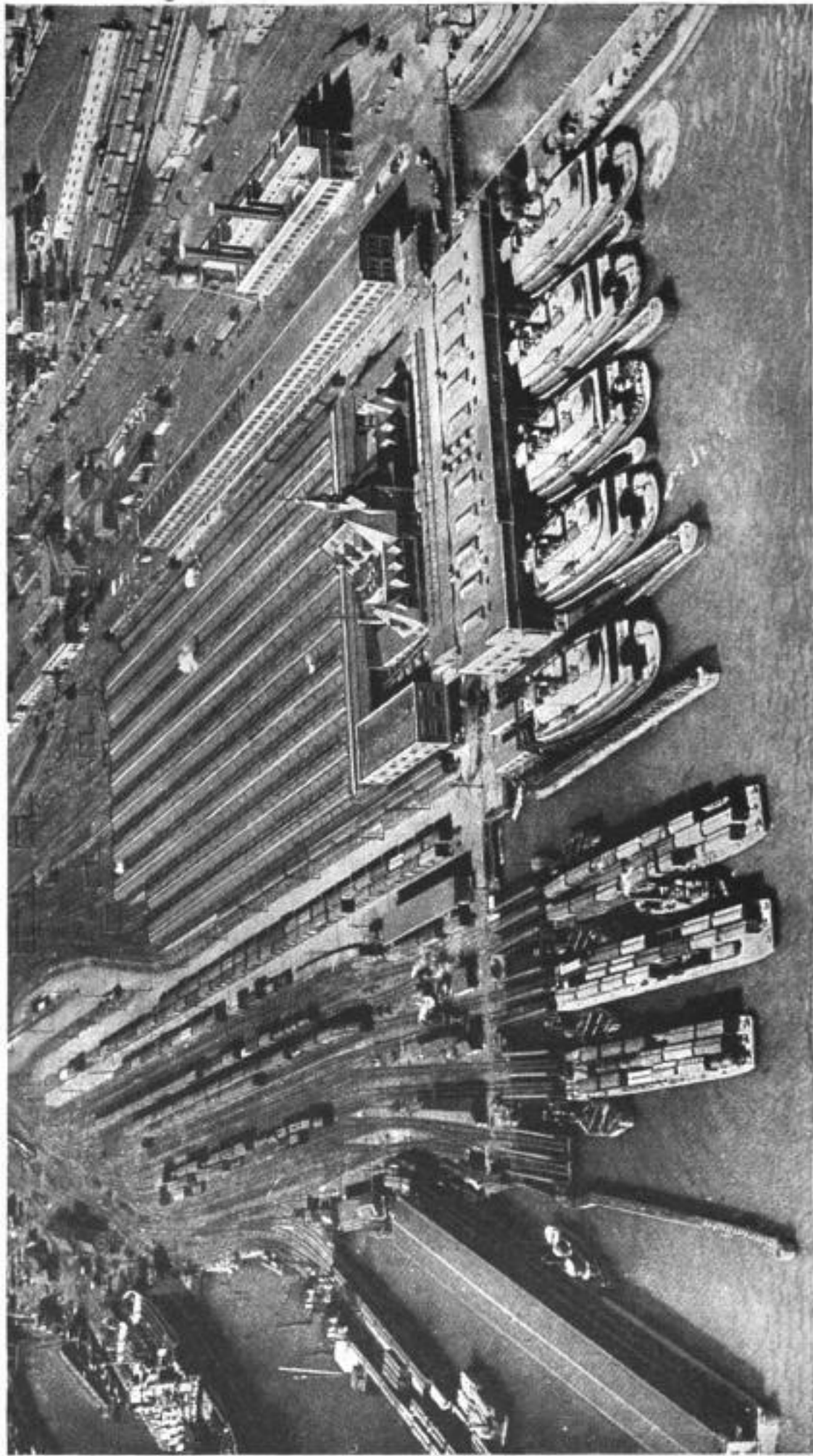
NIGHT EXPOSURE LOOKS LIKE X-RAY PHOTOGRAPH

A freak picture that has the appearance of an X-ray photograph, by showing lines that at first glance appear to represent concealed electric-light wires, was the result of an attempt at night photography. Preparatory to taking this picture of an oil and gasoline-service station, the amateur photographer had all the lights turned on and evidently neglected to close the shutter after making the first

10-minute exposure, for another view of the station shows at 90 degrees to the first one taken on the same film, as can be seen by scrutiny of the picture. The white lines that look as though they might be wires leading to the electric lamps, were undoubtedly caused by the action of the individual lights on the film, while the camera was being moved between the two exposures made at different points.



Above: Peculiar Picture, Evidently the Result of a Double Exposure in Attempting to Take Two Views at Night, of a Service Station with All the Lights Turned On. Left: Front View of Station Photographed in Daylight. Right: Daytime View of the Side of the Station



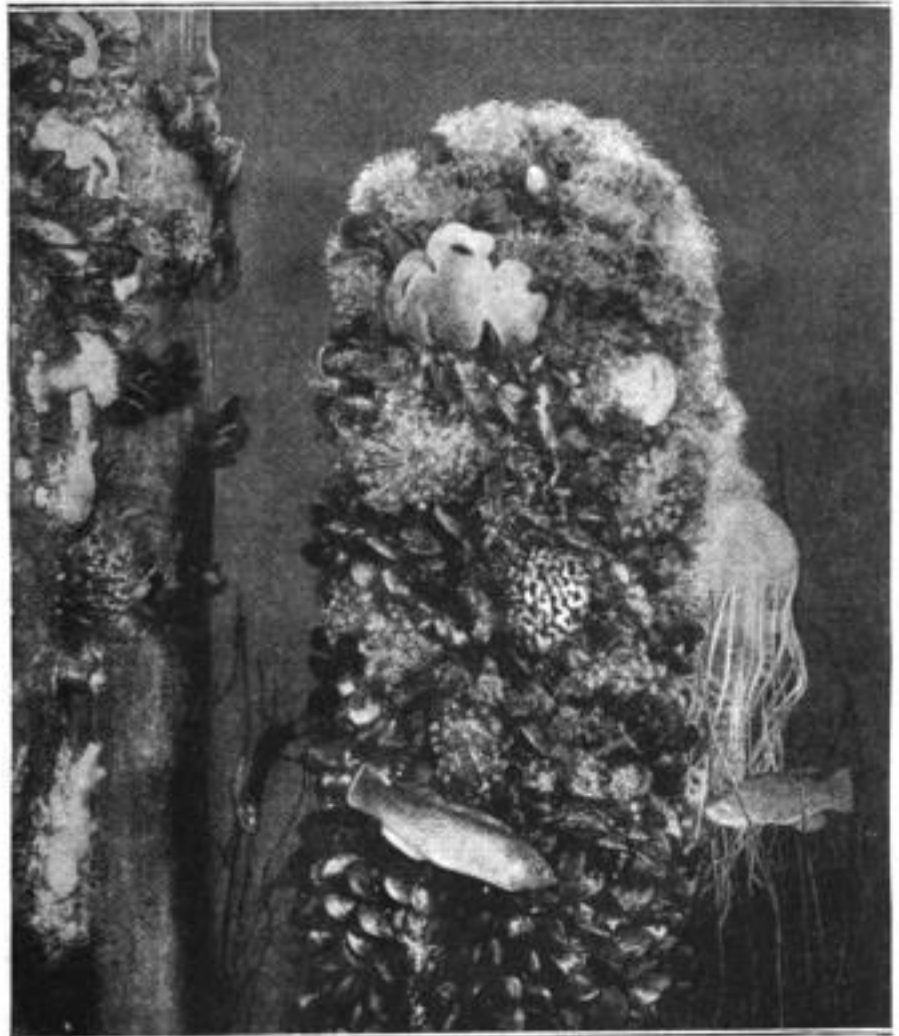
COPYRIGHT, MAJOR HAMILTON MAXWELL

AERIAL VIEW OF A METROPOLITAN TERMINAL WHERE CAR AND FERRY MEET

THIS view, which looks as though it might be an unusually elaborate layout of mechanical toys frequently displayed in store windows at Christmas time, represents a photograph made from an airplane, of the main yards and ferry terminal of the Central Railroad of New Jersey, at Communipaw, Jersey City, N. J. Here scores of electrically operated trains daily thread their way among the maze of tracks, exchanging passengers and cargoes with the ferryboats that ply the Hudson to New York City and return.

GLASS MODELS OF MARINE LIFE

After years of practice, Herman Mueller, an exceptionally skilled glass blower, has produced in glass wonderful facsimiles of the sea life that clings to old wharf piles, or that lies on the bottom of the sea off the coast of Massachusetts. He reproduces every form of marine plant and animal life, and after blowing the glass, he colors it in faithful imitation of the natural tints. In addition to its beauty, his work has real scientific value, and his reproductions are placed on exhibition in the Darwin room of the American Museum of Natural History, in New York City. The only other specimens of the kind that in any way compare with his are the remarkable glass flowers in the Peabody Museum of Natural History, at Cambridge.

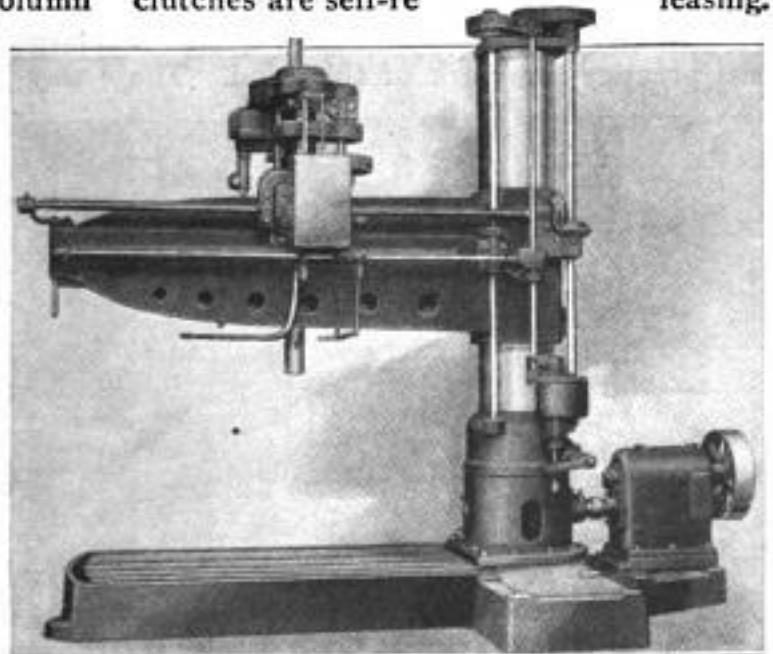


Reproductions of Marine Plant and Animal Life Blown in Glass, That Are Perfect Facsimiles of the Originals, Which were Collected from an Old Wharf Pile at Woods Hole, in Massachusetts

COLUMN-CLAMPING DEVICE FOR RADIAL DRILLS

To overcome the inconvenience of moving with the head. The friction clamping the swinging arm and column clutches are self-releasing.

of a large radial drill by hand, a power-operated clamping device that is operated from the drilling point has been developed. It consists of an oval box that is attached to the lower bearing bracket of the vertical driving shaft, and that by means of friction clutches drives a left and right-hand threaded spindle below the box. This raises or lowers a nut to which is forked a lever. The hub of this lever is tapped and works on the column-binding screw. The engagement of the friction clutches in connection with the threaded spindle is accomplished by a cam on top of the oval box, which is operated by splined vertical and horizontal shafts, a pair of bevel gears, and a lever and links attached to and



Power Column-Clamping Device for Radial Drills: The Device is Attached to the Lower Bracket of the Vertical Drive Shaft

SPECIAL LIGHTS INSTALLED TO LOCATE DRIVEWAY

Special lights installed at each side of the porte-cochère, or carriage entrance, of



Porte-Cochère of a Residence, Showing the Special Electric Lights Which were Installed at Each Side of the Narrow Driveway

a residence, are so wired that they may be switched on at the garage and off at the house, or vice versa. With the installation of these lights, the owner of the home is able to back his car readily out of, or drive into, his garage at night without scraping the fenders of the machine against the house, as was formerly sometimes the case.

SCHEME TO PREVENT WASHOUT OF PAVEMENT GRADES

Having proved its efficiency in preventing the accumulation of water at the base of new concrete-pavement grades, a scheme tried by the Illinois Division of Highways has now been made a standard practice for work of this kind. The



Left: Section of New Pavement Grade, Showing the Drainage Scheme Whereby Holes are Left in the Curb So That the Rain Water may Run Off Before It Reaches the Bottom of the Incline. Right: Side View of Pavement, Showing, More Clearly, the Construction of the Curb and Concrete Drain

essentials of the practice include the sloping of the road, at given points on the grade, toward the curb, in which holes are left for the passage of rain water through it and into the drains at the side. Most of the water is thus taken off the pavement before it reaches the bottom of the incline, where its accumulated force might cause damage. Another phase of the idea is the planting of grain along the embankments at each side of the highway, the roots of this growth helping to hold the fresh dirt in place against the destructive effect of heavy rains.

ELECTRIC LAMP ON FLOAT FOR NIGHT FISHING

Night fishing is made easy by the use of a float, in connection with the fishing



line, that has inside it an electric battery, and screwed into a socket on top of it a small incandescent lamp. The fishing line passes through an eye at the bottom of a wire soldered to the lamp socket. Fish nibbling at the bait causes this wire to make a contact that forms a circuit and flashes a light in the lamp, thus affording the fisherman a sure sign of a possible catch.

For the guidance of airmen, the practice of painting the names of towns in large letters on the roofs of their railway stations, has been recommended.

COLLAPSIBLE PORCH OF HOME TAKEN DOWN IN WINTER

A collapsible porch which may be taken down and stored away during the winter months, has been built for the home of a

HARDSHIPS OF FARM WOMEN SHOWN INGENUOUSLY

An exhibit table arranged during a recent stock show in Oregon cleverly demonstrated some of the hardships of



Above: Interior of the Collapsible Porch Which was Built for the Residence of a Lover of Sunshine, Showing the Roomy Inclosure with the Wooden Frames for Supporting the Screening, and the Canvas Roof Stretched over the Framework of Iron Piping. Right: Exterior of Porch, Illustrating Its Neat Appearance



lover of sunshine. It was because of his desire not to have the sunlight shut off from his dining room during the cold weather, that the owner of the house had the collapsible porch erected instead of one of a permanent character. The floor of the porch measures 15 by 16 feet, and is of concrete marked into small squares in imitation of tile flooring. The sides of the inclosure are of ordinary screening fastened to wooden frames, the whole being surmounted by an awning roof.

There is a revival of interest in the oft-proposed scheme for connecting the North Sea with the Atlantic by a ship canal across Scotland, a 72-mile route from the Firth of Forth through Loch Lomond to the Firth of Clyde being the most favored.

women living on old-fashioned farms. To one side was represented a small farm, a farmhouse in one corner, a few cattle wandering about, and a watering trough and pump in the opposite corner. Halfway between was the figure of mother trudging to the pump with a pail in her hand, while a small sign near by read: "Convenient for Cattle but Not for Mother." On the other section of the table was a graveyard with "true epitaphs," two typical inscriptions reading: "Here Lies the Body of Grandma Grump, She Wore Herself Out Lifting the Pump," and "Rest to the Ashes of Alice Good, Whose Form Was All Bent from Carrying Wood."

FOUR-STORY BUILDING ERECTED AROUND COTTAGE



Four-Story Building Which was Erected around a Small Cottage, Showing One End of the Dwelling as Part of the Building Wall Before It was Entirely Finished

Sentimental reasons caused the owner of a small cottage to preserve it despite the fact that he desired to erect a four-story building upon the site occupied by the dwelling. This was accomplished by raising the cottage to a level with the second floor of the building so that the entire ground floor could be used for stores. The first floor of the house thus forms part of the second floor of the building, while the cottage attic, squared into rooms, forms part of the third story. One end of the house forms part of a wall of the building, but after its completion, there is nothing left on the outside to indicate the unusual construction.

CRYSTALS FOR RADIO SETS THOROUGHLY TESTED

A mineral company, specializing in crystals for radio sets, gives these crystals a first test at the mine to determine and separate the "dead" from the satisfactory ones. Ultimately, the minerals receive two more tests at the hands of an operator licensed by the government. The finished products are mounted by a hand process, in a low-fusing alloy, in standard-size half-inch cups, and are put up in settings containing from a single to a half dozen crystals.

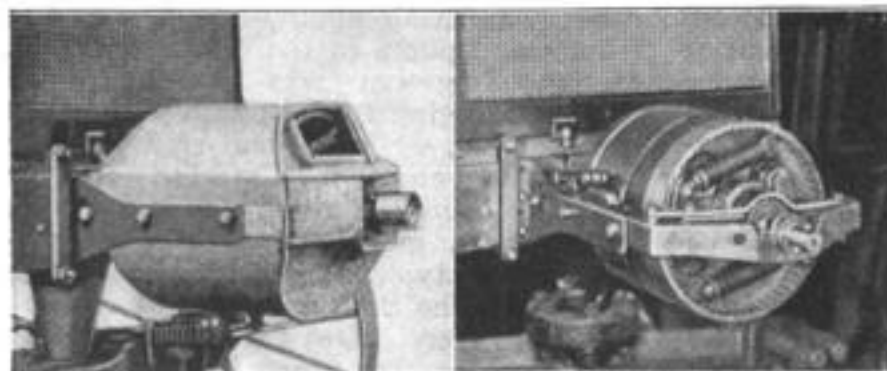


Operator, Licensed by the Government, Shown Testing Crystals. Insert: Different Forms of Crystals Used in Radio Equipment

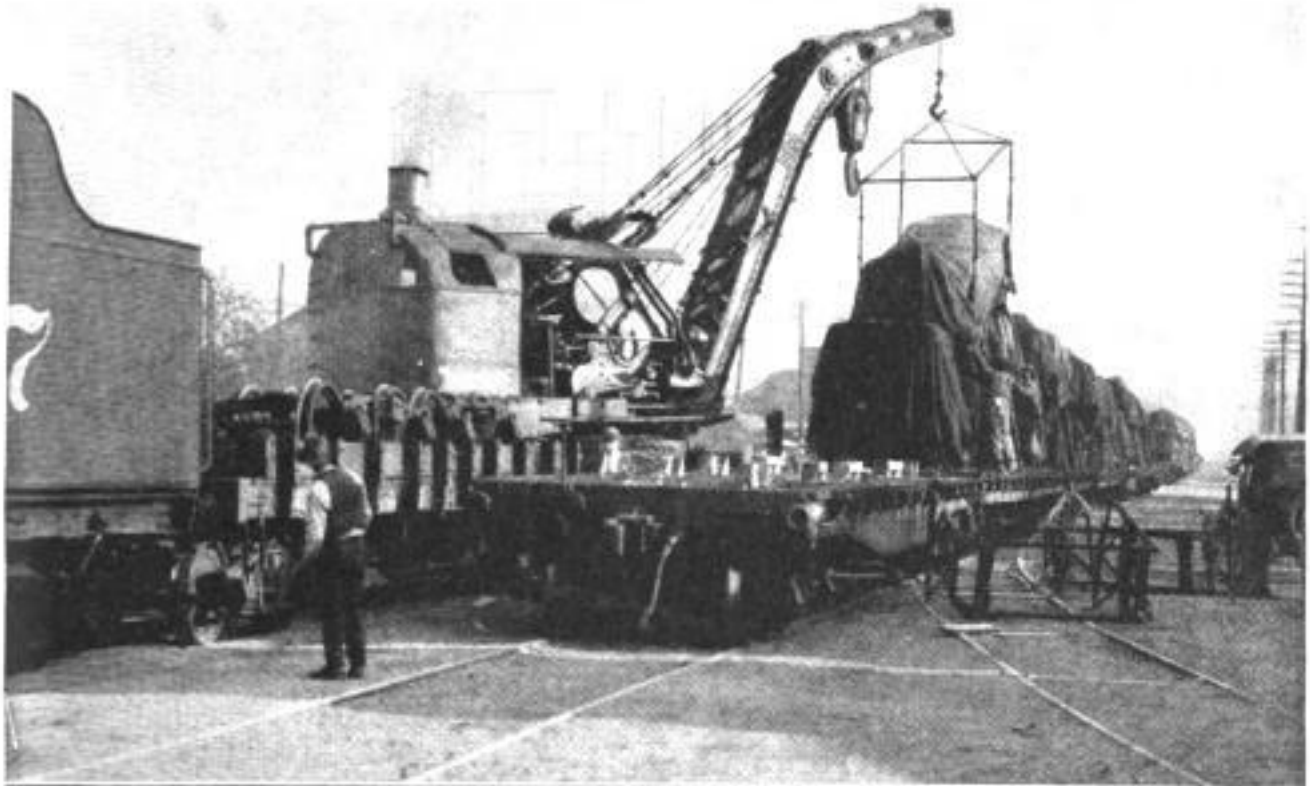
SPRING-ACTUATED STARTER FOR TRACTOR MOTORS

A spring-actuated starter of sufficient power to be used for tractor motors has been tested recently with success. The device is operated from the platform by a

lever near the steering wheel, and turns the motor over 10 times, about three times as fast as can be done by hand. The spring has sufficient tension to turn the engine to the next compression after the first firing stroke, and in case the engine should then fail to start, the spring can be rewound by hand with the lever provided.



Left: Spring-Actuated Mechanism for Starting Tractor Motors, Shown Enclosed and Attached. Right: Close-Up of Starter with Cover Removed



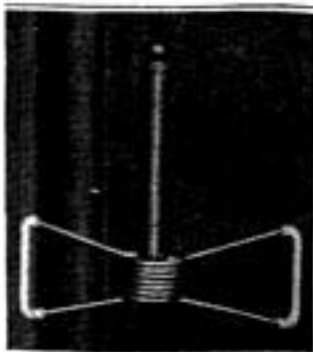
The Wrecking Crane About to Swing One of the Autos Clear and Lower It to the Ground: Using This Method, 48 Automobiles were Unloaded in Four Hours, While without the Use of the Crane, It would have Taken a Large Crew of Men Several Days to Complete the Same Work

RAILROAD WRECKING CRANE USED TO UNLOAD AUTOS

Believed to be the first time in the history of the automobile business, a railroad wrecking crane was used to unload a shipment of autos recently, in the yards of the St. Louis-San Francisco Railway at Birmingham, Ala. By this method 48 automobiles were unloaded in the remarkably short time of four hours. Without the use of the wrecker, it is believed, it would have taken a good-sized crew of men several days to complete the same work.

DOORS CLOSED OR HELD OPEN BY SPRING ARRANGEMENT

Doors may be held open in any desired position, or may be automatically closed after having been opened in the usual



manner, by the use of a simple spring arrangement. The appliance is designed to fit over the end of either hinge when used as a "closer," and is placed underneath the door to use as a "stopper."

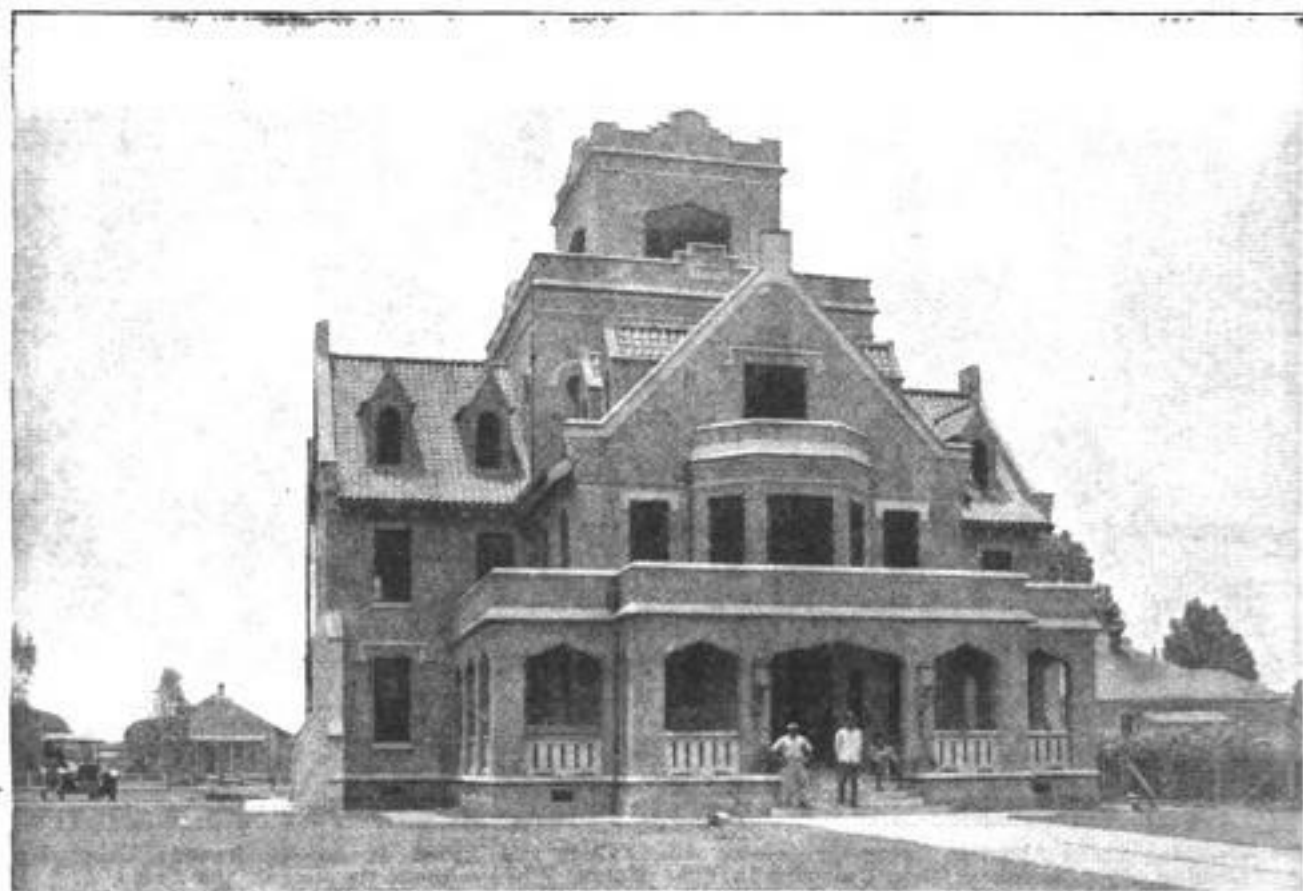
ALL-STEEL FILING CABINET IS EXCEPTIONALLY LIGHT

A filing cabinet that will hold 1,400 full-size business letters, besides a stand-

Steel Filing Cabinet,
Weighing Only 72 Ounces,
That will Hold 1,400 Full-
Size Business Letters be-
sides the Index



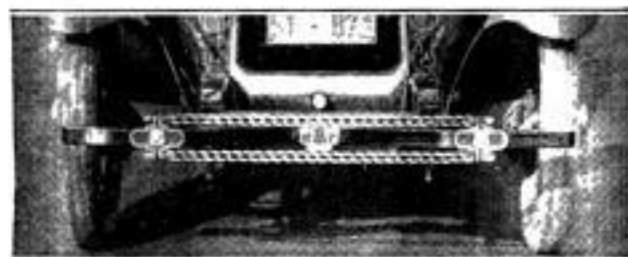
ard A-to-Z index, is so light that when empty it weighs only 72 ounces. It is made of cold-rolled steel, and has a piano hinge for the cover and for the side that is opened out when filing. It has a 12-tumbler lock, and on all cabinets the combinations are different so that no key will open two of them. It was originally designed for use in the home.



Beauregard Parish Jail, De Ridder, Louisiana, That Is More Like a Private Mansion or Clubhouse than a Prison: Inside and Out the Building Is So Attractive That It has been Remarked That the Sheriff should Have More Trouble in Keeping People from Breaking In than from Breaking Out

CHAINS AND DOUBLE SPRINGS FORM NEW AUTO BUMPER

Interesting features are embodied in a new auto bumper, built somewhat on the principle of the regular auto spring. A steel bar fastened to the auto frame has a reverse curve at each end, and these ends, after turning forward and around, are run back to the center of the bar, where they are reinforced by an extra spring leaf and clamped together. The clamping device allows $1\frac{1}{2}$ inches of play, while two chains drawn tightly across the front of the bumper eliminate vibration by holding the bumper taut, and, also, in themselves, are capable of absorbing some of the shock. A rod running from the rear center of the bumper to the front axle helps support the weight of the bumper.



The Chains Drawn across the Front of This New Auto Bumper Hold the Spring Taut and Are Capable of Absorbing Shocks

PARISH PRISON IN LOUISIANA BUILT LIKE A CLUBHOUSE

In appearance much more like a fine clubhouse than the usual prison building, the Beauregard parish jail, at De Ridder, La., was constructed several years ago to conform with the idea that a place of imprisonment should be a house of correction rather than a dungeon of punishment. The building has the reputation of being almost perfect in sanitation and health conditions. It is massively built of reinforced sand-blasted concrete, three stories high, with a terra-cotta roof, and a square central tower. Every cell in the interior is roomy and has a window, so that no prisoner is deprived of fresh air and a view of the beautiful sky and landscape of a southern state. Baths and toilets are provided for every cell, and every prisoner sleeps in a comfortable bed. The jail adjoins the courthouse, near the business center, and connecting the courtroom with the jail is a tunnel through which prisoners on trial are conducted as their cases are called.

☞ Sugar can be produced by action of sunlight on aqueous carbon dioxide—commonly called soda water—according to recent researches.

COYOTE INDUSTRY DOOMED TO DIE

BY MEL WHARTON

THE coyote of the western plains, ruthless slayer of sheep and with a price set upon its head, has a higher market value today than the average sheep on the range. Since 1916, the year during which the government instituted its campaign against this and other sheep-killing animals, the trade in coyote pelts has been greatly stimulated. The increased influx of the pelts on the fur market led to the popularizing of coyote fur, which today is worn in every American city.

In 1916, it was estimated that the depredations of coyotes and other animals cost livestock raisers of the United States approximately \$20,000,000 yearly. A study of the habits of the coyote was made, and cooperation sought to the end that the West might be rid of these costly raids. Extermination operations consist of carefully planned shooting, poisoning, trapping, and den-hunting campaigns.

In 18 states of the Union, bounties are placed upon the heads of coyotes. The average bounty is about \$3.50. The average skin will command \$5.50 at market, thus bringing the total value of a coyote to about \$9. This value has sent scores of hunters, trappers, and poison-bait artists into the realm of the coyote, with the result that thousands are now killed every year. For the fiscal year ended June 30, 1921, the number of coyotes in the United States turned

in for bounties was 24,234. But the number of pelts presented for bounties does not represent the total killed. Experts estimate that fully as many coyotes are killed and die unfound as are brought to market. Thus about 25,000 more are yearly exterminated, bringing the total annual killings to approximately 50,000. The total market value of the pelts yearly is approximately \$225,000, which places the slaying of coyotes upon an industrial basis.



Coyote, One of a Pair Kept for Breeding Purposes, the Offspring being Killed for Bounty and Sale at Market

The peak prices paid for coyote pelts were during the World War when thick-furred and large skins brought \$28 at St. Louis. The industry became so lucrative that there is on record one instance in the state of Washington of the starting of a coyote farm. One enterprising woman rancher obtained a pair of the animals which were bred, the offspring reared to maturity and killed, both for bounty and sale at market. Measures

were taken, however, to prevent the presentation of farm-raised coyotes for state and county bounties. The original pair of coyotes became very tame and could be fondled by the owner much the same as pet dogs or cats.

At the present rate of slaying, at the end of another 10 years only one coyote in ten that now ex-

ist on the plains will be alive, according to predictions of the Federal Biological Survey, from facts of extermination in its possession. There is every reason



Coyote Pelts Hung on the Porch of a Trapper's Home: These 17 Pelts were Obtained in 16 Days by Distributing Poisoned Meat over the Surrounding Country

to believe that the campaign now being waged will continue on the stock ranges. Live-stock raisers assert that each coyote killed is worth \$50 to them. Knowing that the extermination crusade must be carried on if their interests are to be

protected, there is small likelihood that the war will lag until the predatory animals are reduced to a negligible number. The coyote breeds rapidly and stock raisers are relentless in their efforts to rid their lands of the killers.

AIR-DISTANCE RECORDER FOR AIRPLANES

Just as mileage, as indicated by the speedometer on the automobile, is the measure of all performance to the automobilist, so "air mileage," no matter how obtained, acts as the same measure to the pilot of an airplane. Air mileage differs from the

ground mileage of the automobile only in that it is measured relative to the air rather than to the ground. To illustrate this difference, let us consider an airplane whose nominal air speed is 120 miles per hour. If there were no wind blowing, it would cover exactly 120 ground

miles in one hour of flight. However, if there is a 40-mile wind blowing, and the airplane flies directly against it at the rate of 120 miles, it would have covered only 80 ground miles at the end of one hour's flight. If the airplane had been flying directly with the wind, it would have covered 160 ground miles at the end of the same time. This, then, is the fundamental difference between air mileage and ground mileage, and it can be readily appreciated that total air mileage is the logical measure of all performance to the airplane.

In order to have a record of the performance of his ship, every thorough pilot keeps a "log"; that is, he notes the time of take-off and landing of every flight, figures the elapsed time, and totals, day by day, the flying time. To arrive at the distance he has flown, the best he can do is to multiply his hours by the estimated air speed, giving a result which is in most cases so far from correct that reliable performance figures cannot be based on it. And to maintain this record, either

the pilot or his mechanic has to do a large amount of clerical work, that is as unsatisfactory as it is bothersome.

All of this "bookkeeping" and inaccuracy is eliminated by the use of the air-speed recorder.

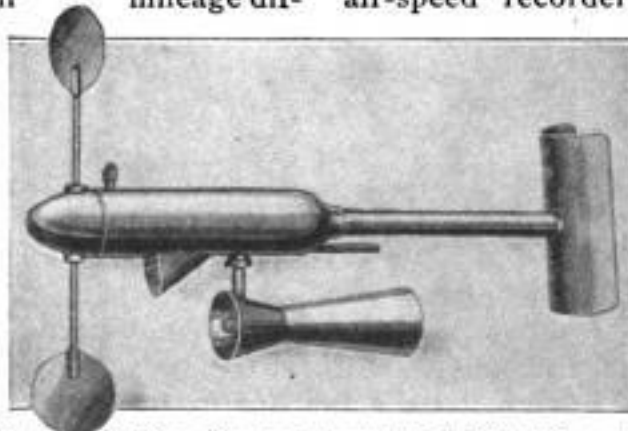
If a trip or daily record is wanted, this may be noted from the "trip" indicator, which is then set back to zero. The season mileage gives a continuous record of the performance of the ship.

This provides a real basis for all calculations and records: fuel and oil consumption, actual air speed, service between overhauls, costs per passenger or per ton-mile, relative financial return from different ships per mile flown, and so forth.

The instrument is also invaluable as a navigating instrument for the pilot flying over unfamiliar country, or in weather which more or less obscures his landmarks. By making allowance for the wind, which can be done by a simple ground observation, it is possible to bring a ship down pretty close to a desired field, even under most unfavorable conditions.

It is, furthermore, a thoroughly reliable and practically fool-proof instrument. A small propeller, which is mounted on a forward wing strut, revolves as the plane goes forward, once a mile actuating a valve which admits suction, created by a small but powerful Venturi tube, to an indicator on the instrument board, adding one mile to the recorded distance.

The accuracy of the recorder, when properly installed, is within a fraction of one per cent for all flying speeds and for altitudes up to 20,000 feet.



Small Aerial Propeller and Venturi Tube That Operate, Once Every Mile, the Recording Mechanism of the Air-Distance Meter



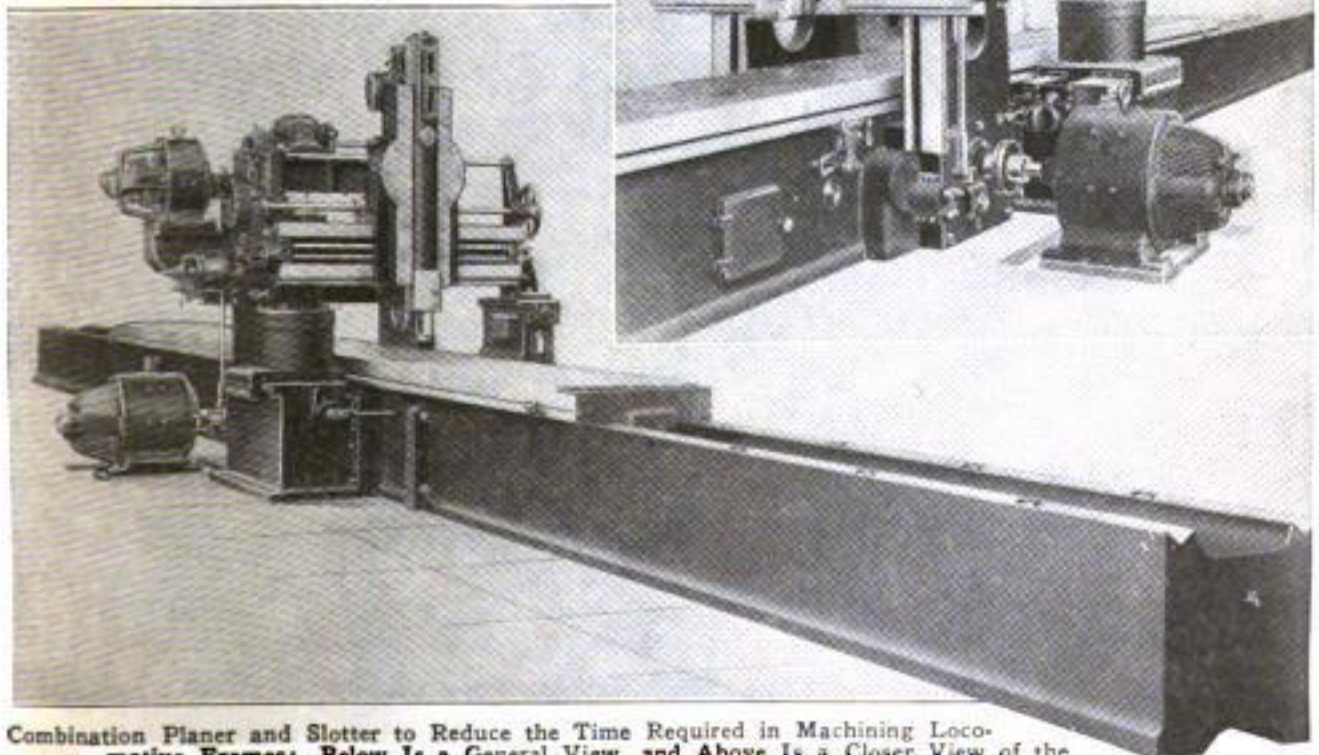
Recording Unit of the Air-Distance Measuring Apparatus for Airplanes

The combined weight of the transmitter and indicator is less than 2 pounds, and the head resistance of the transmitter is practically negligible.

It may be seen that this simple instrument will do a very great deal toward furnishing reliable data for the performance of any ships on which it may be installed.

JOINT PLANER AND SLOTTER FOR LOCOMOTIVE FRAMES

A combined planer and slotter for locomotive frames does away with the necessity of independent settings of this heavy work on both a planer and a slotter. One set-up of the work on the combined machine is all that is required to finish completely the locomotive frame. At about the middle of the long bed of the machine are two crossrails, one supporting the planer head and the other the slotter head. The crossrail for the latter can be swiveled entirely out of the way when necessary to use the planer for work requiring the maximum height under the planer crossrail. This is of sufficient length to accommodate two heads, each having a full traverse across the table. The slotter is self-contained, and the head has independent automatic feed, and both lengthwise and crosswise traverse. A variable-speed motor is mounted on the end of the crossrail, providing the necessary range of strokes.

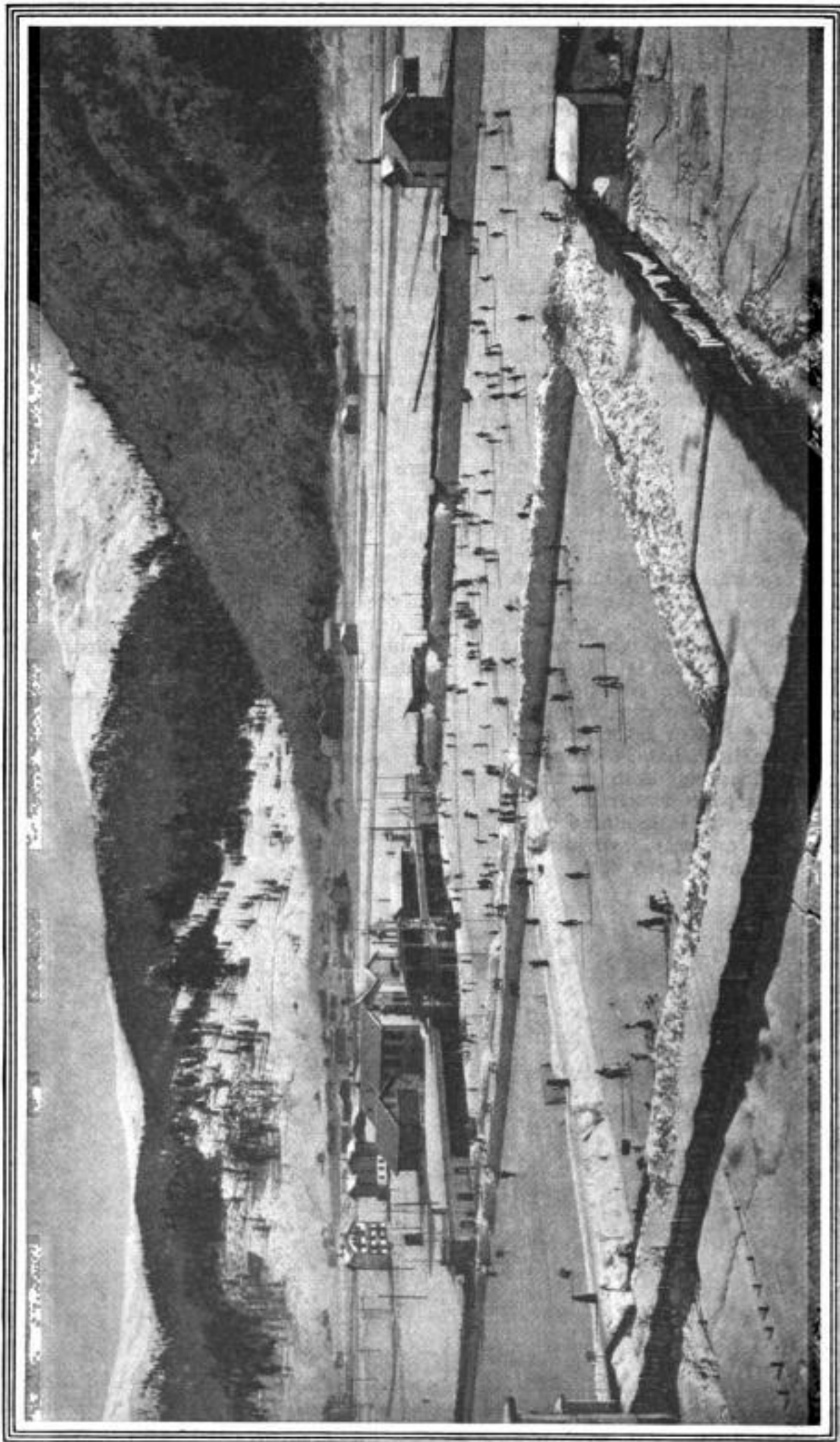


Combination Planer and Slotter to Reduce the Time Required in Machining Locomotive Frames: Below Is a General View, and Above Is a Closer View of the Front Part of the Planer Unit and the Back of the Slotter Unit

SPECIAL AUTO-WHEEL DISKS SEEN AT HAVANA

Colored auto-wheel disks of heavy paper and tin were seen on many automobiles in Havana during carnival time, last year. The disks with the pinwheel, and other freak designs, painted on them were fastened over the regular wooden and wire spokes. Those made of paper had the queerest designs and proved to be the most popular, although a large number of tin models were also sold.





Picturesque Ice-Skating Rink Which is Located at Davos, Switzerland, and Which is the Largest Rink of This Kind in Europe: The Inclosure Covers Approximately 7½ Acres and is Divided into Several Sections for the Holding of Contests in Different Branches of the Sport. Considerable Money is Spent in Maintaining a Smooth Surface on the Ice, and Also for the Removal of Snow, as may be Seen in the Picture

THE LARGEST ICE RINK IN EUROPE

Just as the Cresta Run at St. Moritz is the mecca of the world's foremost toboggan riders, so is the ice rink of Davos—another exquisitely situated Grisons resort—the rendezvous of internationally famed skaters. This ice rink, the largest in the whole of Europe, measures at present some $7\frac{1}{2}$ acres, and is soon to be enlarged. It is divided into three parts, i. e.: First, there is the large general rink, on which the double run of 1,332 feet in length and $16\frac{1}{2}$ feet in width is for the races, as well as the special inclosure for figure skating and waltzing; second, the rink for English figure skating; and third, the rink for curling. Also, there is the Davos village rink.

The rink is generally open from the end of November to the middle of March, and the climatic conditions prevailing at that

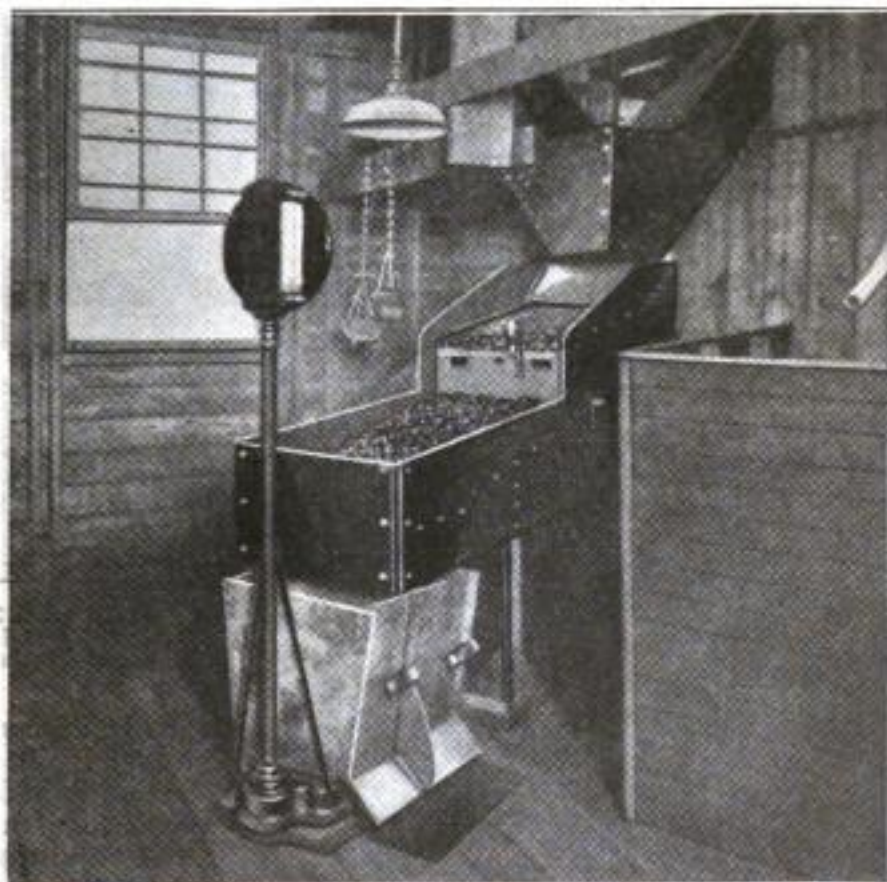
altitude of about 5,000 feet above sea level are so favorable that it is indeed an exception when the rink has to be closed during this period.

Quite a considerable staff of men is employed to maintain the rink in order. The ice is flooded every night and is scraped and polished in the morning before dawn with practically the same care that glass workers bestow upon plate glass. An occasional snowfall does by no means lessen the gay activity on the ice, for it is so energetically dealt with that it requires an exceptionally heavy storm to stop skating, even for a few hours. Brilliant ice festivals and thrilling contests for European and international championships are special features on the Davos rink during January and February, when every variety of ice sport is seen.

MINE-CAR SAMPLER IMPROVES QUALITY OF COAL

A recently invented mine-car sampler is said to have increased the care exercised by men loading coal in a southern mine, to such an extent that the amount of refuse going to the dump was reduced from 20 per cent to less than 8 per cent within two weeks. This is important in maintaining quality from low-grade beds and in avoiding freight on material worthless as fuel. The sampler consists of a scoop arranged to swing in and out of the stream of coal being dumped from the mine car on the tippie, taking a 100-pound sample at each swing and dropping it into the sample bin. From this bin the coal passes to a second bin, from which it is drawn off through a chute and then travels over two shaking screens and a picking table, where an attendant picks out the slate and other refuse. This is dropped into one of the compartments of a two-compartment bin, and the lump coal finally lands in the second compartment of the bin,

which rests on the platform of an automatic dial scale. Several of these units

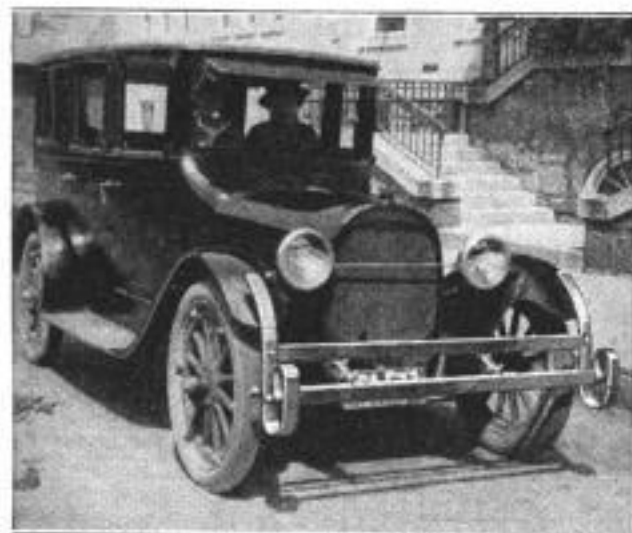


A Typical Installation of Sizing Screens, Picking Table, Bins, and Automatic Dial Scale Used in Connection with Mine-Car Sampler for Determining the Amount of Waste in Mine-Run Coal

installed at one mine have reduced the labor required for sampling, and increased the value of the final product.

BUMPERS FOR AUTOMOBILES PROTECT FENDERS

A new style of bumper for automobiles is so designed that the fenders of the machine are protected from damage in the

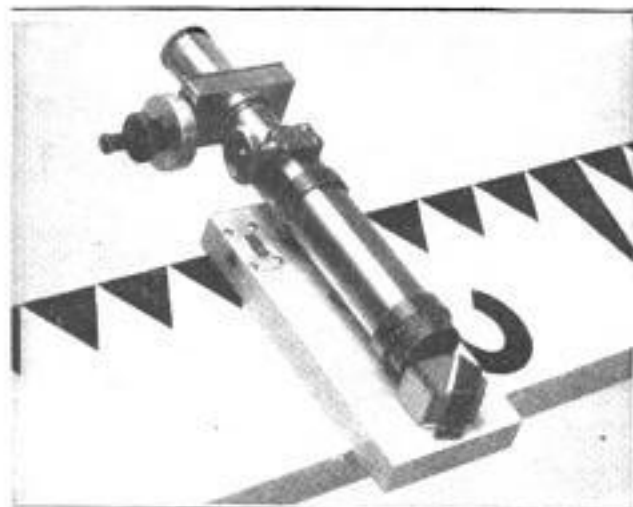


Bumper Attached to the Front of an Automobile, Showing How the Spring Protects the Fender

event of a collision. The bumper is bolted to the springs on each side, and has two of the ordinary steel bands extending across the front of the car. At each end of these horizontal members is a band of similar material which curves up and over the end of the fender. These bumpers are manufactured to fit any make of machine and can be mounted at either the front, rear, or both ends if so desired.

NEW INSTRUMENT SIMPLIFIES SURVEYING WORK

By means of a new instrument, a simple method that greatly reduces the time and labor of making topographical sur-

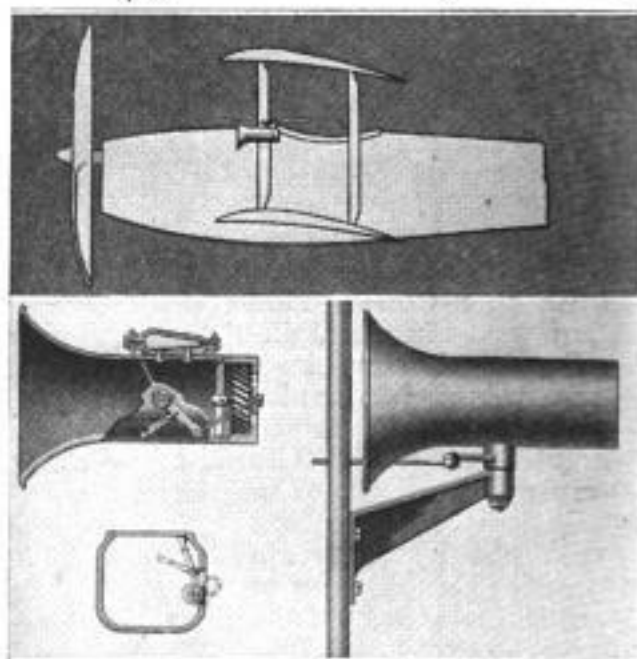


Two of These Instruments are Used in Connection with a Stadia Rod in a Recently Devised Simplified Method of Topographical Surveying

veys, has recently been developed at the Bureau of Standards. As in stadia work, which it is intended to supplant to a great extent, a graduated rod is used which, in this case, is kept at the observer's station instead of being carried to the various points on which readings are wanted. At one end of the rod is placed a small telescope, the cross-hairs of which are brought to bear upon the object. Near the other end of the rod and at a given interval from the first telescope, to which it is made parallel, is placed a second telescope, focused upon the object by means of a small prism and an adjusting screw. In this manner a reading is obtained from which the distance and elevation of the object can be computed.

AIRPLANE WARNING SIGNAL OPERATED BY WIND

The purpose of an automatic signal device, recently invented, is to give warning of the approach of an airplane, which

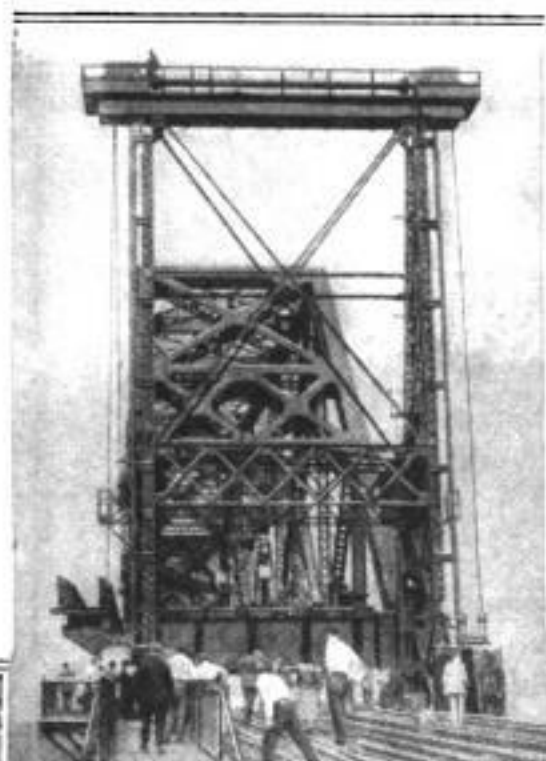


Above: Diagram Showing Location of Wind-Operated Warning Signal for Airplanes. Left: Section Showing Signal Mechanism. Right: Close-Up of Signal Device

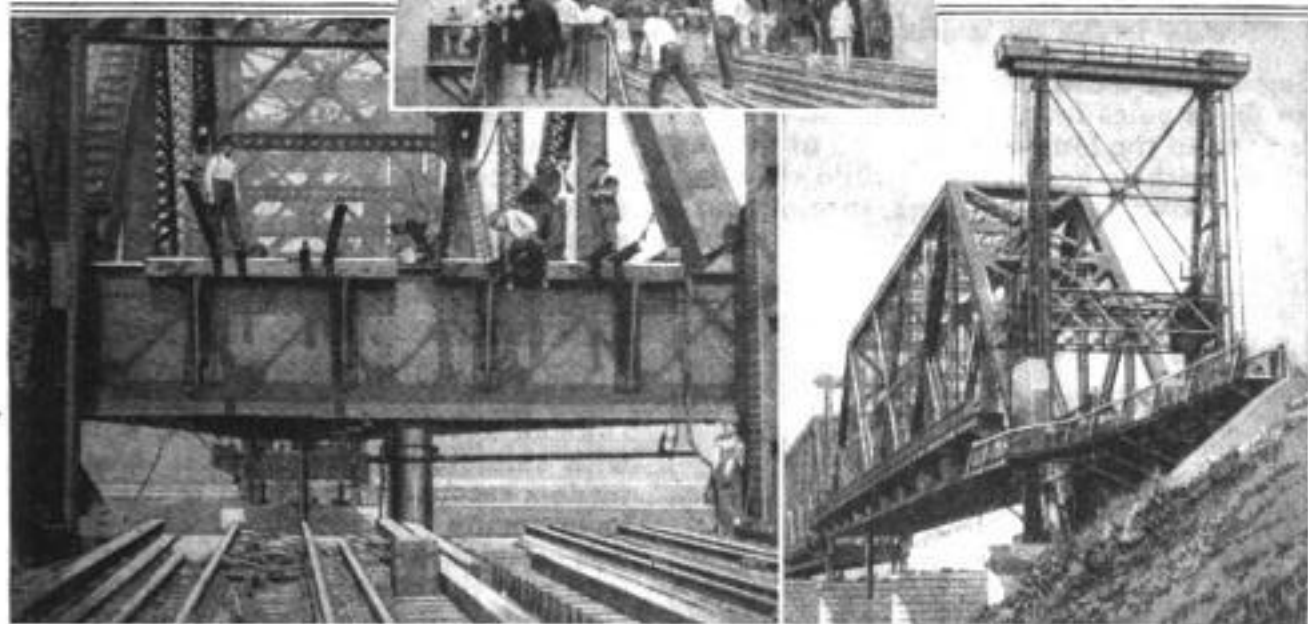
usually descends to the ground with engine shut off, to persons who may be on the landing field. The device, which is provided with suitable levers and rods so as to be under the control of the pilot, is mounted on a bracket within the fuselage and arranged to be swung out through an opening when it is desired to signal. The force of the air passing in through the bell-shaped mouth of the horn, rotates an air motor that can be adapted to drive a siren or other type of signal.

FINISH HEAVIEST VERTICAL-LIFT BRIDGE SPAN

A 370-foot bridge span, weighing 3,000,000 pounds, recently completed for the municipally owned Southern Railroad of Cincinnati, is claimed to be the heaviest vertical-lift span ever built. This span, which forms part of the new bridge over the Ohio River, was built a 13-foot lift at the Kentucky side of the bridge, in order to meet the government requirements for clearance at high wa-



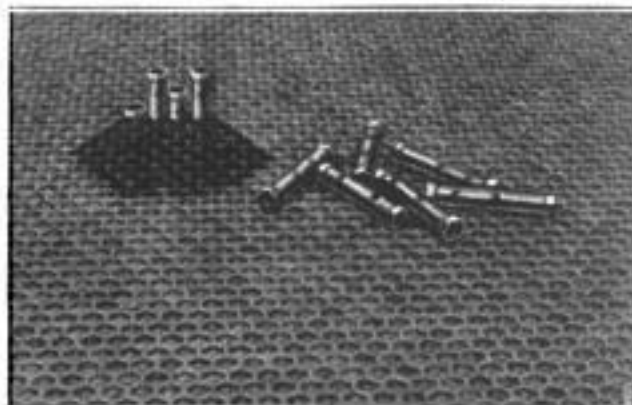
ter. It forms a truss 70 feet high, and in order to reduce the weight as much as possible, silicon steel of high strength was used in place of ordinary carbon steel. The lifting is done between two towers, carrying cables to which are attached four 50-ton counterweights, by means of motors and oil pumps that operate slow-moving hydraulic jacks. The bridge cost 3,500,000 dollars.



Above: Close-Up of Heaviest Vertical-Lift Span in the World, Which Forms Part of the Recently Completed Bridge across the Ohio River at Cincinnati. Left: The 370-Foot Span Raised 13 Feet above the Normal Deck Level. Right: General View of Lift Span

AUTOMOBILE RADIATORS MADE FROM CARTRIDGE TUBES

Automobile radiators are now being made from copper cartridge tubes, as the result of a process developed during the war for the rapid extrusion of copper tubes used in the manufacture of cartridges. A radiator composed of a number of cells made from these copper tubes is easy to assemble and repair, and is not liable to serious damage from freezing, owing to the absence of troublesome joints. Copper transmits heat readily and is practically immune to corrosion.



Close-Up, Showing Construction of Radiator Made from Copper Cartridge Tubes: Note Ease with Which a Tube can be Removed and Inserted

POLES SET IN OCEAN'S BED BY MEANS OF PUMP

A large force pump mounted on the deck of a boat or on a wagon is now be-



Modern Method of Setting Poles for Fish Traps, Used by Cape Cod Fishermen: The Man on the Wagon Operates a Pump That Forces Water through the Hose Nozzle Held by the Man Standing

ing used by the fishermen of Cape Cod, to drive poles for their fish traps, in preference to the long-used method of driving them with a heavy maul while standing on a shaky ladder in the surging surf.



Close-Up, Showing Operator Holding Nozzle in the Same Hole, with a Fish-Trap Pole That has Just been "Pumped In"

The screened end of the suction hose rests on skids which hold it a few inches above the bed of the ocean, to pre-

vent sand from entering. The discharge of the pump has connected to it a wire-bound hose, ending in a nozzle made of iron pipe which is curved to facilitate handling and has a final straight portion about 6 feet long. In operation, the straight portion of the nozzle is pointed vertically downward into the sand or mud and the pump started, the force of the stream of the water being such that the nozzle usually can be sunk to its full length in five to ten seconds. The butt of the pole can then easily be pushed down alongside the buried nozzle into the hole provided. The nozzle is then pulled out and the pole held a few seconds to allow the

hole to fill in around it. It is said that an experienced man can put in two poles a minute, and that in a few minutes a pole is so firmly set that it cannot be pulled out by human force. The pump can be operated either by power or by hand.

SYNTHETIC WOOD IS PRODUCT OF SAWDUST AND SHAVINGS

From shavings and sawdust, combined with suitable binders, there is now being made a reconstructed wood that is said to have many advantages. The process was originated by Prof. George Kemmerer, of the chemistry department of the University of Wisconsin, and the new material has been used commercially since last winter, and has been found to be better than wood for certain purposes.

The sawdust, after being mixed with a new binder material, is put into a mold, and subjected to a pressure of from 500 to 1,000 pounds per square inch. The resulting product is much tougher and harder than ordinary wood, does not split, and is practically impervious to water. This reconstructed wood takes finishes, such as varnish and enamel, very well. Its chief use is in the manufacture of articles of irregular shape, such as toilet sets, radio dials, and variometer rotors. Instead of having to undergo the tedious and costly process of carving, as in the case of ordinary wood, the process pulp can be put into a suitable mold, placed under pressure, and when dry, the product is hard, grainless, and seamless.

It does not break or chip, and it holds screws firmly. Although the material can be cut with a saw, it is difficult to cut it with a knife. When put under pressure in conjunction with ordinary wood, it was found that the latter bent and cracked more readily than the new product. In these respects and many others it very much resembles a new synthetic wood that is now being made in Germany from cellulose, and which was described in last month's issue of this magazine. As it is a product of waste material, it is probable that the American wood can be made at less cost than the German.

EXPLOSION THROWS MACHINE THROUGH ROOF

The explosion of the steam generator on a vulcanizing outfit threw the machine up through the ceiling and roof of a filling station at Perryton, Tex., recently. It weighed 1,200 pounds. The tremendous concussion literally jarred the whole town, and the shock was distinctly felt

for a distance of a mile from the scene of the accident. Fortunately, all the em-



Filling-Station Roof, Showing Part of Vulcanizing Steam Generator Which was Thrown Up by the Terrific Force of the Explosion

ployes happened to be outside the station when the explosion occurred, and no one was injured.

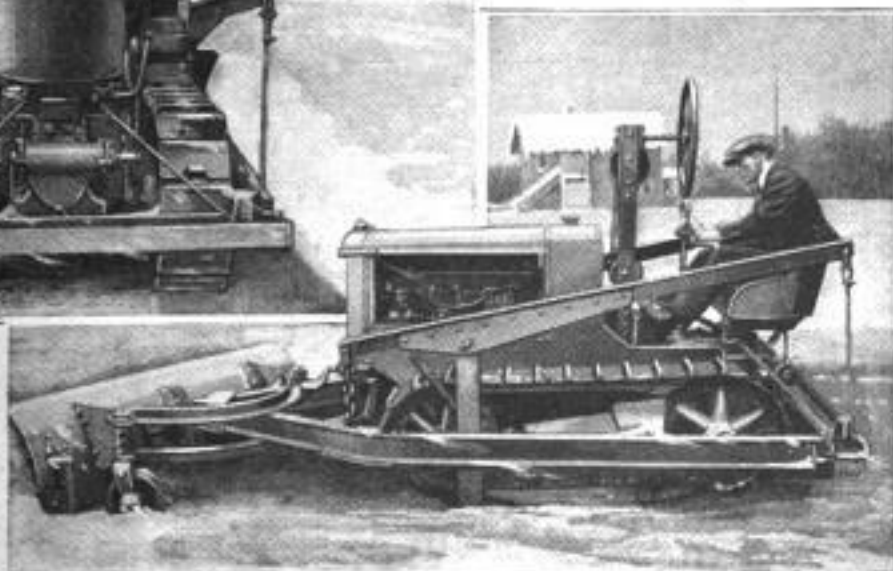
NEW-TYPE SNOWPLOW BUILT FOR SMALL TRACTORS

A tractor snowplow for use on city streets and country roads, has recently

lifted by means of two long levers, the fulcrums for which are pins held by brackets located on the frame of the tractor. The two levers, placed at either side of the tractor, are operated by a cable and worm-gear hoist mechanism which is controlled by a large hand-wheel in front of the operator. The plow is of



Above: Rear View of Endless-Tread Type of Tractor, Fitted with New Snowplow Rig, Intended for Use on Country Roads and City Streets Where Snowfall is Not Excessive. Right: Side View of Tractor Snowplow in Operation, Showing One of the Long Elevating Levers on the Side



been developed that has an elevating mechanism of new design. The blade is

moderate capacity, for use on sidewalks and where the snow is not deep.

CIVIC FEATURES THAT PROMOTE THE COMFORT



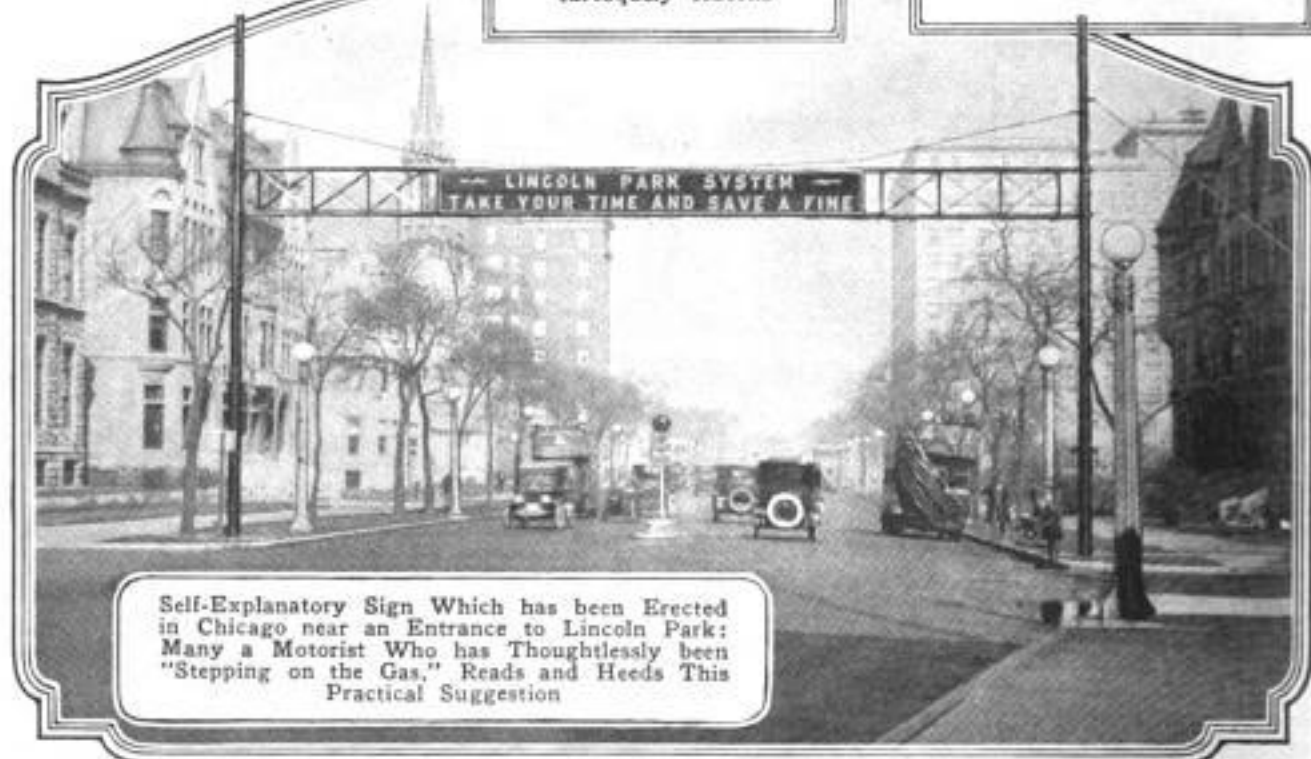
This Inclosure Is a Pound for Lost Children and is Located in a Municipal Park in Milwaukee, Wisconsin. So Many Children were Picked Up by the Park Police Every Sunday and Holiday throughout the Summer, That Some Place was Needed to Keep Them Until Missed by Their Parents



This Sign is Placed at Dangerous Curves in Chicago, to Warn the Approaching Motorists of the Situation Ahead. The "S," or Double Curve Painted on the Signboard, Is Usually an Effective Warning

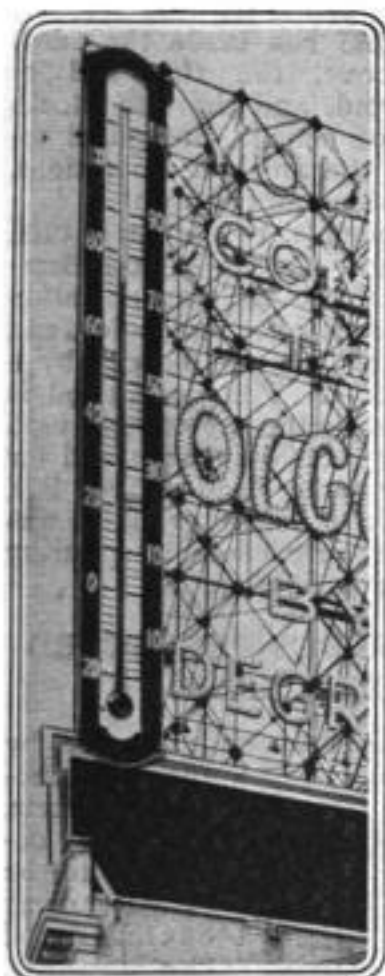


Decorative Panel on a New Bridge Erected at Banff, in the Heart of the Canadian Rockies: The Indian Head is Made of Concrete and was Modeled, Molded, and Cast on the Bridge Which It Now So Picturesquely Adorns



Self-Explanatory Sign Which has been Erected in Chicago near an Entrance to Lincoln Park: Many a Motorist Who has Thoughtlessly been "Stepping on the Gas," Reads and Heeds This Practical Suggestion

AND ENJOYMENT OF VISITORS AND RESIDENTS



MADE BY GILLIAMS' SERVICE

World's Largest Thermometer, 50 Feet in Height, Which is Constructed over a Roof on the Boardwalk at Atlantic City, New Jersey



Memorial Arch Which was Erected in a Public Park, to Commemorate the Soldiers of Greenview, Illinois, Who Lost Their Lives in Defense of This Country during the Civil War and the World War: The Arch Is 26 Feet in Height, 24 Feet in Width, Has Four-Foot-Square Columns, and Contains Ornamental Lights



Silver Baseball Bat and Ball Which were Made Full Size and were Placed in the Window of a Store in Miami, Florida, as the Prize of a Baseball League in That City



This Beautiful Concrete Bridge and Winding Approach, Built by the Municipality of Kingfisher, Oklahoma, Forms a Picturesque Entrance to the Town, and is Said to Be the Largest of Its Kind in the Country

NEW AUTOMOBILE CLEANSER HAS HANDY CONTAINER

A new preparation for cleaning dirt and grease from automobile bodies or for eliminating scale and rust from the radiators, has the added advantage of being noninjurious to the hands. In removing



the scale and rust from a radiator, a tablespoonful of the substance is placed in a gallon of water, which is then poured into the circulating system. The engine is then started working the pump for about an hour, after which the draining off of the liquid will carry the

scale and rust away. The preparation is put up in a convenient glass container having a band, or strap, around it so that the bottle may be fastened to a wall in an inverted position. The neck of the bottle-like container has a special sliding valve.

SLATS FOR THE MANUFACTURE OF LEAD PENCILS

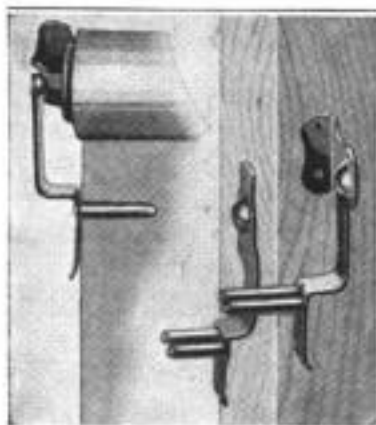
Lead pencils are made from slats of wood, one-half the thickness and the length of the pencil, and wide enough to finish three to six pencils. The slats are made on special machines, each doing its

part in giving the pencil its proper shape. After one machine has made the small semicircular groove, the tiny rod of graphite is inserted, and the two blocks forming halves of pencils, are glued together ready for the finishing operations, followed by polishing and printing.

For the best pencils, red cedar is used because of its light weight—a consideration in the matter of transportation charges; its pleasant odor and color, and the ease with which it can be cut by a knife in sharpening. The heartwood is most desirable, while the sapwood is used for the cheaper grades of pencils and for penholders. The name "lead pencil" is a survival of the days before graphite was used and pencils were made by pouring melted lead into a goosequill.

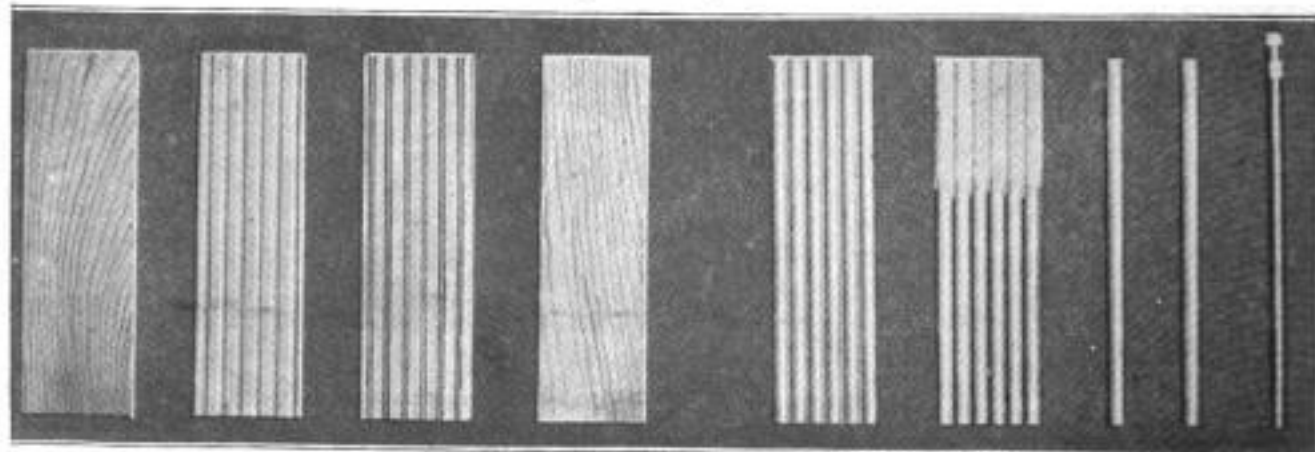
WINDOW SHADES PROTECTED BY BRACKETS

Window shades may be protected by the installation of simple, though effective, brackets,



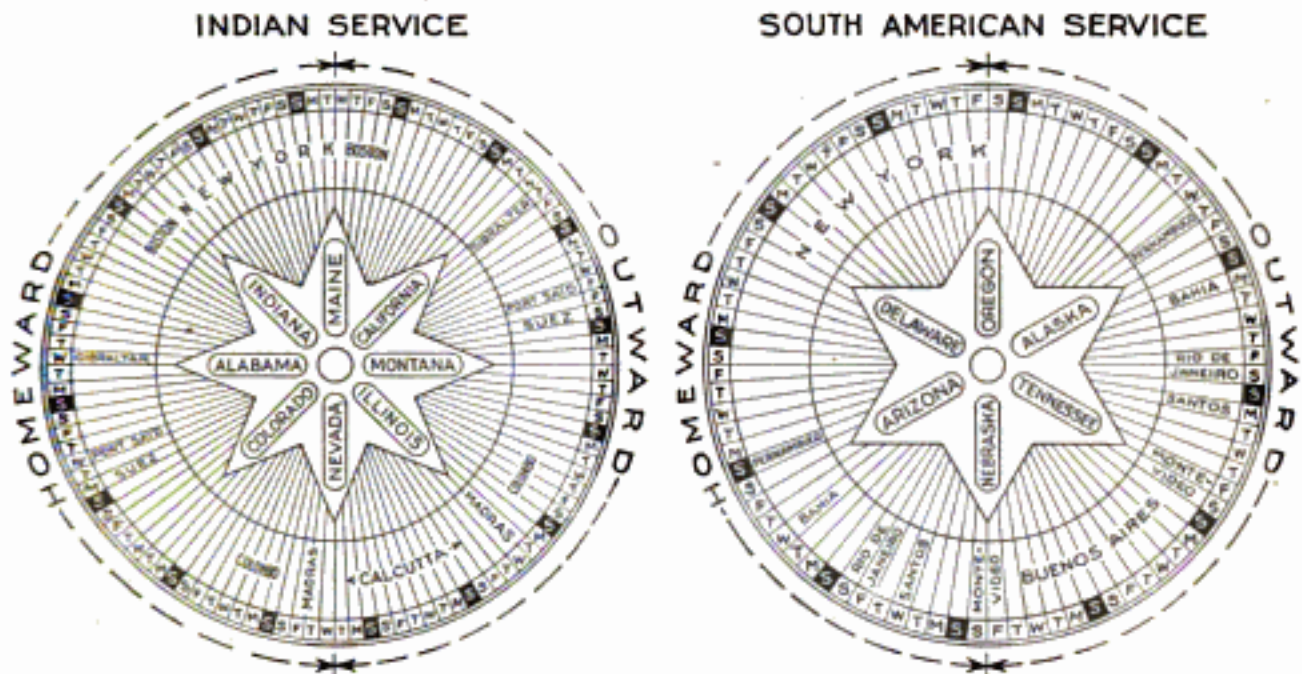
which are designed to be mounted at each side of the window, on the casing. The brackets have two rounded prongs, or guides, through which the shade slides

when pulled down or rolled up. Thus, the shade is prevented from flapping out of an open window, from going behind the roller should it slip from a person's hand, or from being pulled down or rolled up in an uneven manner.



Successive Steps in the Manufacture of Lead Pencils, Beginning at the Left with a Cedar Slat from Which Halves of Pencils are Formed, and Ending with a Finished Pencil, at the Right

CHARTS SHOW DAILY LOCATION OF STEAMERS



On the Two-Route Charts Shown Above, the Revolving Star-Shaped Disk Indicates the Scheduled Daily Location for Each Ship in Service. The Dial Has as Many Divisions as the Days Required to Complete the Trip

A prominent firm of shipowners keeps daily track of the whereabouts of its vessels by means of a chart dial, which, if more widely known, would probably be adopted by shipping companies in general.

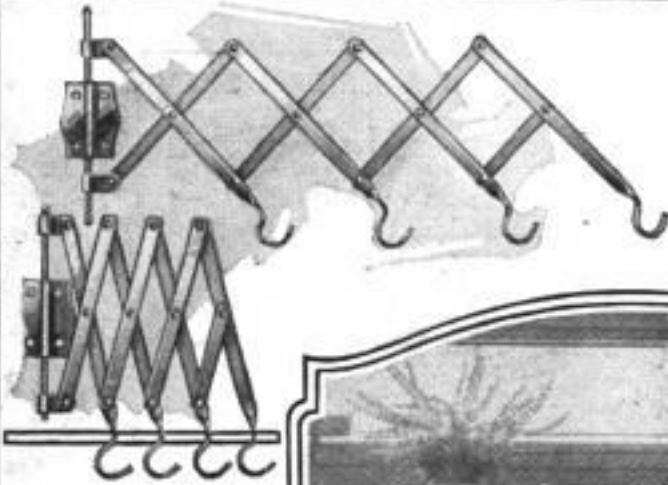
The dial consists of a circle, some 15 or 18 inches in diameter, inscribed on a light-colored wooden board, which is hung in some convenient position on the office wall. The circle is divided into as many sections as a round voyage takes days, each section representing a day. If a steamship company has two services, for instance, one from New York and Boston via the Suez Canal to Indian ports, the other from New York to Brazil and Rio de la Plata, and a complete round trip on the former consumes 112 days, and the other 84, the two dials required would have 112 and 84 divisions respectively. Each section is marked with a day of the week, the lettering of Sunday being red, so as to distinguish the weeks. The different ports en route are marked off at the necessary intervals. The sections denoting days in which the vessels are in port are colored red, sea-going days being blue. If, further, eight vessels are required to maintain a fortnightly Indian service, and six for a similar service to South America, the star-shaped revolving metal disk, which is screwed to the center, is made with eight or six radiating points, as the case may be.

The names of the various vessels are printed or typed on small gummed labels, and are affixed one to each point of the star in the order in which the ships are appointed to sail. Thus, if the "Maine" sails on a Wednesday, for India, the point of the star designating this boat will be placed at Wednesday, the first section after or to the right of the New York sections. The "Indiana" being the next on the list, immediately succeeds the "Maine" on the star, and the "California," which was the previous sailing to the "Maine," is on the next point ahead, or to the right, and so on. It will thus be seen that by moving the star one section to the right daily, the position of every vessel engaged on that particular run is automatically shown. Should a vessel be laid up for repairs or for other reasons, or should it be transferred from one route to another, its name label is exchanged for that of the vessel replacing it.

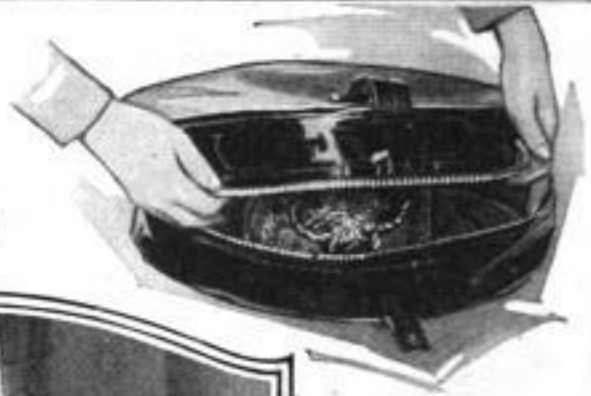
PLAN SYSTEM OF HIGHWAYS FOR NATIONAL DEFENSE

A 180,000-mile system of highways, needed as a means of transportation for troops and supplies in case of foreign invasion, has been outlined by army officials and turned over to the Bureau of Public Roads, whose engineers are now busy perfecting details. The roads, which will be of benefit in peace times also, are to be built by the states, with Federal aid.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



This Collapsible Garment Hanger is Easily Mounted in Closets, Bathrooms, Halls, and Similar Places, Requiring Little Space



Hat Box Which Is Collapsible and Consequently a Convenient Article for Traveling, as It may be Closed Almost Flat When Not in Use



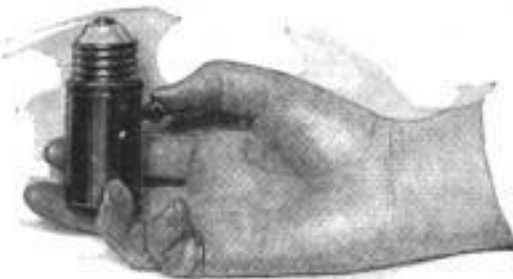
Portable Wired Stand That Has Three Electric Outlets for the Attaching of Various Electrical Appliances, and may be Easily Moved About



This Combination Cabinet for the Bathroom Fits between Two Studdings and Contains a Medicine Chest, Disappearing Seat, Mirror, and Compartment for Shoe-Shining Implements



Floor Mop Which may be Quickly Tied on a Broom, is Handy for the Housewife, and Easily Laundered

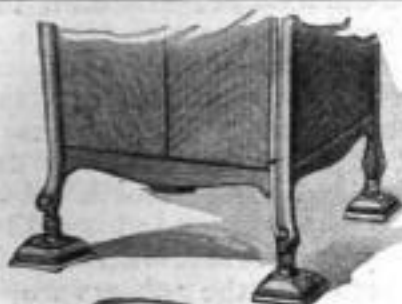


Attachment Plug That is Connected to the End of the Extension Cord of a Vacuum Cleaner or Iron, and Contains a Switch



Oven Thermometer and Numerous Recipe Cards with Temperature Directions on Each, Packed in Quartered-Oak or Cloth-Covered Cabinet

INTENDED FOR THE HOME AND ITS MEMBERS



Caster Cups Which are Composed of a High-Grade Rubber-and-Glass Combination: When Placed under a Talking Machine, They are Said to Improve the Tone Greatly



Tough Meat is Made Tender by Running It through the Sharp-Pointed Aluminum Rollers of This Machine, Thus Doing Away with the Tiresome and Noisy Pounding of Steaks



Electric Aquarium That Not Only Furnishes Light for the Room in Which It is Kept, but Permits Different Lamps to be Used to Shed Colored Lights on the Fish, a Method Said to Be Beneficial



Attachment That Fits Tightly on Any Ordinary Milk Bottle, Making It a Suitable Container for Oil



Luminous Number for Use on House Exteriors, So That It may be Easily Located on the Darkest Nights, Thus Eliminating Mistakes



String Beans are Fed into This Apparatus, the Handle Turned, and the Strings Removed. The Beans may Also be Cut in Lengths



Knitted Sleeping Suit for Campers, Which is Made in All Sizes, of Brushed Worsted, in Natural Gray or Other Colors: The Hands and Feet are Pushed through Slits When Desired

SEPARATION OF CONTINENTS OF OLD AND NEW WORLDS

When the eastern coast of the continents in the western hemisphere are placed side by side with the western coast of the continents in the eastern hemisphere, it is quite remarkable how closely they fit together, like two pieces of a toy puzzle. Is this purely casual, or has it some physical significance? The theory is now advanced that at one time they actually were united, forming one huge continent. To explain their separation, the theory sets forth that the crust of the earth is buoyed up on a semiviscid substratum upon which detached portions of the crust may drift away. According

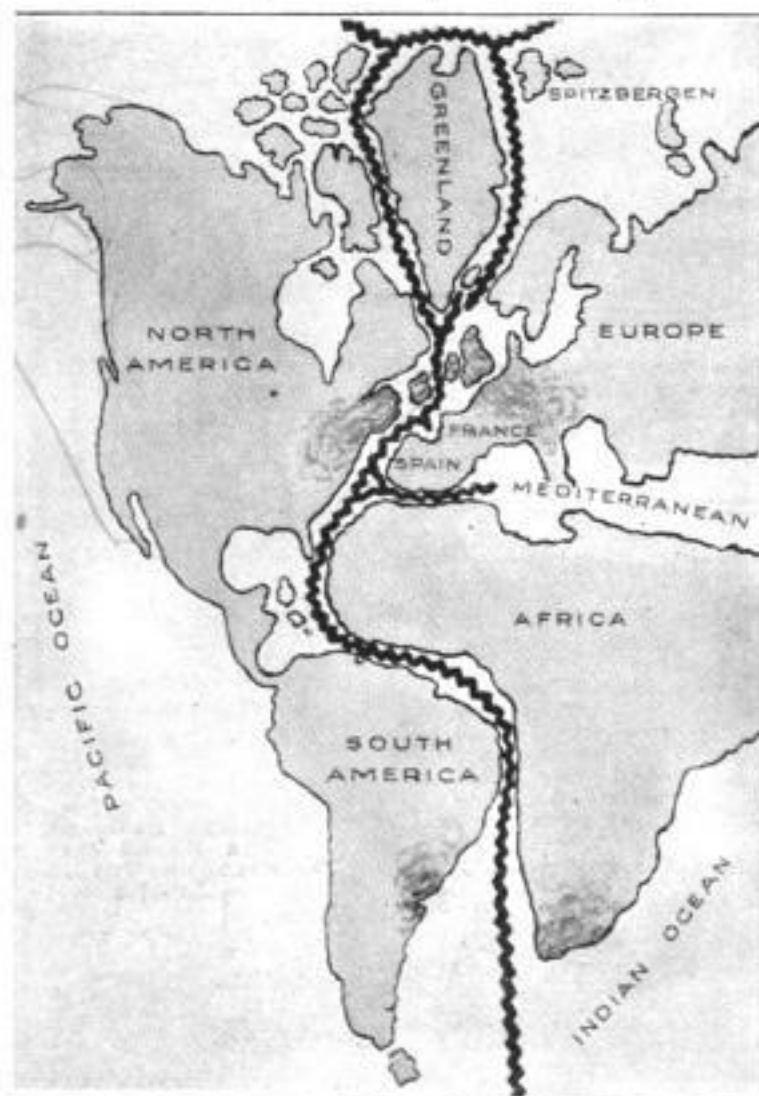


Diagram Showing How the Contours of the Eastern and Western Coasts, Respectively, of the Continents of the Old and the New Worlds, Fit Together When Placed Side by Side

to the new theory, South America first split away from South Africa, the rift gradually extending northward to where North America was joined to Europe, which separated later. This would account for the fact that because of this comparatively recent separation, many

plants and animals are common to both western Europe and eastern North America. Still more corroborative evidence in support of the theory is the fact that accurate astronomical observations prove that there is an actual western drift of both Greenland and North America. Even in so short a period as 12 years there was a measurable increase in the distance between the observatories at Greenwich, England, and Cambridge, Massachusetts.

PLANT-QUARANTINE INSPECTION OF CALIFORNIA TOURISTS

With the ever-increasing popularity of transcontinental motor touring, all automobilists entering California in the future must submit to official inspection of their cars and personal belongings under the plant-quarantine laws at the mountain-pass gateway through which they enter the state. For many years the state has had very strict laws and absolute embargoes on many fruit, vegetable, and plant products, in an effort to exclude such plant pests as the cotton-boll weevil, citrus scale, corn-borer worms, and others. These laws have been enforced upon all freight shipments, on railway dining cars, and other means of entry into the state, but not upon pleasure motor vehicles.

Now, however, with motor cars entering the state at the rate of from 200 to 500 per day, it is realized that these laws cannot be effective unless they are also enforced upon motor tourists. These travelers frequently carry oranges or grape fruit infected with citrus scale, cushions stuffed with raw cotton containing the boll weevil, or other plant materials, the importation of which is in violation of the state laws.

Inasmuch as the quarantine inspectors will work in coöperation with the state police and Federal authorities in checking all visiting motorists, it is believed that the new system will

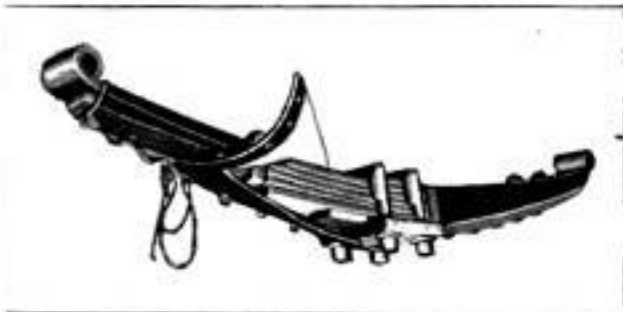
also have a wholesome effect in the checking of crime within the state. This is particularly true of the violations of the laws with regard to the illegal transportation of aliens, liquors, and narcotics. The effect of these regulations will be watched with interest.

TAR EXTRACTED FROM COAL IN COMBINED PROCESS

A combination distillation and burning process in which the tar products are driven off from coal before being burned under boilers, is now being introduced in Germany. Coal from the bunker is fed to the boiler furnace through a retort, at the bottom of which is a distilling chamber facing the glowing fire on the grate. The gases are driven off from the coal discharge into an extraction apparatus alongside the boilers, and the tar, ammoniacal liquors, and other products recovered. This method is said to be more efficient than the separate gas and coking plants.

ADJUSTABLE OILING COVERS FOR AUTOMOBILE SPRINGS

Being adjustable in both length and width, a new form of automobile-spring cover, of the laced-on type, can be accommodated by means of its hook and lace fastening to any slight variations in the springs of cars. The covers are made in 20 standard sizes, from which sets can be selected to fit the springs of almost any make of car. They are made of water and oil-proof material, lined with felt



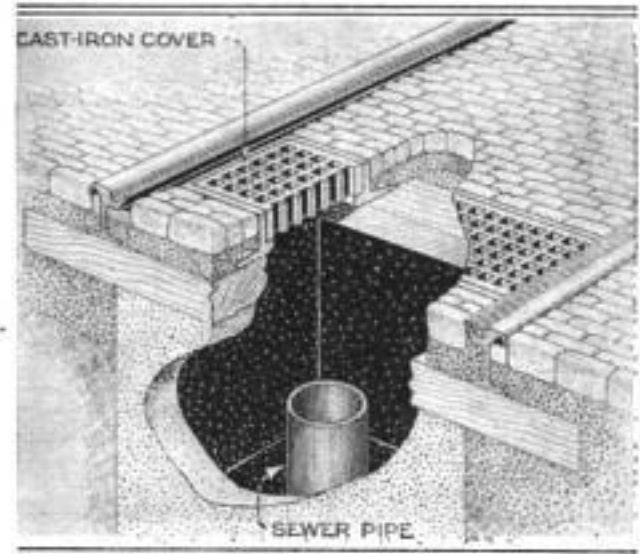
Adjustable Oiling Cover for Lubricating Automobile Springs: It Is of the Laced-On Type, is Made to Fit Almost Any Spring, and Is Oil and Dust-Proof

wicking to hold the oil. This lining is saturated with oil when the covers are put on, and oil cups are provided for renewing the lubrication.

STREET-CAR TRACKS DRAINED BY CATCH BASINS

Catch basins located beneath the pavement are being used by an eastern street railway, to drain the water that accumulates along the tracks. The concrete or brick catch basin has a cast-iron cover with large openings, and its top is laid flush with the pavement, which is sloped slightly toward the basin. A drain pipe leading to the sewer is built in the side

or bottom of the basin so that the opening will be about one foot above the bottom of the chamber. To avoid wide

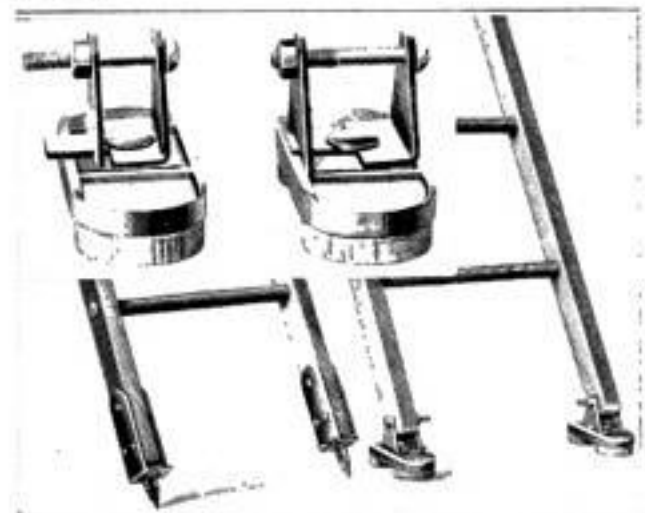


Section Showing Catch Basin Built to Drain Street-Car Tracks: Note Space for Refuse to Accumulate in Bottom of Chamber

spacing of the ties, the cover frame is placed on top of the ties, which are notched out for this purpose.

ADJUSTABLE LADDER SHOES THAT PREVENT SLIPPAGE

To prevent a ladder from slipping when in use, shoes have been devised which are capable of adjustment for bolting onto the bottom of ladders of any size. On the bottom of the shoes are two circular cork pads which, when worn out, may be replaced by unscrewing a nut and putting on new pads. The cork prevents slippage on smooth surfaces, such as metal, concrete, wood, marble, or similar floors, and also on soft ground outdoors.



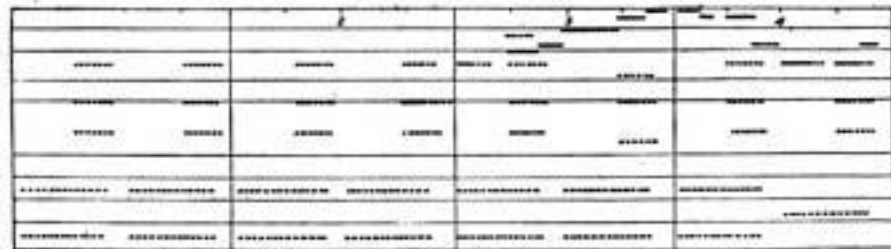
Above: Close-Up of Adjustable Cork-Grip Ladder Shoes. Below: Ladder Equipped with Points at the Left, and at Right, with Cork-Grip Shoes

PLAYER-PIANO ROLL WITH PRINTED MUSIC SCORE

A radical change, with very interesting possibilities, has been made in the method of operating the music rolls of player pianos. The perforations run horizontally, instead of vertically, in the conventional manner. The advantage claimed by the inventor for this method is that the perforations thus pass before the eye from left to right in the natural manner of reading, and make it practicable to print over the perforations the full music score, with all the usual notations. To anyone who can read music, this furnishes a means of giving the proper expression and rhythm in the execution of the score.

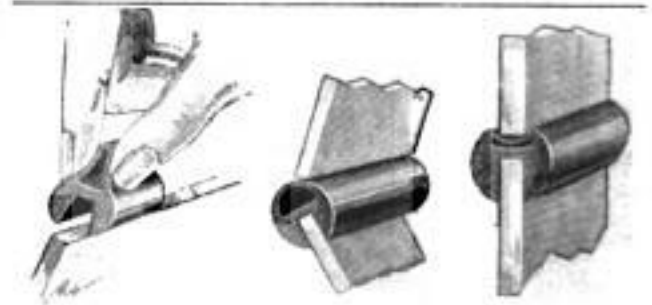


Player-Piano Music Roll That Runs Horizontally Instead of Vertically, Making It Possible to Read the Score of the Song That is Printed Above the Perforations: The Score, It will be Seen, Contains all the Usual Notations



IMPROVED WINDSHIELD STRIP HAS DOUBLE SEAL

An improvement in a rubber type of weather strip for automobile windshields, provides for an air cushion that causes the rubber to form an effective double seal around the lower edge of the upper windshield glass. The strip fits snugly on the upper edge of the lower glass and is easily applied to any of the straight-type windshields.

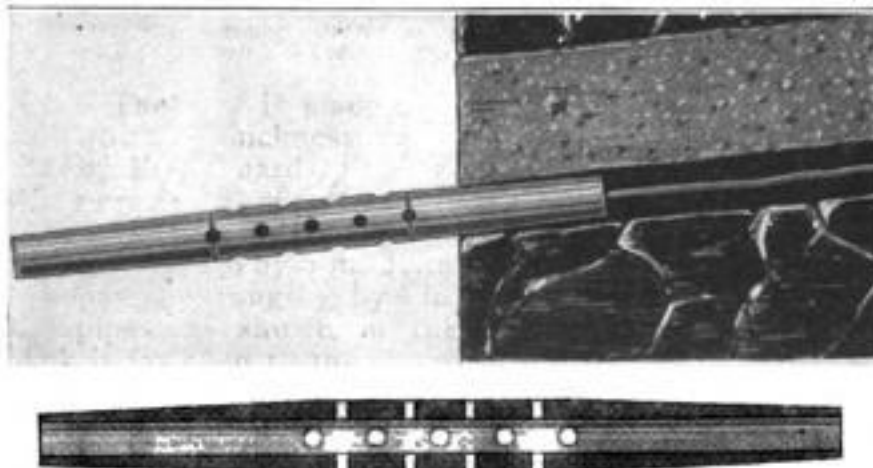


Left: Applying Weather Strip to Windshield. Center: Glass Tilted to Apply Strip. Right: Double Seal

TUBE GUARDS AGAINST MARSH-GAS EXPLOSIONS

In gaseous coal mines, the danger of premature explosions, when blasting, is

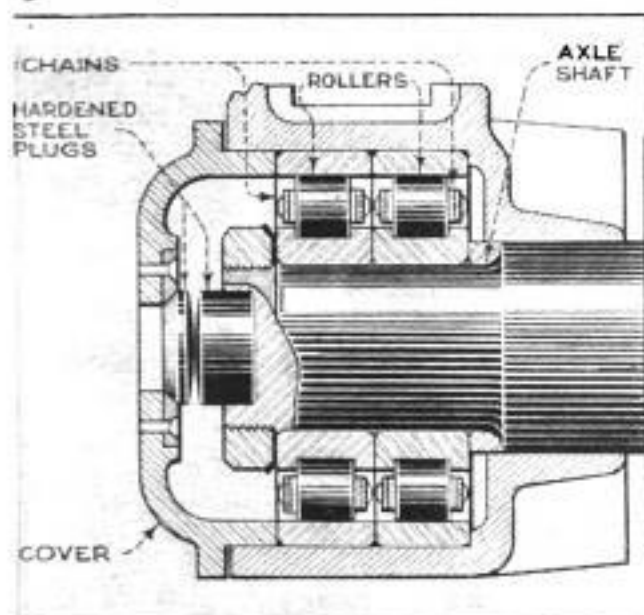
one of the ever-present hazards to be guarded against. If marsh gas exists in the drill hole when the blasting fuse is lighted, the latter may easily become ignited throughout its entire length, almost instantly firing the charge before the miner has a chance to withdraw to a safe distance. An insulating tube has lately been patented, which, if packed into the end of the drill hole, prevents preignition by allowing the gas to escape through small holes in the walls of the tube, while the match is applied to the fuse.



Above: The Insulating Tube as It Appears When Packed into the End of the Drill Hole. Below: A Section of the Tube, Showing the Small Holes for the Escape of Marsh Gas

ROLLER BEARINGS APPLIED TO RAILROAD CARS

In an attempt to realize for railroad service some of the advantages of roller bearings demonstrated in other industries, the Great Eastern Railroad of England has recently been experimenting with various types, and decided that the chain-link type is superior to the standard form of roller bearing. The distinctive feature of this design is an endless and detachable chain that guides and separates the rollers, thereby eliminating the usual separating pieces and providing for the maximum number of rollers of the largest possible diameter-to be employed in each bearing. The races are made by a process whereby the grain of the metal is caused to be circumferential, so as to increase toughness and prevent grooving. A saving of 14 per cent on the haulage effort is expected. A Swedish company, which manufactures bearings that the Pennsylvania railroad is reported to be trying out, makes the rollers barrel-shaped, so that they run freely between the axle and the race. As the result of years of research with this bear-



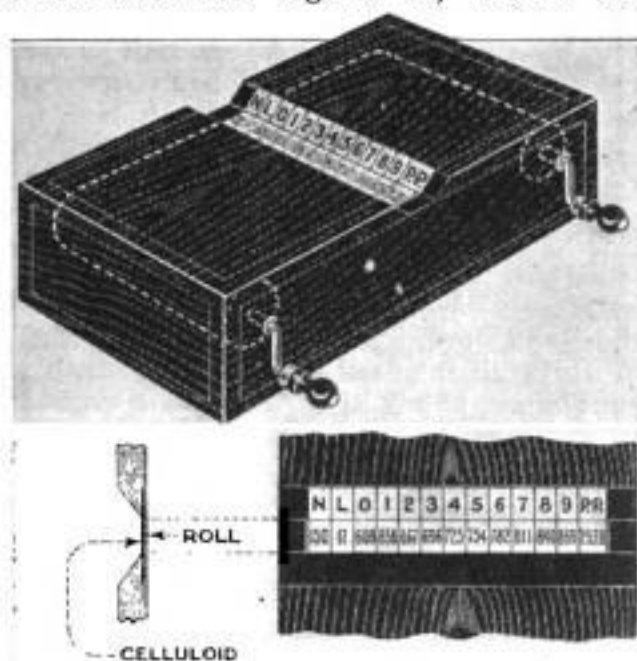
Section of Chain-Link Type of Roller Bearing as Applied to Car Journals by an English Railroad Company

ing, Swedish railroads anticipate a saving of about 15 per cent on the coal bill, besides a reduction in the cost of maintenance of rolling stock.

☐ Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.

LOGARITHMIC TABLE MOUNTED IN ROLLER CABINET

The advantage of a device that promises to be of considerable convenience to those who use logarithms, lies in the

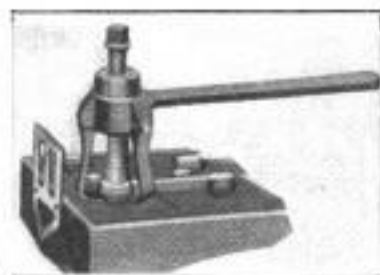


Above: Illustrating Box and Roll Mounting for Logarithmic Table. Below: Close-Up, Showing How Only One Row of Figures Appears at a Time

readiness with which the numbers can be located. It consists of a logarithmic table printed on a long sheet which winds on and unwinds from two rollers mounted in the sides of a box. A thin slip of celluloid covers the space between the beveled edges of an opening in the top of the box, and through it only one line of the table can be seen at a time.

BATTERY-CONNECTING LINKS EFFICIENTLY REMOVED

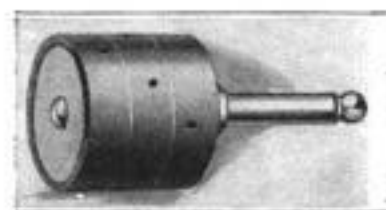
The removal of automobile storage-battery links, for the purpose of repairing the cells, may be accomplished in an efficient manner by the use of a new cutting tool. This tool contains a circular knife which is gradually forced down



by a screw arrangement until the "burned-on" link is smoothly cut away from the posts of the battery, thus leaving clean and smooth surfaces which facilitate the reburning process when the repairs are completed.

SIX PAIRS OF RADIO PHONES CONNECTED TO ONE PLUG

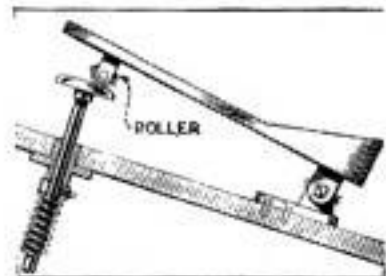
Six pairs of radio phones, or receivers, may be connected to one multiple plug, thus offering a convenient means for



from one to a half dozen persons to listen in on the same set. Positive electrical connection is provided for 12 standard receiver terminals, by merely inserting the tips of these into the holes found in the appliance, which, in turn, is inserted into a jack on the equipment panel.

ACCELERATOR FOOTREST MAKES FOR COMFORTABLE DRIVING

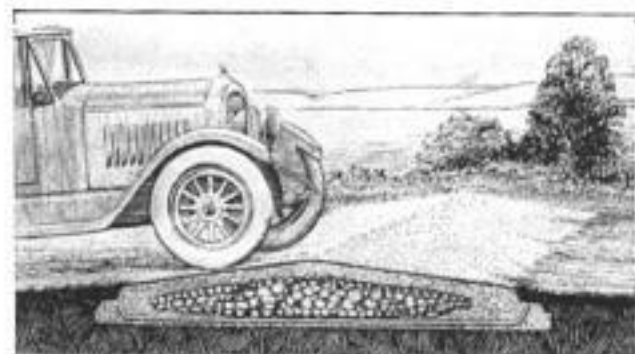
A new footrest for the accelerator control for automobiles, is intended to relieve the strain caused by long and steady driving. It consists of a



foot-shaped pedal piece provided at the heel with a rocker joint that screws to the floor of the car, while the toe carries a roller that rests on the button of the accelerator.

SEVERE JOLT GIVEN SPEEDERS NEARING CROSSING

As a further precaution against accidents at railroad crossings, the legislature of Tennessee has provided for concrete bumpers to be built 100 feet on either side of all dangerous crossings in that state.

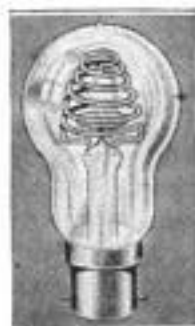


Cross Section, Showing How the Concrete Bumpers are Built to Protrude Six Inches above the Regular Roadbed

These are to rise 6 inches above the roadway so that it would be impossible to take the bumps at high speed without seriously damaging the car. Warning signals will be erected both in front of the bump and at the crossing.

SENSITIVE ELECTRIC LAMP USES WEAK CURRENT

A lamp that can be illuminated at intervals of an infinitesimal part of a second by a current so feeble that it can safely

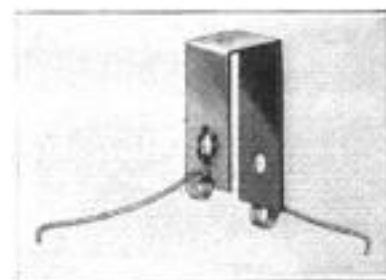


pass through human hands, has lately been introduced at the Bureau of Standards. Moving objects appear to be stationary when photographed or viewed by the light of this lamp, which will also prove economical as a pilot light for many purposes. It will operate on either direct or alternating

current, and is so sensitive that it will light when held near a conductor carrying high-frequency current.

HAMMER AND DAMPER-SPRING CLIP FOR PIANO TUNERS

The replacement by piano tuners of worn-out damper-lever and hammer-rail springs, in the ordinary way a very tedious



job, is made easy by the use of a spring clip designed for the purpose.

These clips, made of thin steel, will slip on any spring rail of an upright-piano action, and may have connected to them a spring for the damper, or one for the hammer, or both. As there is very little tension on the clip, all that is necessary to retain it is a small tack inserted through a hole on top of the clip.

Thirty Chinese airmen, all licensed pilots from American or Canadian flying schools, form the nucleus of an air force of 200 fliers that South China is organizing for defense against Peking and for the suppression of bandits and river pirates. Flying boats equipped for land or water service, will be used.

ZINC AND BRASS MAIL BOXES TO BE TRIED IN EAST

Because the steel of the standard letter box deteriorates rapidly upon exposure to the elements, necessitating frequent repainting, the Post Office Department has decided to try boxes made of zinc and brass. It is believed they will prove more resistant to the action of the salt air than those made of steel, and 1,000 of brass and 100 of zinc will soon be placed in service along the seacoast. In order that the effects of atmospheric conditions on the brass design may be determined, some of the boxes made of this metal will be left unpainted. While the general practice of painting mail boxes will probably be continued, it is expected that the new types will require attention less frequently.

PHONOGRAPH TONES IMPROVED BY INTERFERENCE TUBES

Undesirable high tones, or "whistles," an annoyance commonly experienced by phonograph users, may be eliminated by the use of recently patented interference tubes. These consist of U-shaped metal appliances, designed to be incorporated in a main tube that is fitted between the reproducer and tonearm of a talking machine. According to the inventor, the arrangement of bypaths for the sound



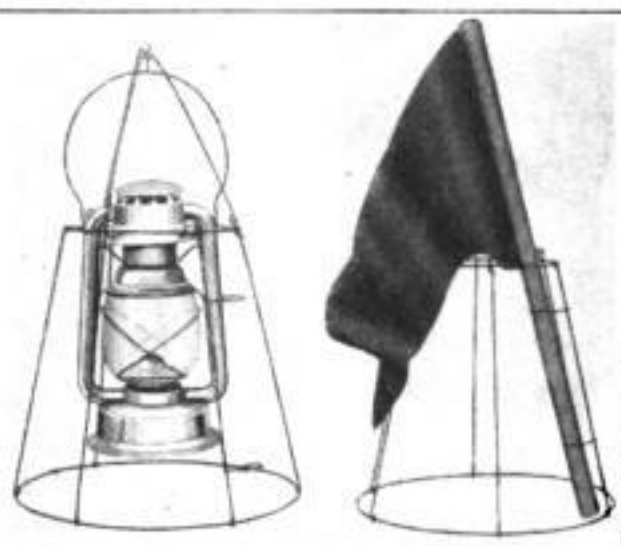
Two of the Interference Tubes Shown Fitted in the Main Tube between the Reproducer and the Tonearm of a Talking Machine

waves causes certain of these to be considerably softened with but little loss in volume. Tight-fitting stoppers are also provided with the outfit so that the user of the machine can plug the tubes if it is desired to nullify their action; or, by means of an extension on one tube, the softening effect may be varied.

☐ A chocolate-coating machine said to represent a decided improvement over present ones, has recently been developed abroad, to meet the needs of confectioners whose output is large.

UPRIGHT LANTERN HOLDER CONVENIENT AND SAFE

To avoid the danger to hand lanterns of being upset or broken when placed on

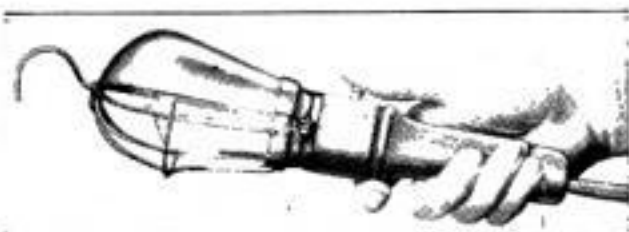


Safety Holder Shown at Left Carrying a Hand Lantern, and at Right Holding Erect a Red Danger Flag for Use at Level Crossings

the ground, a simple upright holder has been devised that has a very much wider base than that of the lantern, which it also protects with six wire guards. The holder is conical in shape, and at its top point is a hook from which the lantern hangs by its handle. One of the wire guards is fitted with loops for holding erect a danger flag such as is used at level crossings.

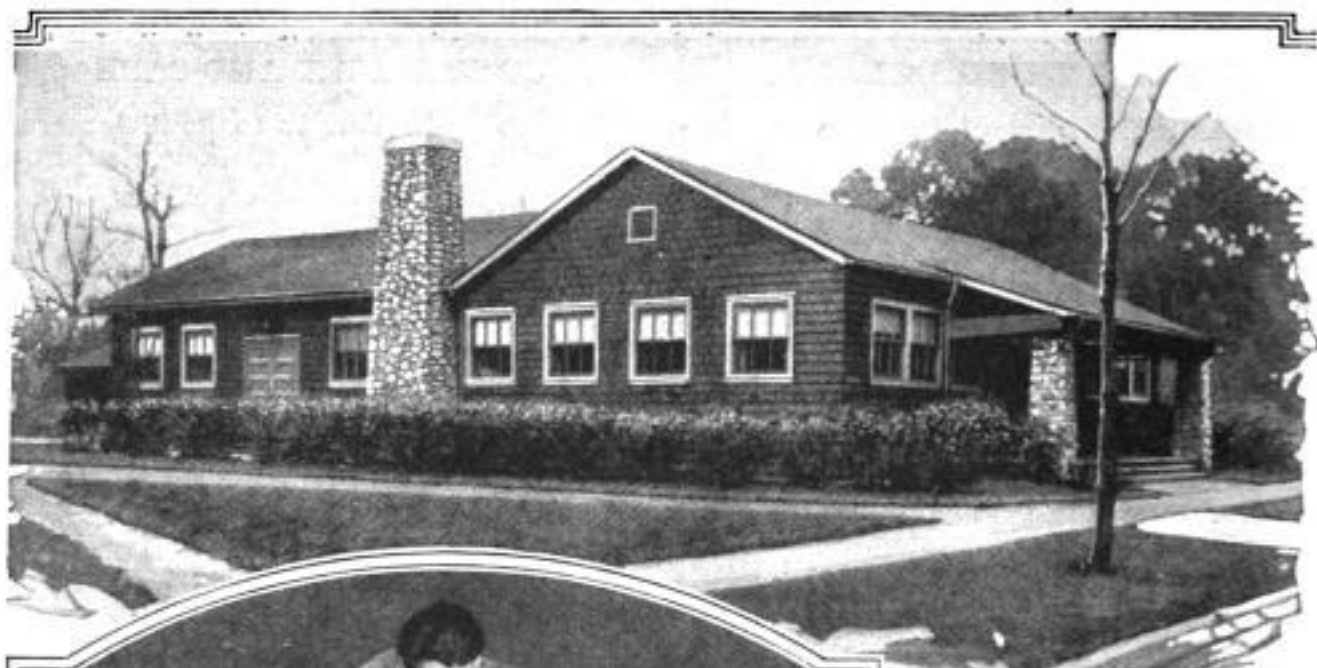
"TROUBLE LAMP" EXTENSION HAS SWITCH IN HANDLE

"Trouble lamps" on the end of long extension cords are valuable aids when making repairs on automobiles or any machinery in which certain parts are not reached by ordinary illumination. To make these lamps more efficient, one has been produced that contains a push-button switch in the wooden handle. Thus, the user may turn the light on and off at will without having to walk back and forth from a switch in the lighting circuit.



"Trouble Lamp" on the End of an Ordinary Extension Cord, Showing How the Push-Button Switch is Located in the Wooden Handle

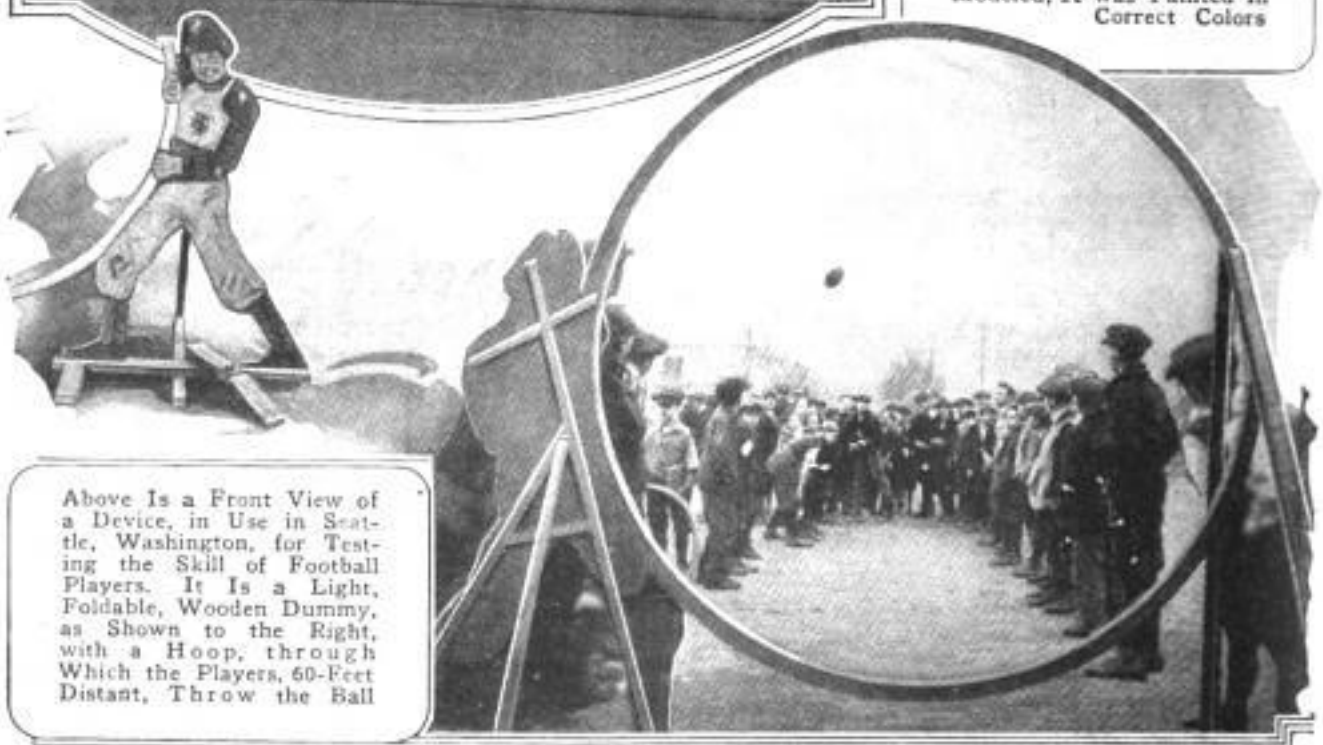
CHILDREN'S PICTURE-STORY DEPARTMENT



The Enterprising Boy Scouts of Evanston, Illinois, Bought an Old Navy Building for \$200, Hauled It 20 Miles, and Converted It into This Attractive Structure, Which Is Now Their Headquarters. It Proved to Be a Most Profitable Undertaking in Every Sense of the Word



Left: Mercator's Projection of the World Modeled in Relief with Pulp Made by Soaking Old Newspapers in Water. The Map was Made by Boys at the London County Council School, in England. After being Modeled, It was Painted in Correct Colors



Above Is a Front View of a Device, in Use in Seattle, Washington, for Testing the Skill of Football Players. It Is a Light, Foldable, Wooden Dummy, as Shown to the Right, with a Hoop, through Which the Players, 50-Foot Distant, Throw the Ball

OF MODERN ACTIVITIES AND INTERESTS



Little Teddy Wright, of San Diego, California, Only 10 Months Old, Is Such a Remarkable Little Acrobat That, as Seen from Left to Right, He Swings Six Feet Clinging to the Rings, Then Lets Go of Them and Swings Head Downward. After That He Chins the Horizontal Bar



Right: Tubercular Children being Treated to Their "Sun Baths," Electrically, on a Cloudy Day. They Are in the Lymanhurst School Hospital of Minneapolis, Minnesota, the Only Hospital of the Kind in the United States



Jackie Coogan, the Well-Known Child Actor of the Movie Screen, in His Tiny Car: Though Short in Stature, He Is Long in Speed, for He has Just Raced a Dead Heat with His Dad in the Big Touring Car

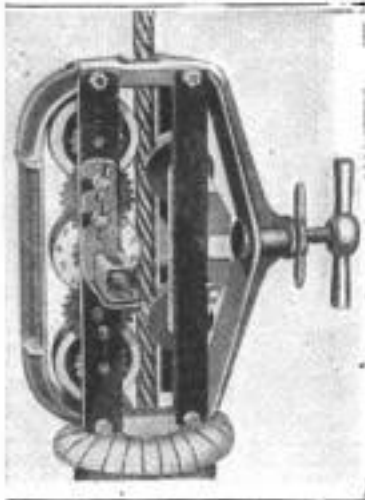
CARBIDE GENERATOR GIVES POWERFUL LIGHT

A portable carbide generator which yields a powerful light, has lately been introduced as an aid to construction work when carried on at night or in dark places. The outfit holds six pounds of carbide at one charge, this amount being sufficient to operate a burner giving a 50-candlepower light for 27 hours. The generator is 34 inches in height and 20 inches in diameter. The appliance may also be installed for illuminating a house of three or four rooms, or for the lighting of small vessels. It is claimed that the light from a single burner is of such brilliancy that the face of a watch may be clearly seen at a distance of 100 yards, thus illustrating its efficiency for illuminating purposes.



RECORDING METER MEASURES DEPTHS OF OIL WELLS

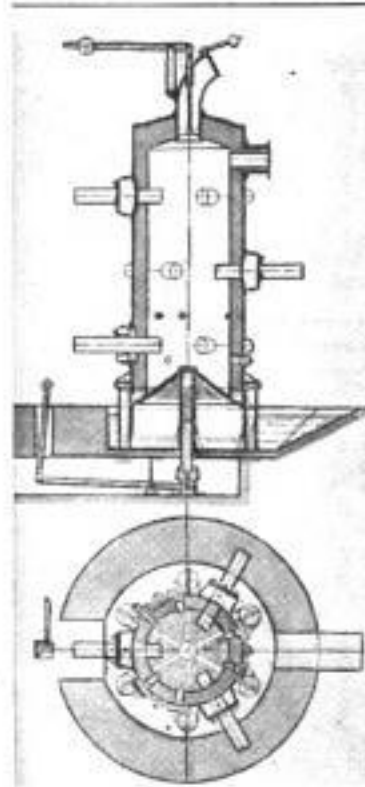
For measuring the depths of oil wells without the use of the ordinary steel measuring line, a registering meter which, it is said, will measure the deepest well in 10 minutes, has recently been placed on the market. It consists of a rectangular frame, inside of which are mounted three flat-rimmed wheels, all exactly 1 foot in circumference. These are geared together so that all revolve at precisely the same speed.



The frame is clamped to the cable of the drilling line at the top of the well casing, and the flat wheels are in contact with one side of the cable. On the other side are two trolley wheels, on a floating carrier, inside of which is a coiled spring which, by its pressure, gives all the wheels a firm, flexible grip on the cable. As this is withdrawn, the wheels are revolved, and at each revolution register 1 foot on a counter beside the center flat wheel, on which is a dial graduated to inches.

ELECTRIC GAS PRODUCERS DEVELOPED IN ITALY

In countries where there is plenty of water power but little coal, such, for instance, as Italy, great interest is being taken in the development of electrically operated gas producers. An Italian producer of this kind consists of a combustion chamber in the form of a vertical iron-jacketed cylinder, lined with fire brick. Its lower end is resting in a water seal, and on its upper end is a cover equipped with a charging hopper. Above the water seal and at the bottom of the interior



BY COURTESY OF MECHANICAL ENGINEERING

shaft is a grate. Penetrating into the shaft at different heights are sets of three equally spaced electrodes, which are connected in parallel to the generating circuit. Above the lower set of electrodes are a number of small porcelain tubes for admitting steam or air into the shaft. The gas outlet is at the top of the shaft. After gradually filling the shaft with heated coal, the current is cut in and flows through the column of coal, forming small arcs between the different pieces, and raising the fuel to a very high temperature. The coal is then gasified by the introduction of air or steam through the porcelain tubes.



An Inexpensive Farm Lime Spreader

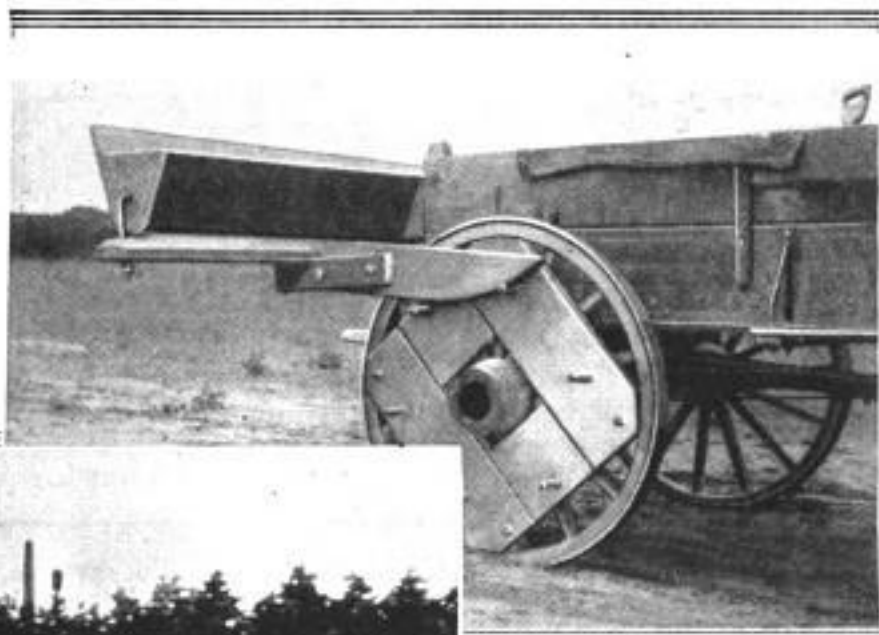
By R. H. MOULTON

ONE of the farmer's greatest problems is that of distributing lime or marl upon his land without great expense for equipment.

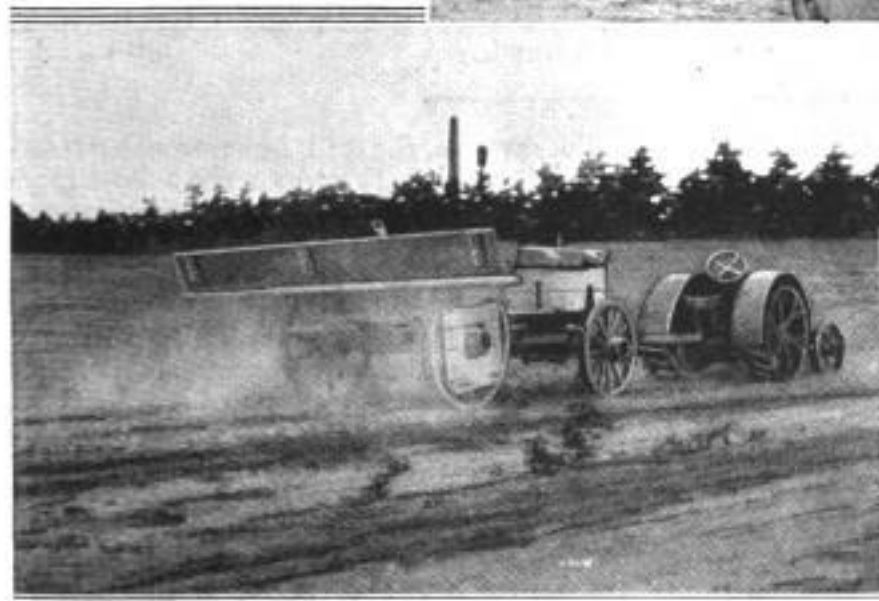
Prof. H. H. Musselman, of Michigan Agricultural College, has evolved a lime spreader that solves this problem, as it can be built at a cost of about \$20. This will enable the farmer who wishes to use lime on his land, but who does not care to go to the expense of buying a commercial spreader, to make his own.

The spreader is designed to be attached to the rear end of a wagon box, and consists of a hopper, to which is fitted an agitating board, the latter being operated by a rocker arm dropping

per by bolts, as indicated, lock washers being used between the nuts, to preserve the adjustment. It is beveled on each side $\frac{1}{2}$ in. deep, and a piece of $1\frac{3}{4}$ by 4-in. stock, 18 in. long, is bolted to it. On this piece, the rocker arm, which is made of 2 by 6-in. oak, is bolted. A slot is cut in the arm, as indicated by the dotted lines, to fit the forward bolt.



Above: Close-Up of Hopper, Rocker Arm, and "Disk." Below: The Spreader in Action over Firm Ground, Drawn by a Small Tractor



from pin to pin on a "disk" attached to one of the rear wheels of the wagon.

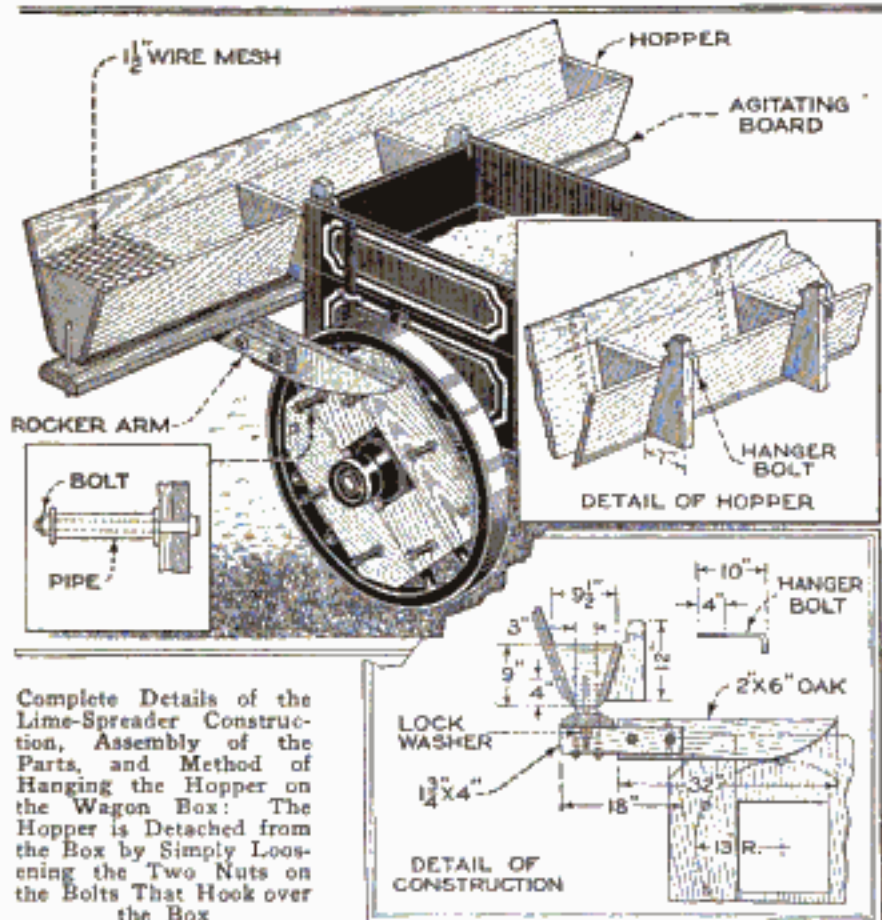
The hopper should be built of lumber at least $\frac{3}{4}$ in. thick, braced as shown, and hung from the wagon by $\frac{5}{8}$ or $\frac{3}{4}$ -in. hanger bolts. The agitator board is about 2 in. thick and is hung from the hop-

per by four bolts, passed through the disk and boards placed on the inner side of the wheel.

The wagon box should extend about 18 in. behind the rear axle, and the top of the hopper, when hung in position, should

be from 24 to 30 in. above the axle. The rocker arm may be adjusted for different heights of boxes, but, when the spreader

This spreader has been tested with pulverized limestone, both dry and damp, with excellent results. If lumpy material



Complete Details of the Lime-Spreader Construction, Assembly of the Parts, and Method of Hanging the Hopper on the Wagon Box: The Hopper is Detached from the Box by Simply Loosening the Two Nuts on the Bolts That Hook over the Box

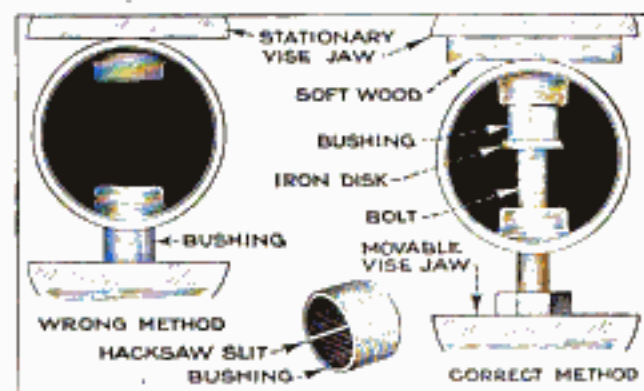
is to be used on two different wagons, it is preferable to have the boxes at the same height above and the same distance behind the axle.

is to be used, it should be shoveled through a screen of poultry netting or 1 1/2-in. wire mesh placed on top of the hopper. Lumps remaining on the screen can be broken up with the shovel, and brushed through.

Where the soil is firm enough to permit a load of lime to be drawn over it, the box may be hung on the loaded wagon and the lime spread by shoveling directly into the spreader. In case the spreading is to be done over plowed ground, it will be found impracticable to draw the full load. In this case, and where the lime is in storage, or piles, only enough is shoveled into the empty wagon carrying the spreader to go once around the field, or some other convenient distance. It will not be found practicable to spread pulverized lime in a high wind, although a moderate wind will not greatly affect the evenness of spread.

Refitting Piston Bushings

When fitting bushings in pistons, great care must be taken that the piston wall, which is made of thin metal, is not forced



The Wrong and the Right Way to Fit New Bushings in Pistons: By Using the Correct Method the Cylinder will Not be Distorted

out of shape, as the piston will then score the cylinder.

To remove the old bushings, first saw a slit in them; they can then be tapped out very easily. The new bushings should be .001 in. larger than the bearing holes. The illustration shows both the correct and the incorrect method of fitting bushings. The bushings should be forced in from the inside of the piston. An iron disk and a bolt, or piece of round steel, are placed between the bushing and the movable vise jaw; pressure is then applied by turning the vise screw. The bolt must be faced on both ends so that it will be square with the bushing. A block of soft wood is placed between the stationary vise jaw and the piston to prevent marring the latter.—E. J. Bachman, Fullerton, Pa.

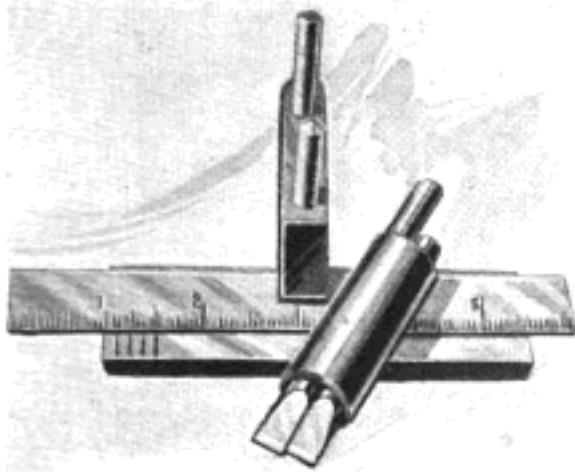
Whenever a horizontal steam pipe is reduced in size, there should be a drip, to avoid partially filling the larger pipe with condensed water.

Gasoline Container for Tube Repairs

An empty shoe-polish bottle, of the common type that has a sponge swab attached to the stopper, is convenient for keeping gasoline in readiness for cleansing around a hole in an inner tube, preparatory to applying a patch. Another bottle and swab is of equal service for applying the cement.

Marking Scales on Machine Parts

It is often desirable to mark a scale on slide, spindles, and other parts of machinery where such graduations would facilitate operation. A marking tool for this purpose can be made quickly and at little expense, as shown in the photograph. It consists of two small, flat chisels and a sleeve. The chisels are ground flat on one side, so that, when the flat sides are put together, the edges will be in line. Both chisels, when fitted together in this way, slide snugly in the sleeve. The edge of the shorter chisel is placed on a division of a scale clamped on top of the piece to be graduated, and the long one is pushed



A Simple Tool, Consisting of Two Chisels and a Sleeve, Used to Mark Scale Graduations on Machine Slides or Spindles

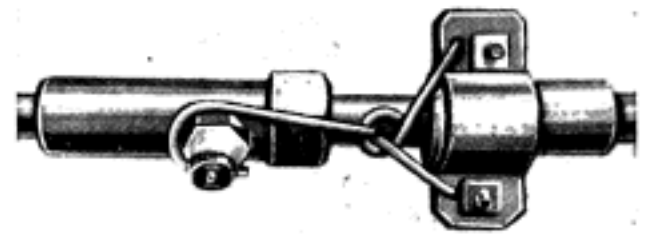
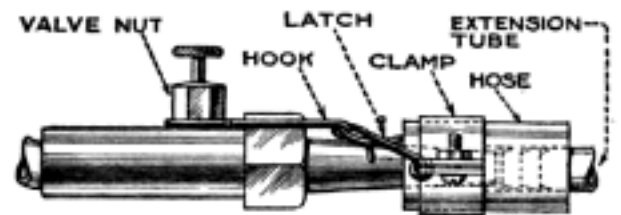
down until it touches the work; it is then tapped with a hammer to make the impression.

Extension for Air-Hose Nozzles

The detachable extension to an air-hose nozzle, shown in the illustration, proves very convenient when blowing out dirt or chips from deep holes and slots, as it can be inserted into the hole, and the air pressure applied from the inside of the hole. When an ordinary nozzle is used, a sort of whirlpool action is set up, and much of

the matter settles again when the pressure is shut off.

The extension* consists of a piece of



A Detachable Extension for an Air-Hose Nozzle That Facilitates Cleaning of Deep Holes and Slots: It can be Attached in a Moment

metal tubing, and a length of hose to fit over it, both being held to the nozzle by a clamp and a wire lock. The only work required on the tube is the cutting of a few hose steps. The clamp is made of two pieces of sheet metal, held together by two small stove bolts. A hole is drilled on each side for the wire lock. This consists of a latch on one side and a two-piece hook on the other. To attach the device, the hose is pressed tightly over the nozzle, the wire hook is placed around the valve nut, and is then drawn over so that the latch can be slipped into the ring. This attachment, although shown connected to a valve-operated air nozzle, can be used equally well on the spigot-operated type by placing the hook around the spigot instead of the valve nut.

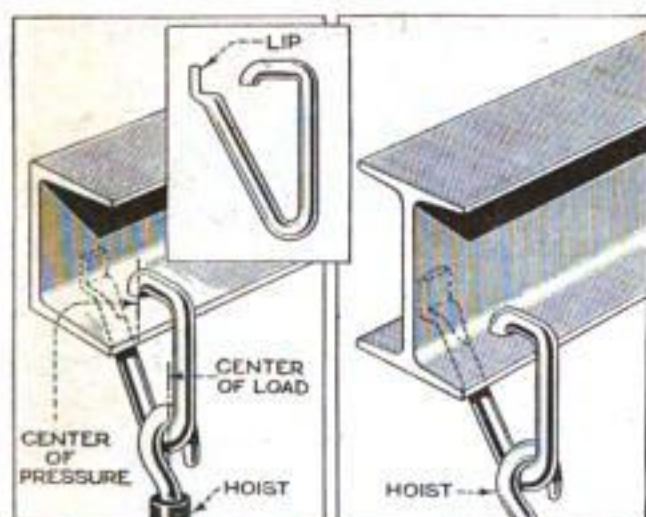
Gold Color on Brass

A rich gold color can be imparted to brass articles by boiling them in a solution of 2 parts saltpeter, 1 part common salt, 1 part alum, 24 parts water, and 1 part hydrochloric acid, all by weight.

Another method of obtaining the same result consists in the application of a solution of 3 parts alum, 6 parts saltpeter, 3 parts sulphate of zinc, and 3 parts of common salt to the surface of the articles. After applying this solution, the articles are heated until they become black. They are then washed with water, rubbed with vinegar, and again washed with water and dried.

Detachable Beam Hook

The illustration shows a detachable beam hook that has been found to give

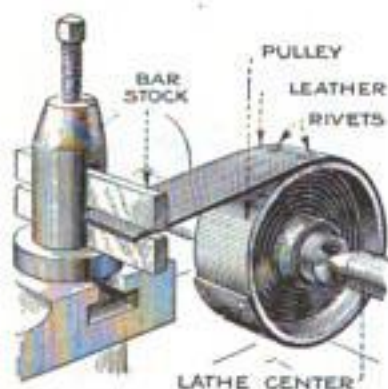


A Simple Beam Hook That Holds Heavy Loads Securely without Danger of Slipping, and That is Attached or Detached Instantly

excellent service in a machine shop for suspending loads on overhead channel and I-beams. The construction is very simple; the hook consists of only one length of iron rod, bent as indicated, and with a lip formed on one end. When attached to the beam, the load center is not in line with the center of pressure; this forces the lip against the beam, and keeps the hook rigidly in place. The hook must be made to fit the beam, but, as the beams of a shop are usually of uniform size, one size of hook may be found sufficient.

Relagging Pulleys

When relagging pulleys it is difficult to hold the leather tight enough, while riveting, so that it will not become loose



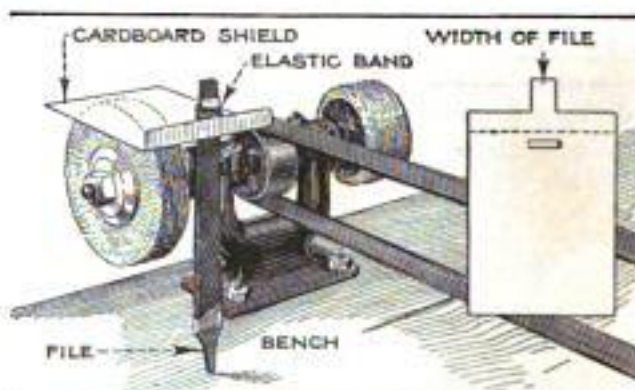
after very short use. For this reason the method shown in the illustration was devised, and has been found to be entirely successful. The pulley to be lagged is driven tightly on a mandrel and placed between centers in a lathe, the mandrel being dogged as usual. One end of the lagging is riveted to the pulley, and the pulley is then turned so that the next riveting point is uppermost. The lagging

is gripped between two bars in the tool-post, as shown. The lathe is locked by placing it in back gear, and the lagging is tightened by means of the cross slide.

A Shield for Cloth Buffing Wheels

The shield for cloth buffing wheels shown in the drawing can be improvised in a few moments, and protects the worker's eyes and face from the rouge and particles of metal thrown off while the wheel is revolving, just as well as a much more elaborate one.

The shield is made of cardboard, cut out as shown, and provided with a slot to fit a 12 or 14-in. flat file. An ordinary rubber band is used to hold the shield to the file at any desired height over the wheel, the shield being bent and slipped over the file as shown. If the polishing spindle is attached to a wooden bench, the file tang is driven into the wood directly behind the wheel, but if the spindle is attached to a metal base, the file tang is driven into a box or wooden



A Cardboard Shield,* That can be Improvised in a Moment, Protects the Worker's Eyes from Particles Thrown off the Buffing Wheel

block of the same height, and this is placed behind the wheel.—Harry Moore, Montreal, Can.

Removing Stains from Concrete

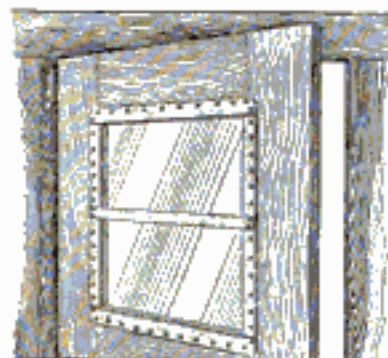
Concrete and stucco houses are often discolored by stains, caused by dirty water dripping from window sills and cornices. These stains can be readily removed by scrubbing with water, using a heavy bristle or wire brush. Rust stains can be removed by scrubbing the spots with a solution of 1 part muriatic acid and 5 parts water. When using this, the hands should be well protected from the acid, as it is very strong, and will cause severe burns. After scrubbing the concrete, the acid must be well rinsed off with clean water.

Tool Tray for the Stepladder

Four pieces of quarter-round molding, nailed along the edges on the top step of a stepladder, form an excellent tray for holding tools. The molding is nailed with one flat side down and the other toward the center of the step. Electricians will find this tray of considerable assistance while hanging fixtures, as the tools, solder, and tape can be laid on the top without any danger of falling off, even while moving the ladder from one position to another.—W. Norman Fox, Atlantic City, N. J.

Shock Absorber for Door Glass

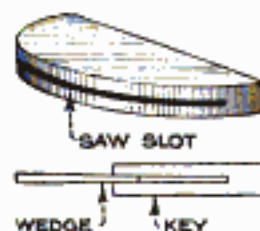
To prevent the glass panes in the door of his office from being broken when the



door was slammed, a Wisconsin factory foreman fitted the glass to the door with rubber strips instead of wooden cleats. Rubber strips, 3 in. wide, are cemented to the edges of the glass on each side, and also across the center, as shown. When dry, the rubber-framed pane is placed in position in the door, and the rubber is tacked down. The strips are cut from a discarded inner tube. No glass has been broken since it was fitted in this manner.—G. E. Hendrickson, Argyle, Wis.

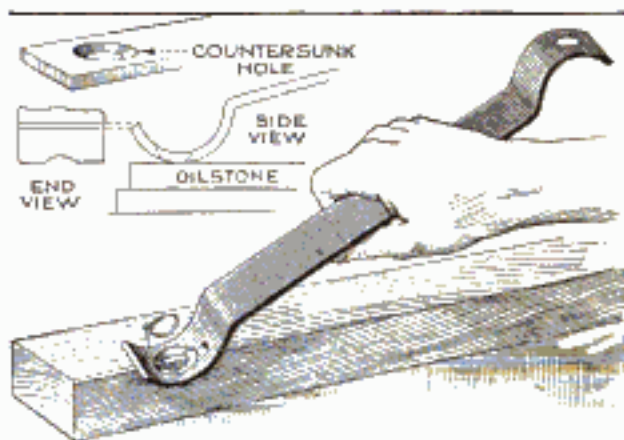
Seating Woodruff Keys

To tighten a Woodruff key in its seat, a slot is cut into the key, as shown in the illustration, and a small piece of sheet metal, slightly thicker than the slot, and tapered on one edge, is forced into the slot, to expand the key. The edges of the sheet metal are then trimmed off, and the key is filed to an exact fit in the seat.—L. R. Butcher, Des Moines, Ia.



A Chamfering Tool

An excellent tool for chamfering wood, and one not as well known among woodworkers as it should be, can be made from

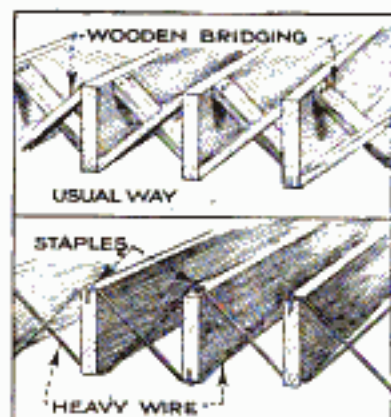


A Simple Chamfering Tool That can be Made in a Short Time from Flat-Bar Stock, and is Easily Sharpened

a length of flat steel. A hole is drilled in each end and countersunk on opposite sides. The ends are bent to the shape shown in the illustration and are case-hardened. The cutting edges of the holes are sharpened on an oilstone. The tool is held on the work at an angle, and the user may either draw it toward or push it away from his body.

Bridging Joists with Wire

A novel method of bridging joists, using wire as a substitute for the diagonal wood bracing, has proved very successful in the construction of a frame building. Lengths of No. 8 gauge galvanized-iron wire are led under and over the adjacent joists as shown, and are securely fastened with heavy staples. Both wire and staples are driven down flush with the joists, so that the flooring boards can be laid without trouble. The usual form of stretcher for fence work is used to tighten the wire. The weight of the load places the wire in tension, instead of in compression, as with the wood bracing, and for this reason the wire must be stretched tightly and stapled securely, so that it cannot slip.





MAKING WATERING TROUGHS IN CONCRETE

By E. R. Haan



THE advantages of concrete watering troughs on the farm are obvious. Troughs made of wood and iron are short-lived, especially if they are not kept filled to a constant level, and they deteriorate even more rapidly if built below ground than if built above it. Besides, the rust and decay incident to the use of wooden or iron troughs foul the water they contain, while in concrete troughs, if kept clean, the water remains pure and sweet. Concrete troughs are, moreover, not only easy to build, but cost considerably less for maintenance than wooden or iron ones, as it is not necessary to drain and paint them periodically.

While this article specifically refers to watering troughs for stock, exactly the same procedure is employed in making tanks for storage of water, so that these remarks, and the following directions may be taken as applying to storage-tank construction as well.

Tanks may be made either round or rectangular. The round tank requires less material for a given capacity than a rectangular one, but is more difficult to construct, except when a concrete silo is being erected, when the same forms can be used in making the tank.

The construction of the rectangular tank will be taken up first.

The trenches for the foundation are dug well down below the frost line, and the pipe lines for inlet and overflow laid down at the same time. The trenches being finished and the pipes laid, the construction of the forms may be taken up. Forms for concrete work should be made of green lumber, as seasoned wood will warp and swell, owing to the moisture in the concrete. The boards used should be planed, and dressed on both edges, as a form made of planed boards is easily cleaned, and the dressed edges allow the form to be made "tight." This is a necessary feature, for, if any cracks or gaps are left in the form, the cement in the mixture will leak through, leaving a porous spot in the wall. If the forms are well soaked with water, after assembly, there will be little possibility of leakage. Tongued-and-grooved boards, while not

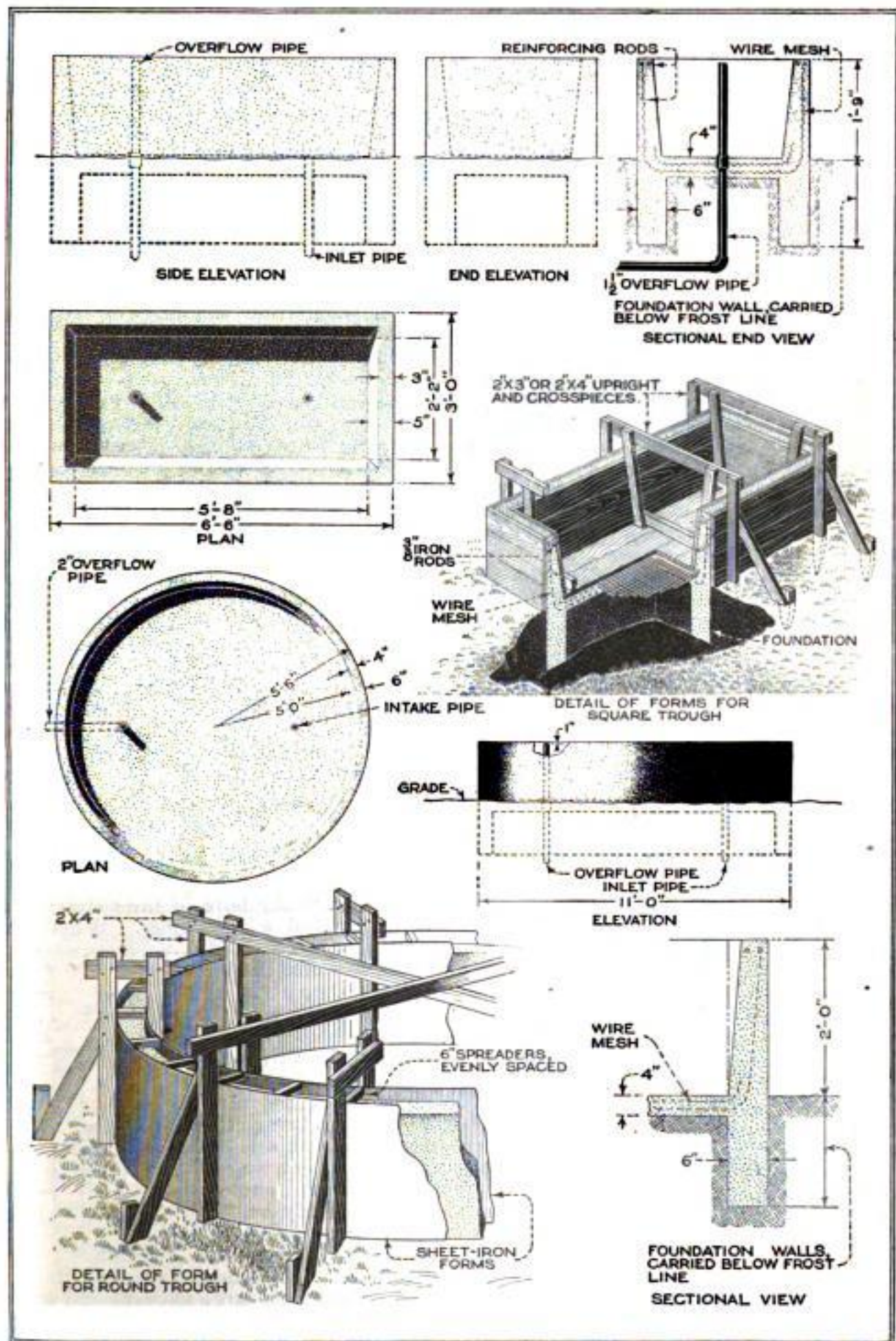
essential, make the best form, and leave a good, smooth finish on the completed work.

Lumber 1 in. thick is used for the forms, and the braces are made of 2 by 4-in. stuff. The outside forms are braced to stakes, driven into the ground, as shown. The concrete used for the work is mixed in the proportion of 1 part cement to 2 of sand, and 4 of clean, broken stone. When the foundation has been poured and the outer forms erected, spread about 1 in. of concrete over the earth that carries the bottom of the tank proper, cut the lower piece of wire-mesh reinforcing to size, and lay it in place, carrying it up along the sides, as indicated. Lay about $1\frac{1}{2}$ in. more concrete over the bottom, place the smaller section of mesh, and lay the remaining $1\frac{1}{2}$ in. of concrete. The inner form, which must be ready before the pouring operation is started, is then hung in place, as shown, and the side walls poured; the concrete must be of a "quaky" consistency.

The forms must be liberally slushed with linseed or crude oil, before pouring, to prevent the concrete from sticking to the lumber.

The concrete, while pouring and afterward, must be thoroughly poked and rammed into all corners, and churned with a long iron rod, so that it will be homogeneous and waterproof. If this part of the work is done thoroughly, there will be no need of applying waterproofing compounds, but it is absolutely necessary that no porous or incompletely filled parts exist in the walls, and this can only be prevented by painstaking rodding. Tapping the forms all over lightly with a hammer will aid in giving the concrete a dense, smooth surface, eliminating subsequent troweling.

The inlet pipe for the tank should be flush with the bottom of the form, and may be temporarily plugged while pouring. The overflow pipe should be about 1 in. below the level of the walls. Reinforcing rods, $\frac{3}{8}$ in. in diameter, are inserted around the tank in all four walls, near the top, although they are only



Construction of Concrete Watering Troughs: Above, Details of Forms and Dimensions for Rectangular Trough, Showing How Inner Form is Braced and Hung from Outer One; Below, Form Made of Sheet Iron for a Circular Trough, If Silo Forms Are Not at Hand. The Interior Taper is Formed by Hand, on the Circular Trough, After the Inner Form is Removed. The Edges of the Tanks may be Rounded, If Thought Necessary, While the Concrete is Still "Green" and Easily Shaped

shown in two in the drawing. No stops should be made in the work once the foundation has been poured; the pouring should be as continuous as possible until the work is completed.

The inner forms can be removed in 24 hours, and the inside surface of the tank painted with a neat-cement wash. The tank should be soaked with water twice a day for two weeks, when the outer forms may be removed, and the tank put in service. The upper edges of the tank may be rounded while the cement is still soft, if desired. The material necessary for a tank of the dimensions shown is approximately 1.66 bbl. cement, .55 cu. yd. sand, 1.10 cu. yd. broken stone, 9 sq. yd. $\frac{1}{2}$ -in. square wire mesh, and 70 ft. $\frac{3}{8}$ -in. reinforcing rod.

If no silo forms are available, the circular tank may be constructed as shown in the lower illustrations, using heavy sheet iron to form the side walls.

The foundation is laid as for the rectangular tank, and the wire-mesh reinforcing placed in the same manner. The

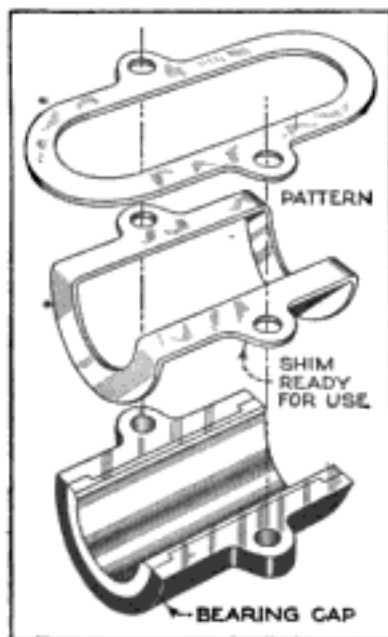
inner sheet-iron form must be securely braced, as shown, when hung from the outer one, and spaced from it by 6-in. wooden spreaders, which are moved upward as the concrete is deposited. The reinforcing rods are bent into hoops and placed in the concrete so that the joints come as far apart as possible. Three hoops are used, so the joints should be placed 120 degrees apart. The inlet and overflow pipes are placed as before.

The inner form should be removed as soon as possible, and the inner taper formed on the tank by troweling or cutting the cement as indicated by the dotted line in the sectional view. The inside taper on both tanks is important, as when ice forms on the water it tends to slip up the sides of the tank rather than exert pressure against them. After painting with a cement-water mixture, the tank is cured for two weeks.

The material required for the tank is 4.40 bbl. cement, 1.40 cu. ft. sand, 2.80 cu. yd. broken stone, 24 sq. ft. wire mesh, and 125 ft. $\frac{3}{8}$ -in. reinforcing rod.

Removing Crankshaft End Play

End play in the crankshaft of an automobile engine results in considerable



wear on various parts. In a light car that has its magneto incorporated with the flywheel, such end play will not only vary the intensity of the light and the strength of the ignition, due to the varying distance between the magneto coils and magnets, but will often result in weakening of the magnets and breakdown of the coils, owing to the scraping of the magnets against the coil cores.

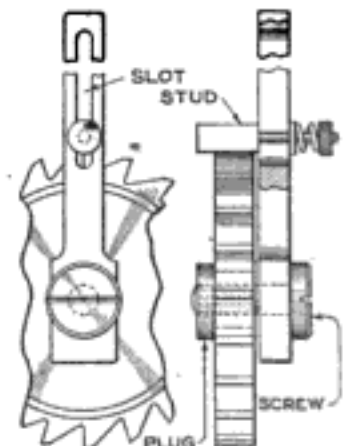
This trouble is usually remedied by fixing a shim to the end of the bearing cap with solder and pins. A better method, however, is to use a brass shim of the type shown in the illustration. It can be

attached much more easily and is more satisfactory than the shim on each end of the cap. It is placed on the face of the bearing cap, and the ends are bent over as indicated.

A Cutter-Grinding Gauge

The cutting faces of side and face-milling cutters are apt to become out of parallel with the bore of the cutter, after being ground a few times. When this occurs, it is worth

while to make the gauge shown in the drawing which is much better for testing the cutters than the ordinary square. A piece of stock is turned for a plug; this is made with a shoulder at one end, the body being a neat sliding fit in the bore of the cutter, and is drilled through its axis and tapped for a large fillister-head screw.



A piece of $\frac{3}{8}$ -in. flat stock is then cut for the arm, shaped as shown, drilled and slotted for the screw and stud, and then ground on the side to be used against the cutter. This side should also be lapped, if possible.

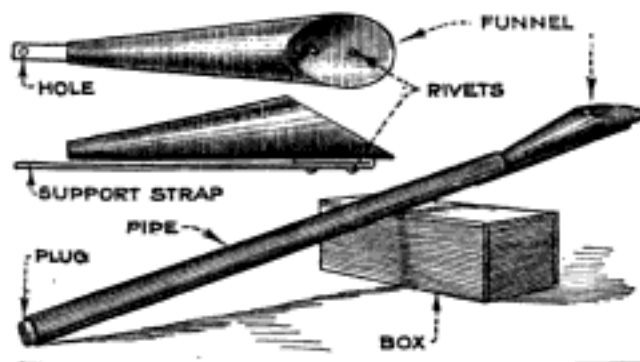
The stud, of tool steel, is turned and ground parallel, the smaller diameter being a good fit in the slot, and threaded on the end for a knurled nut. To hold the stud square and at the same time allow it to slide easily, a light spring is placed between washer and nut.

To use the gauge, insert the plug into the cutter bore, tighten the arm to the plug by means of the screw, then slide the stud down against the tooth. The clearance on the side of the tooth, and its parallelism, may be tested by holding the cutter up to the light.

Funnel for Pouring Melted Resin and Lead

The funnel shown in the illustration has been found very useful for pouring melted resin and lead into copper pipes, a customary operation before bending them, in order to prevent buckling.

The funnel is made of tin or sheet brass, shaped as shown. The wide end is cut off at an angle, to facilitate pouring when



A Tin or Sheet-Brass Funnel That Facilitates the Pouring of Melted Resin or Lead into Pipes, before Bending Them, to Prevent Buckling

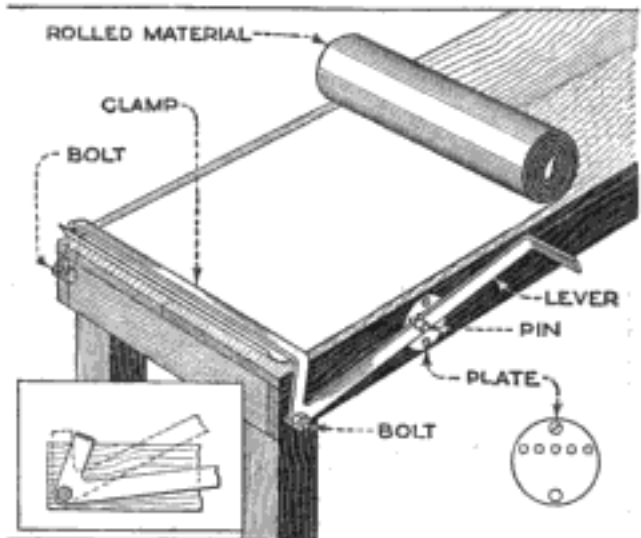
the pipe is in an inclined position. The narrow end of the funnel is inserted into the end of the pipe, and is held to it by means of a length of $\frac{1}{4}$ -in. strap iron, which is doubled and riveted to the funnel at the wide end, and extends a few inches beyond the narrow end. A small hole at the end of the strap permits the funnel to be hung on a nail when not in use.

Toolmaker's Magnifying Glass

A small magnifying glass can be made very easily by inserting a strong spectacle lens into the narrow end of a telephone mouthpiece. The glass is made round by grinding it on an emery wheel so that it fits exactly. Thick shellac is used to hold the glass in place.

Clamp for Rolled Material

A useful clamp, for holding down the end of rolled material that has a tendency to curl back when unrolled, is shown in

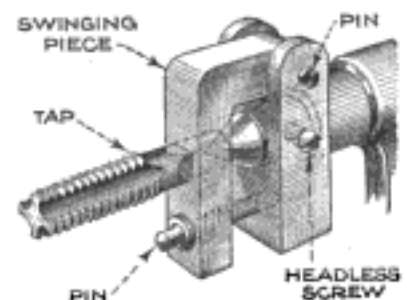


A Serviceable Clamp for Holding the End of Rolled Material Which Greatly Facilitates Marking Out, or Cutting It

the drawing. A length of $\frac{3}{4}$ by $\frac{1}{8}$ -in. flat iron, bent as shown, to suit the width of the bench, is pivoted on two bolts driven into the bench. A circular plate is fastened to the side of the bench, under the center of the lever. A number of holes are drilled in a row through the plate to accommodate a pin, which is used to hold the lever down. By inserting the pin in different holes, the clamp is adjusted to various thicknesses of material.

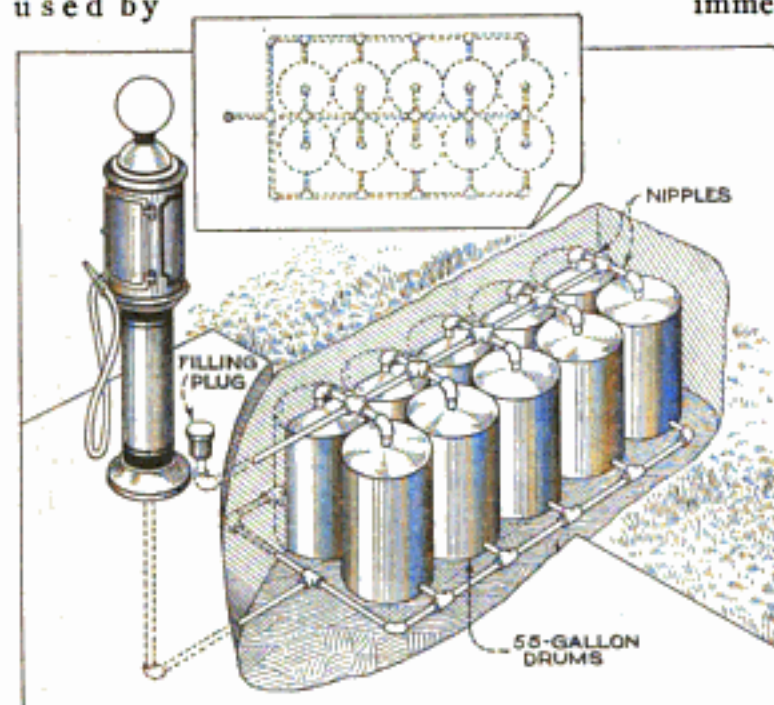
A Quick-Acting Tap Holder

In addition to several turning jobs on hand for the lathe, there was one piece drilled, on the end, which required to be tapped. Being anxious to do this without changing the setting, the quick-acting tap holder shown in the drawing was devised. The square shank of the tap is held in a swinging piece, clamped to the tail-stock center, so that, when in use, the center fits into the center hole in the tap shank. When the tap is in position for use, it is located accurately by the pin, which also prevents it from lifting. When the tapping operation is finished, it is only necessary to pull out the pin and swing the holder aside.



Cheap Gasoline-Storage Tank

The illustration shows the arrangement of a 550-gal. gasoline-storage tank, used by



A Number of Steel Oil Drums, Combined to Make a 550-Gallon Storage Tank for Gasoline: The Cost Is Far Less than That of a Single Large Tank, and the Drums Are as Satisfactory

a service station. It was installed at far less expense than an ordinary single tank of similar capacity.

The reservoir is made from ten 55-gal. steel oil drums, arranged as shown, just below the surface of the ground. All the drums are connected, at the bottom, to each other and to the pump, with pipe and fittings; the small nipples that connect the fittings to the drums have a right and a left-hand thread, so that any one of the drums can be removed without much trouble. The tops are similarly connected to each other and to the filling pipe. By using this arrangement of drums, instead of a single large tank, an estimated saving of \$400 was made.

Casehardening Bronze

The bronzes that possess the greatest hardness lack the requisite properties for chasing and sinking fine, intricate designs. It is, however, possible to obtain a hard face on bronze by a process similar to the casehardening of steel, and this is practiced with some bronze dies. The method is that of coating the surface of the die with pure tin and then heating to a low, red heat in order to alloy the tin with the surface of the bronze. Copper and tin unite in all proportions, and, when alloyed with from 20 to 30 per cent of tin,

the bronze becomes comparatively hard. The surface of the die to be casehardened is cleansed of grease by soaking in a strong, hot potash solution, and then immersing in a pickle, or acid dip, to remove the oxide. A suitable pickle, which works more rapidly if hot, is made in the proportion of 1 part sulphuric acid to 5 parts of water. The die is allowed to soak several hours until clean; it is then taken out, brushed, and the surface coated with a strong solution of zinc chloride to act as a flux. The surface is then covered with pure, melted tin. The tin may be melted on the surface by a soldering iron, but the best method is to use a torch or a blowpipe. The tin is melted on the surface only, and as little as possible is put on, as the fine detail of the die must not be filled up. The die is then washed in water to remove the excess of flux, and the surface is examined. If there are any portions that are not covered with tin, the process is repeated.

The next operation is to heat the die to a red heat, preferably in a muffle, though a blowpipe or torch may be used if the work is small. To prevent the surface from oxidizing, it is advisable first to cover it with a strong solution of boracic acid. The boracic acid is dissolved in hot water and the solution brushed lightly over the surface. A light coat only is necessary. The die is placed on an iron plate, to keep it from breaking when heated, as tin-bronze becomes brittle at red heat, and it is heated to a low, red heat and allowed to remain in this condition from 10 to 15 minutes. The plate is then removed from the muffle and the die allowed to cool. The boracic acid is removed by soaking in hot water and afterward pickling, if necessary.

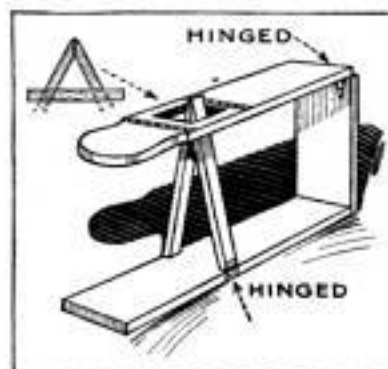
Dies hardened by this method can be used for stamping leather, soft metals, paper, and similar work, as they can be made originally soft enough for chasing or sinking with ease, and then hardened without destroying the design. The best results are obtained by using a rather soft bronze mixture with as little lead as possible. Such a bronze, high in copper, is not likely to give trouble by softening or cracking during the heating. A bronze mixture recommended for treatment by the method described is made in the proportion of 88 per cent copper, 8 tin, 2 zinc, and 2 lead.

Float for Boiler Gauge Glass

An indicator that plainly shows the water level in the glass gauge on a boiler can readily be improvised. Cut a thin slice from a small bottle cork, paint it bright red, and give it a few coats of shellac. Place this circular slice of cork inside the water glass, so that it will float in the water. The indicator enables one to read the gauge from a distance, even on dark days and in smoky boiler rooms, when it would otherwise be a considerable strain on the eyes to observe the water level in the glass.—John M. Pipp, Muncie, Ind.

Combination Harness Vise and Bench

The difficulty of sewing and mending harness without some convenient means for holding it firmly in place, led to the construction of the simple device shown in the drawing. After several methods had been tried, with slight satisfaction, it was found that by using this vise-and-bench combination, most of the difficul-



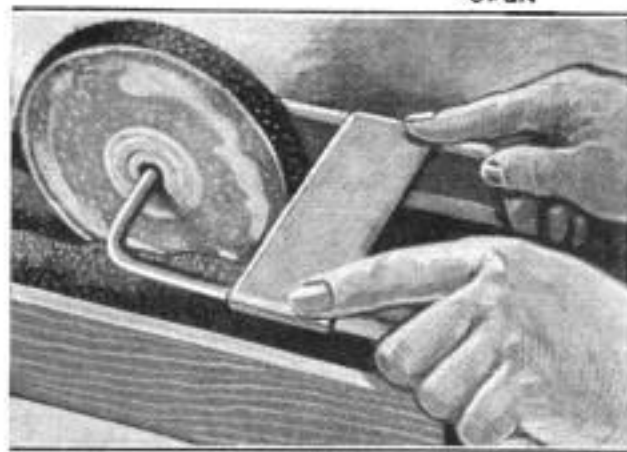
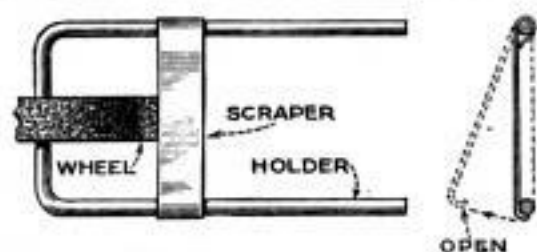
ties were eliminated. The base was made 4 ft. long, and an upright was nailed firmly to one end of it. A top, also 4 ft. long, was then fastened to the upright by means of large hinges, so that it could be raised and lowered. A square hole was cut near the other end of the top, to fit over two 2 by 4-in. uprights that were hinged to the base to form the vise. On two sides of this hole, pieces of strap iron were screwed, as indicated, to prevent the bench from being split. The end of the top was formed into a seat for the workman. His weight provided sufficient pressure on the vise to hold the work firmly at all times.—R. P. Lincoln, S. Minneapolis, Minn.

A Scraper for Glued Emery Wheels

When recoating glued emery wheels, the scraping device shown is very handy for removing the surplus abrasive, and is preferable to the usual hand scraper, which does not true the wheel surface.

The scraper is made by bending a

length of iron rod to a U-shape, and hooking a strip of sheet metal across the legs. The strip of sheet metal swiv-

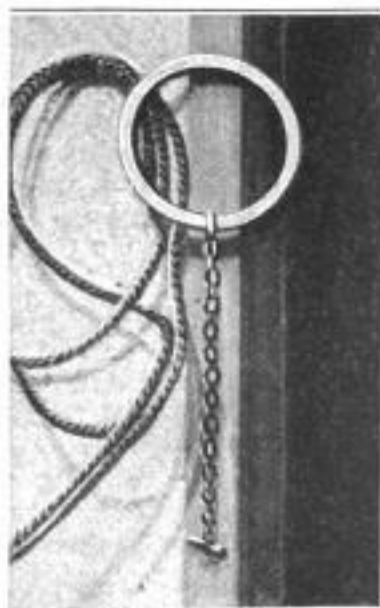


A Simple Scraper Used to Keep the Surface of Glued Emery Wheels True While Rolling Them in the Abrasive. Below: Method of Using

els on one leg, so that it can be swung around to clear the wheel while pushing the rod through the hole in the center, and slides along the rod so that it can be used on wheels of various diameters.

Keeping the Tire Gauge "at Home"

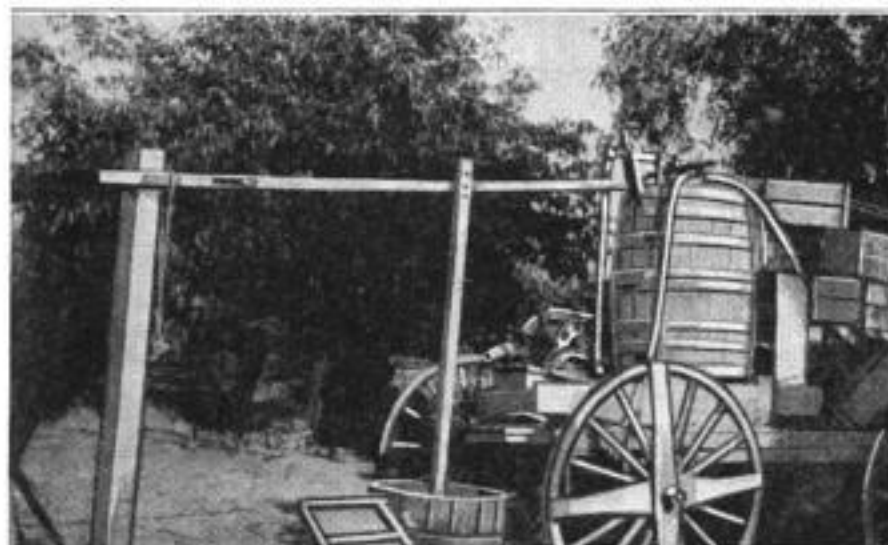
An excellent method of preventing the tire gauge from being lost or mislaid around a garage or service station, when it is not desired to attach it to the air-hose nozzle, is shown herewith. The gauge is brazed to one end of a



length of towing chain, and an old steering-wheel rim is attached to the other end. No passing motorist can pocket this assembly.—S. A. Pease, Milwaukee, Wis.

Improved Motor-Driven Washing Machine

An improvised washing machine, operated by a small spraying outfit, is shown



Above: A Spraying Outfit, Driven by a Gasoline Engine, Used to Operate Washing Machine. Below: Plunger Removed to Show Construction



in the illustration. A barrel, cut in half, provided two excellent tubs. A plunger, made to fit easily in one of these tubs, was attached by means of a long 2 by 3-in. stick, to the center of a 2 by 2-in. walking beam. One end of the beam was pivoted at the top of a fencepost, and the other was fastened to the pump arm of the spraying outfit. The clothes to be washed were tied loosely under the plunger, so that they would be partly lifted on each stroke of the plunger. By starting the engine of the spraying outfit, the apparatus was set in operation, and was found to wash the clothes thoroughly in a very short time.—W. L. Salvage, Beaumont, Calif.

Blue Stains on Wood

Blue stain is the most troublesome of the sap stains that discolor wood. It is caused by a fungus that germinates on the sapwood and penetrates its cells in search of starches and sugars. The action of the fungus causes no perceptible weak-

ening of the wood, but the discoloration lessens the value of the lumber for many purposes, such as interior finish, flooring, and basket or box veneers. The stain at first may be no more than a bluish spot or streak on the surface, but later, as the fungus develops, the discoloration may involve all the sapwood and become too deep to be surfaced off. The blue-stain fungus can revive in timbers after long periods of inaction brought on by lack of moisture.

Warm weather and a comparatively high moisture content of the wood are the most favorable conditions for the growth of the fungus. Most of the infection occurs in green lumber that is piled without ample ventilation between the boards, in the mill yard or during shipment.

As yet no absolutely dependable means of preventing blue stain has been found other than kiln-drying the lumber. The ordinary kiln-drying process is entirely effective, but there are many cases in which this means of prevention is not feasible. Staining during air seasoning can be largely controlled by open piling.

This affords free circulation of air and so hastens drying, but not always sufficiently under adverse weather conditions.

The treatment of the green lumber with antiseptic dips is the most effective method which is generally applicable at the present time. For this purpose the chemicals commonly used are soda ash and bicarbonate of soda. Neither, however, is a sovereign remedy under severe conditions, such as continuous rainy periods during the warm months, but will go far toward keeping the stock clean. In rainy seasons an eight-per-cent solution of sodium carbonate is desirable, but in drier weather, half this strength should suffice. When sodium bicarbonate is used, an 11-per-cent solution should be employed in wet weather and five to six per cent in dry weather. This chemical, when dry, should contain about 37 per cent of alkali.

In the use of these chemical dips, the following points should be kept in mind: The solutions should be carefully mixed, and the concentrations in the dipping tanks should be kept uniform by means of a hydrometer. The solutions should be heated when applied, the bicarbonate of soda solution not above 120° F., however, because it is broken down into the carbonate by excessive heating. The stock should be dipped as it comes from the saw. After dipping, it should be carefully piled so as to insure ample ventilation. Narrow, chemically treated cross strips are preferable to the wide untreated strips commonly employed, since treated "crossers" tend to eliminate stain at the point of contact.—U. S. Forest Products Laboratory, Madison, Wis.

Handling Roofing Paper

When applying prepared roofing paper, a great deal of time can be saved by using a pair of tin shears, instead of a knife, for cutting it, especially if the paper is coated with crushed slate or gravel.

The pitch used in cementing the laps, as well as the tar compounds in the paper, usually adhere to the hands while working. This can be removed very easily by means of kerosene.

Leaf for the Worktable

In a small printing shop, one of the benches is provided with a leaf at the end, as shown in the photograph, to prevent stacks of papers or booklets from falling off. The leaf is as wide as the table and about 20 in. long. It is hinged to the edge of the table, and, when

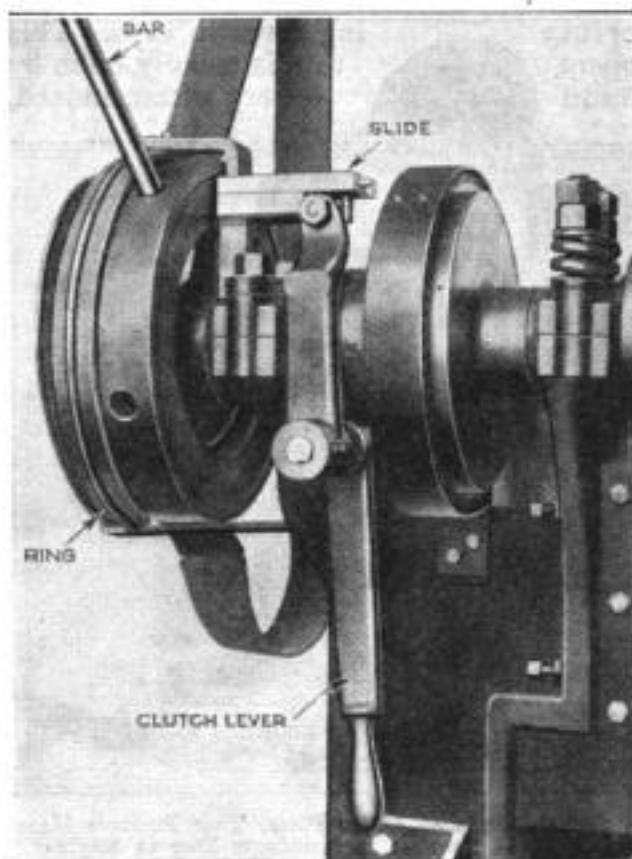


A Leaf Attached to the End of a Printing-Shop Workbench Serves to Keep Pamphlets and Papers from Falling Off the Bench

raised, is held by means of a hasp fastener on each side. When not in use, the leaf is dropped down out of the way.

Safety Device for Punch Presses

On some makes of punch presses the manufacturers provide a number of holes in the flywheel, so that, by inserting a bar



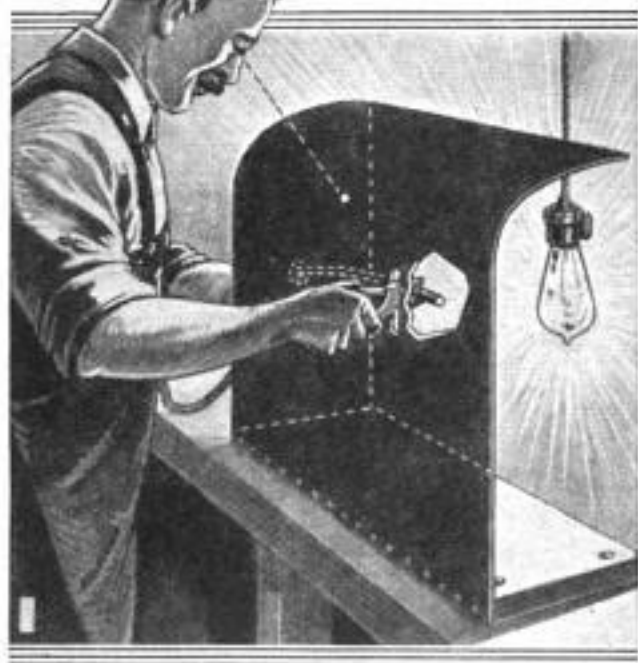
A Safety Device for Punch Presses That Prevents the Clutch from Engaging When a Handbar Remains in One of the Holes in the Flywheel

into the holes, the machine can be turned over by hand when setting and adjusting the dies. This makes a very handy arrangement, but, should the die setter forget or neglect to remove the bar, there is trouble as soon as the clutch is thrown in. Exactly such an occurrence caused a man to be struck by the flying bar, when the power was thrown on without the bar being removed. This accident resulted in the installation of the safety device shown in the photograph, which prevents the clutch from being thrown in while the bar is in the flywheel. As illustrated, the clutch lever operates a slide, to which a ring, running completely around the flywheel, is attached by means of a bracket. If the bar is not removed, the clutch cannot be operated because the ring comes up against the bar and prevents further movement of the clutch lever.—S. A. McDonald, Brooklyn, N. Y.

☞ Oxygen and acetylene tanks should never be dropped or handled roughly, and should never be stood on end, unless fastened so as to prevent their falling over.

Shield Protects Worker Handling Dynamite

A large number of the accidents incident to the use of dynamite are directly traceable to the methods used for crimping fuses in caps. This operation is usually done by hand—very often, indeed,



A Shield, Made of Boiler Plate, That Reduces Materially the Number of Accidents Due to Explosions of Dynamite Caps While Crimping

by biting the end of the cap with the teeth, an exceedingly dangerous practice. Realizing these dangers, the head of a building-material company that does a great deal of blasting in its own quarries, devised the shield shown in the illustration for the protection of the workmen.

The shield is made of $\frac{1}{2}$ -in. boiler plate, curved at the top; an endpiece, made of the same material, is riveted to the left-hand side, as indicated by the dotted lines, and the whole fixture firmly fastened to a heavy base. In the front of the shield a slot is cut, large enough for the crimping pliers to work in, and a few inches above and to the left of this, a $\frac{1}{4}$ -in. hole is drilled. A hole, large enough for the fuse, is drilled in the endpiece, level with the plier slot. The fuse is inserted through the hole in the endpiece, the cap slipped over it, and then, with the left hand holding the fuse, the pliers are pushed through the slot, and the cap crimped, the workman observing the operation through the $\frac{1}{4}$ -in. hole.

Should the cap explode, the only harm done would be the "stinging" of the workman's fingers, due to the sudden opening of the pliers. A fine particle of an ex-

ploded cap might, of course, pass through the $\frac{1}{4}$ -in. hole, but, in that case, it could, at most, injure only one eye, while, without the shield, the worker might lose both eyes, in addition to his fingers.

Familiarity with dynamite, as with many other potentially dangerous things, breeds, if not contempt, at least carelessness, and the company providing these shields has found it necessary to force the workmen to use them, by warning them that any workman crimping caps without using a shield not only does so at his own risk, but will be discharged immediately, if detected.

Backing Up Typewritten Copies for Blueprinting

When backing up typewritten copies with carbon paper, as is customary before blueprinting from them, the following method will be found very useful: The copies are usually made on thin bond paper, and it is found difficult to feed it through the typewriter without trouble, due to wrinkling of the carbon paper. To avoid this, wind the carbon paper, with the coated side exposed, tightly around the platen of the typewriter, taking care to get it perfectly smooth. Put a spot or two of paste on the free end and stick it down. The bond paper can then be inserted and run through without troubling about the carbon paper.

Holding a Surface Gauge

When a surface gauge is used on round work, it often happens that the gauge is forgotten on the work, with the result



that it topples over and falls to the floor. As a precaution against this, a mechanic employed the method shown in the photograph. A pair of spring outside calipers were adjusted to grip the finger depressions on each side of the surface gauge, and a parallel clamp was fastened to the calipers to act as a counterweight.

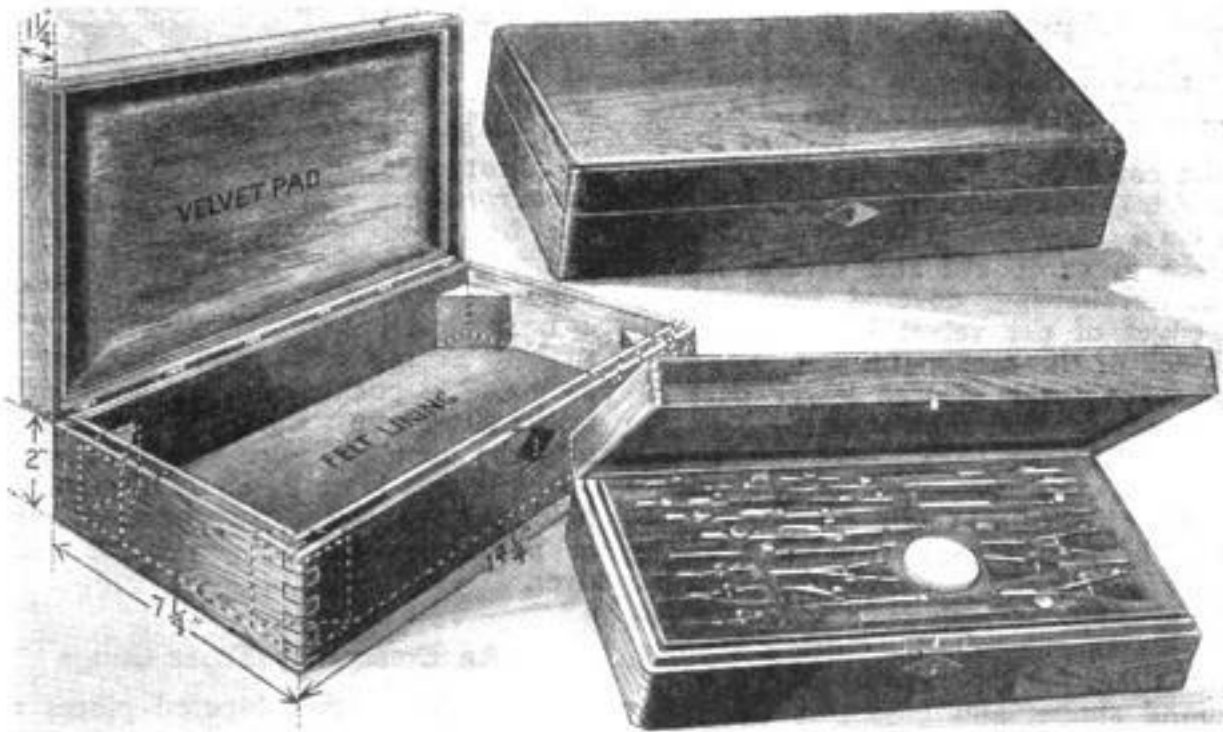
Making a Draftsman's Instrument Case

By J. D. McRAE

A SET of drawing instruments costs a considerable sum, if bought complete, and most draftsmen prefer to purchase the instruments as they are needed, especially topographical draftsmen, who use pens, etc., not found in the ordinary set. When the collection is complete, the draftsman thinks of a case for it, but soon discovers, upon consulting a catalog, that this is an expensive item.

The illustration shows a case that can be made for a negligible sum, and that, if the work is carefully done, will look as good as any commercial case. The instrument tray consists of two pieces of $\frac{3}{16}$ -in. soft wood, glued together and cov-

ered velvet. Where there is a cavity for a round lead box, saw slits around it at random. Cut a piece of velvet somewhat larger than the area of the tray. Apply glue sparingly to the bottom and sides of the cavities only. Lay the velvet over the tray and press the instrument that fits into a corner cavity in place. Then move on to the next cavity and press down the instrument that fits in it. Continue in this way, finishing an entire row before beginning with the next. Carefully force the gathered velvet, between the instruments, into the slits, with the blunt edge of a knife. This is all that there is to the tray-covering process. It



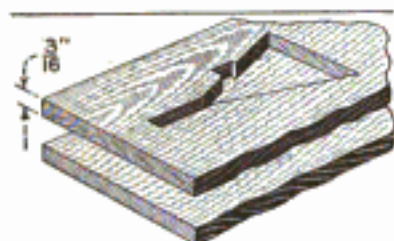
A Homemade Wooden Case for Mechanical Drawing Instruments That Compares Favorably with Manufactured Cases in Strength and Appearance: The Tray is Made to Suit Any Collection of Instruments Desired. The Space under the Tray can Also be Utilized for Pencils, Thumbtacks, Erasers, and Other Articles

ered with velvet. The length and width of the tray are determined by the number of instruments, and the arrangement desired. On one piece of wood, lay out the instruments in order and outline them in pencil. Cut these shapes through the wood, making the holes slightly larger than the outlines. Glue the perforated piece to the other piece, and place under pressure while drying. When dry, take a hacksaw blade and cut slits, $\frac{3}{16}$ in. deep, from the ends of the instrument cavities to the ends of the tray, and also cut slits all around the edges, about $\frac{1}{2}$ in. apart, as shown in the detail. These slits are to take up the surplus, or puck-

can be done very easily if practiced first with a remnant of velvet and a scrap piece of wood. Bring the velvet over the edges of the tray $\frac{3}{16}$ in., and cut off the surplus material. Also cover the underside of the tray with velvet, bringing the edges up $\frac{3}{16}$ in. The seam along the edge is covered with a narrow strip of fiber or aluminum, fastened neatly with countersunk flat-head screws.

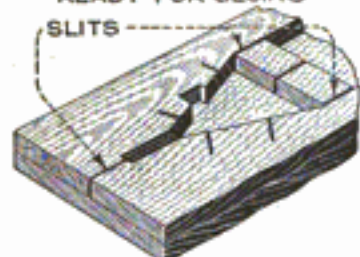
The case can then be made. It consists of two thicknesses of $\frac{3}{16}$ -in. wood, joined together with glue and screws, the latter being driven in from the inside, and countersunk. The double thickness prevents warping. Fit small

blocks in the corners as shown, and drive screws through them to hold the dovetailed corners firmly together; the joints



READY FOR GLUING

SLITS



GLUED AND SLIT
READY FOR COVERING
DETAIL OF TRAY

thus made are very strong and permanent. The blocks also serve as tray supports. Attach the cover with six hinges; these provide sufficient strength, and also stiffness, which eliminates the necessity of a stay hinge to hold the lid up. Fit a velvet pad inside

of the cover to hold the drawing instruments in place when the case is closed and carried around. The pad consists of a piece of cardboard and several layers of cotton batting, covered with velvet, the edges of the velvet being sewed at the back of the cardboard.

Line the inside of the lower part of the case with dark-colored felt, cut to fit, and glued to the bare wood. Stain the outside of the case and apply shellac. When dry, rub down with fine sandpaper and apply another coat of shellac. Repeat this process until the finish is satisfactory. Before varnishing, make a trimming for the keyhole by cutting a piece of drawing paper, colored black, to a diamond shape, and glue this over the keyhole.

Borax as Shellac Solvent

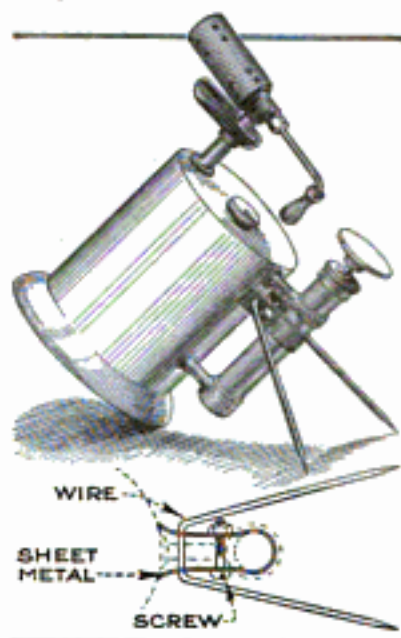
Borax has been found to be an excellent solvent for shellac, and an inexpensive substitute for alcohol. It is of special value in cases where it is necessary to avoid the fumes of alcohol. Another advantage of shellac dissolved in borax is that it does not dry so rapidly as shellac dissolved in alcohol, since the water evaporates much more slowly than alcohol.

An excellent shellac varnish of the proper consistency for brush work is prepared from 5 parts of borax, 15 parts of powdered shellac, and 100 parts of water, mixed well in a pail that is immersed in boiling water for a few hours. A very small quantity of glycerin adds pliability and toughness.

Stand for Gasoline Blowtorch

To hold a torch so that the flame is directed up against the underside of a lead or babbitt ladle, or against small tempering plates, the method shown in the illustration has been found to be much more convenient than the usual one of tilting it by means of blocks of wood, fire-brick, or pieces of metal.

A strip of sheet iron is bent around the handle, the ends being long enough to reach the side of the torch so that they will be drawn against the latter when the bolt and nut are tightened. A piece



of wire, shaped as indicated, and sharpened at each end, is pushed through holes drilled in the sheet-iron strip. This can be stuck into the bench to hold the torch in any position that is desired. This method of holding the torch is very neat and there is practically no danger of it falling over.

An Emergency Taper Gauge

When duplicating tapered pieces that are not standard, a simple gauge can be made to fit the taper. The sample piece



is placed in a vertical position, approximately in the center of a piece of steel tubing, and the space between is filled with babbitt. Before pouring, the piece is given a thin coat of tallow, to prevent the babbitt from adhering to it. After pouring, it is tapped lightly to make it fit as perfectly as

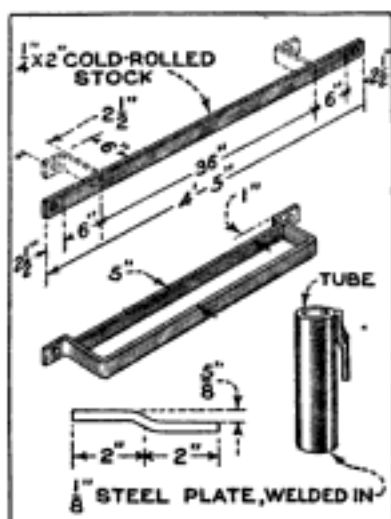
possible, then removed, and the rough ends of the gauge faced off. The pieces should all be rough-turned first, then the sample piece should be placed between centers, and indicated, setting over the

tailstock or adjusting the taper attachment until the indicator shows that it is set correctly. The sample may then be removed, and the pieces finish-turned.—E. N. Davey, Montreal, Can.

Sectional Rack for Welding Rods

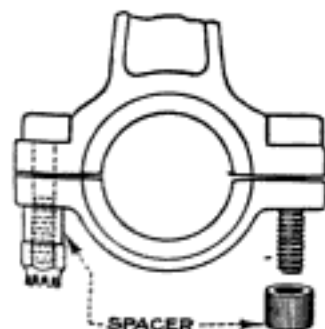
It is an easy matter to keep welding rods in good order, so that the metal required for any particular job can be selected without any trouble, by making a rack equipped with removable steel containers.

The rack is made of flat bar stock, welded together as shown in the drawing. The containers are made of steel tubing, a disk, made of $\frac{1}{8}$ -in. steel plate, being welded in one end of each length, to form a bottom, and a clip to the other end to serve as a hanger. These containers are made in two sizes, 12 in. and 25 in. in length, as the welding rods usually come in two general sizes. The steel, iron, and bronze rods are supplied in pieces about 3 ft. long, while the cast-iron, cast-aluminum, and other rods vary from 12 in. to 18 in. in length.—A. S. Jamieson, Springfield, Mass.



Spacer Aids Fitting of Caps

When fitting connecting-rod or main-bearing caps, spacers made of bushing stock or tubing have been found to facilitate the work and to save considerable time. By using spacers it is not necessary

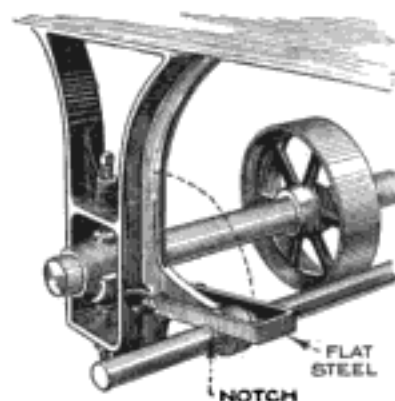


When the spacers are not used, a wrench must be used all the way.

to turn the nut down until it touches the bearing cap, but only to turn it down three or four threads until it touches the spacer. Half a turn with a wrench will then tighten the cap.

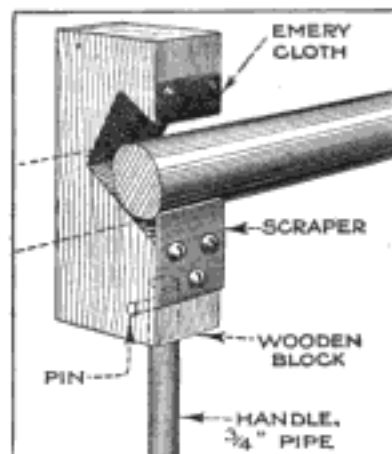
Countershaft Lock

A safety lock for countershafts is shown in the illustration. It is designed to prevent a machine operator from starting the machine while the clutches and pulleys are being oiled. The lock is simple to make. It consists of a piece of flat steel, $\frac{1}{8}$ by $\frac{3}{4}$ in., bent to U-shape, and bolted to the hanger so that it straddles the shifter-rod bearing, as shown. Two notches to fit the lock are filed in the shifter rod, while the belt is on the loose pulley. When the oiler desires to lock the countershaft, the device is swung down to catch in the notches. This prevents the shifting of the belt to the fast pulley.



Tools for Cleaning and Polishing Shafts

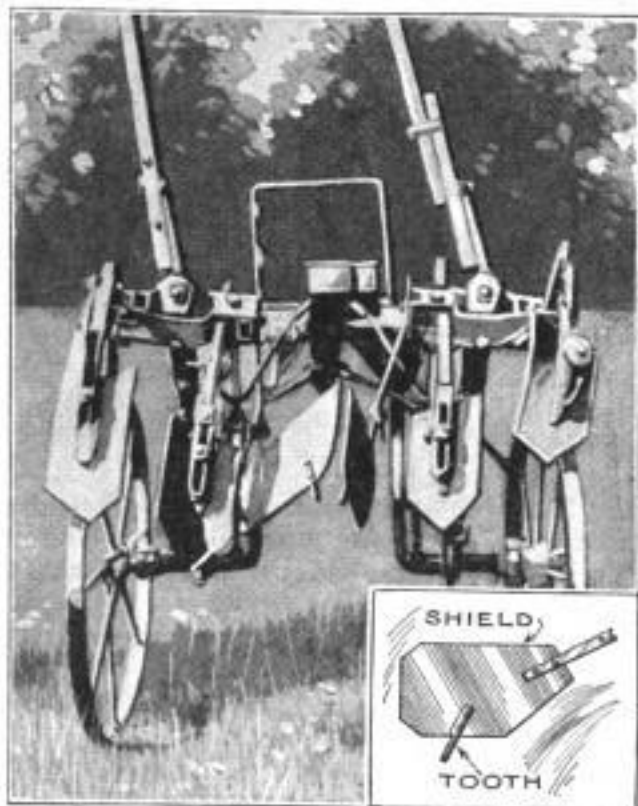
The tool shown in the illustration is used for cleaning and polishing shafts without the aid of a ladder. A 2 by 4-in. hardwood block is cut out as shown. The upper part of the recess is lined with emery cloth, and a piece of flat steel is screwed to the block, as indicated. A hole is drilled in the bottom of the block to receive the $\frac{3}{4}$ -in. pipe that serves as a handle. A pin passes through both block and pipe to hold the pipe in place. The handle must be long enough to enable the operator to reach the shaft while standing on the floor below. The tool is pressed upward on the revolving shaft to scrape off hardened grease or oil, and pulled downward to polish it.



☞ The best ratio of heating to grate surface is about 35 to 1, and grate area to draft area as eight to one.

Teeth on Cultivator Improve Efficiency

Teeth, fitted on the bottom of the shields of a cultivator, as shown, make them more effective in breaking crusted



Small Teeth Attached to the Shields of a Cultivator Greatly Improve Its Efficiency in Breaking Crusted Soil and in Cultivating Listed Corn

soil, and are of special value when cultivating listed corn.

The teeth are 4 in. long and project $1\frac{1}{2}$ in. below the edge of the shields. Each tooth consists of two pieces of $\frac{3}{8}$ -in. rod, flattened at one end and riveted to the rear part of a shield as shown, one piece on each side of the shield.—Mrs. Ruth Darling Shultis, Grand Junction, Colo.

Air-Dried Versus Kiln-Dried Wood

There is much difference of opinion as to whether air-dried or kiln-dried wood is the stronger. However, some 150,000 comparative strength tests, made by the Forest Products Laboratory, on kiln-dried and air-dried specimens of 28 common species of wood, show that good kiln-drying and good air-drying have the same effect upon the strength of the wood.

The belief that kiln-drying produces stronger wood than air-drying is usually the result of failure to consider the difference in the moisture contained in wood after being dried. The moisture contained in kiln-dried wood is generally

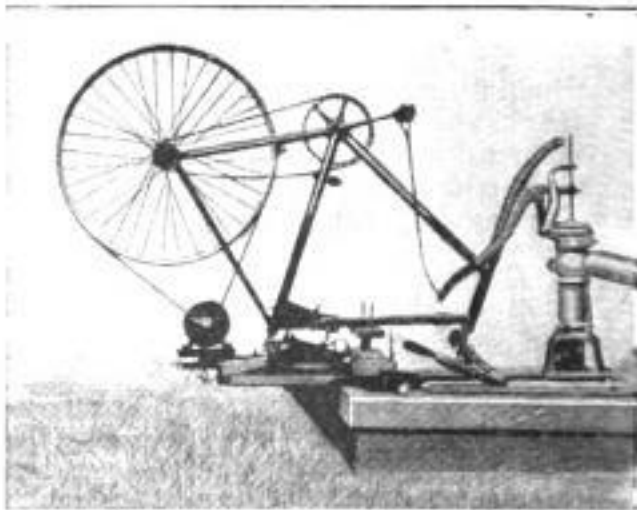
from 2 to 6 per cent lower than that of thoroughly air-dried stock. As the strength of wood is increased with the elimination of moisture, kiln-dried wood is at first stronger than air-dried wood. However, the difference in strength is not permanent, because, in use, a piece of wood will come to practically the same moisture condition whether it is kiln-dried or air-dried.

The appearance of the dried wood is not a reliable index of its strength. Furthermore, the same kiln-drying process cannot be applied with equal results to all species. To insure uninjured kiln-dried material, a knowledge of the correct kiln conditions to use for stock of a given species, grade, and thickness, and a record showing that no more severe treatment has been employed, are necessary.

Novel Arrangement for Pumping Water

Finding it necessary to pump 3,200 gal. of water out of a cistern, a bicycle, electric motor, and small pump were arranged as shown in the photograph, and, although the arrangement presented a comical appearance while running, it proved to be very effective.

The bicycle was turned upside down and fastened to a wide board. Staples were used to fasten the handlebars, and a small wooden block to clamp the saddle. The tire was removed from the rear wheel and a small $\frac{1}{16}$ -hp. electric motor mounted on the board, behind the saddle, so that its pulley was in alinement with the rear wheel. A belt was made from a piece of $\frac{1}{4}$ -in. cotton rope, with the ends spliced together, of such a length that,



A Novel Arrangement, Consisting of a Small Motor, Pump, and Part of a Bicycle, was Found Very Effective for Pumping Water from a Cistern

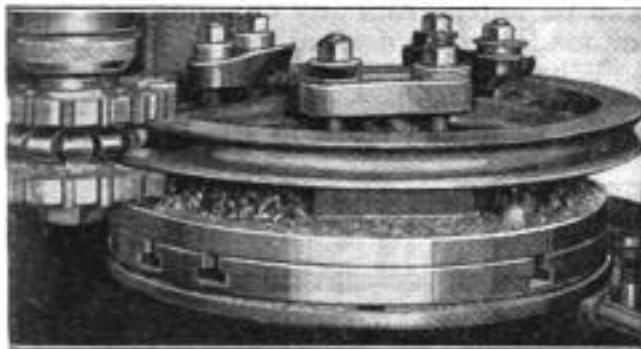
when it was put on the motor pulley and rear wheel, the coil springs of the saddle

were slightly compressed, insuring a proper tension on the belt at all times. A 3-in. cistern pump was fastened to the board in front of the handlebars, the board set over the cistern, and a length of pipe run down to the bottom of the latter. A connecting rod was fitted from the handle of the pump to the bicycle pedal; the rod was made from an automobile brake rod.

The gear ratio is about 50 to 1. The pump operates at about 40 strokes per minute, and gives an output of 3 gal. per minute or 180 gal. per hour.—Dr. A. C. Griffin, Whitestone, L. I.

Machining Sheave Pulleys

The usual method employed to machine a large sheave pulley, by setting it on an arbor in a lathe, and turning it down first in the center and then on each side, is slow and laborious. A much quicker method, that has been found to be very successful, is to use a vertical milling machine and three cutters, two straight ones for the sides and a curved one for the center. All three cutters are in use



A Vertical Milling Machine, Equipped with Three Cutters, Finishes Sheave Pulleys Much Faster than They can be Finished in the Lathe

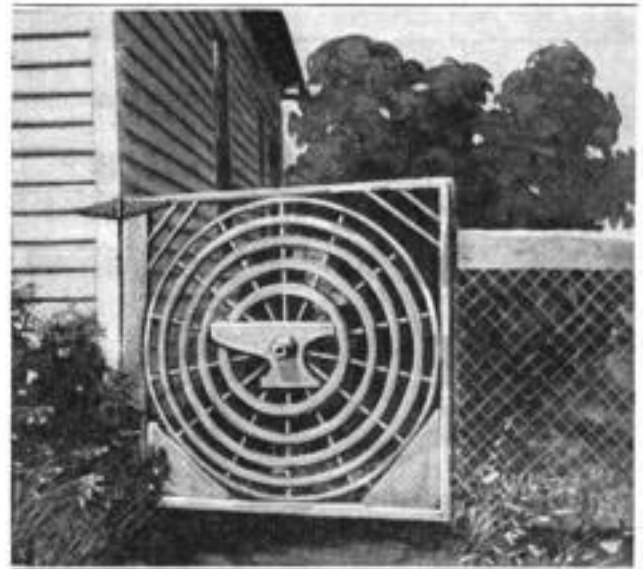
at the same time, and a considerable saving in time is effected.

Truing a Universal Chuck

When operating on particular work with a three or four-jaw universal chuck that is out of true, the difficulty can be remedied without using shims, as follows: Place a piece of tubing, having an internal diameter suitable to the work, between the jaws, and tighten them up equally, so that the tubing is bent slightly out of round. Bore the tubing out to the size of the work. Then insert the work and tighten the jaws, and the work will run perfectly true. The tubing will not turn in the jaws.—J. Harger, Honolulu, Hawaiian Islands.

A Novel Gate

The photograph shows an original type of gate, built by a blacksmith and



This Gate, Used to Advertise a Blacksmith and Wheelwright Shop, Is Quite Novel in Design and Attracts Considerable Attention from Passing Farmers

wheelwright to advertise his shop. It consists of a wagon wheel and a number of rims. A square frame is built around the wagon wheel, and rims of various sizes are attached to the spokes at equal distances from each other, as shown. A piece of sheet iron, cut in the form of an anvil, is fastened to the hub. The whole gate is painted red and black.—Mrs. M. F. Phillip, Caneadea, N. Y.

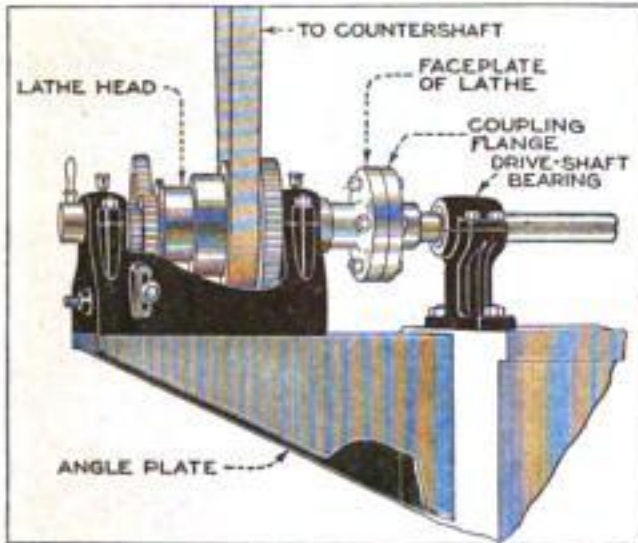
Tinning Black Iron

For tinning black-iron and steel objects, to prevent them from rusting, the following method has been found very satisfactory, leaving a thick deposit: The scale on the surface of the work to be tinned is first removed by immersing the object in raw muriatic acid until the metal turns white. The work is then put into cut muriatic acid; this is made by adding clippings of sheet zinc to raw muriatic acid, until it will dissolve no more. The cut acid leaves a zinc film deposited on the surface of the work, so that the molten tin will adhere better. After shaking off the surplus acid, the object is dipped into the molten tin, solder, or lead, as desired. If the coating is not satisfactory, dip the object into the cut acid and molten metal again.

Small pieces of bar solder that accumulate in shops, can be used for coating purposes; even the dross that is skimmed from the surface of molten solder and lead can often be used for this purpose.

Lathe Head Used as Variable-Speed Drive

An old lathe head has been found to give excellent service as a variable-speed



An Old Lathe Head Used as a Variable-Speed Drive Gives Six Speeds and has Proved Entirely Satisfactory on a Special Machine

drive for a machine tool. The head is mounted on an angle plate on the end of the machine bed. The spindle of the lathe is carefully aligned with the drive shaft of the machine, and the two are coupled together by using the regular lathe faceplate as one half of the flanged coupling, and bolting it to a coupling on the end of the drive shaft. The lathe countershaft is fastened in place overhead and belted to the cone pulley. With this arrangement, it is possible to drive at six speeds. This drive saved considerable delay in one machine shop, on a special machine, where the choice of the drive was delayed until the machine was urgently needed.—J. V. Romig, Allentown, Pennsylvania.

Concrete Foundations for Engines

The concrete used in making foundations for engines that run without much vibration should be mixed in the proportion of 1 part cement, 2 parts clean, coarse sand, well graded from the finer particles to those just passing through a $\frac{1}{4}$ -in. screen, and 4 parts clean, hard pebbles, or hard crushed stone, ranging from $\frac{1}{4}$ in. to 2 in. in size.

Foundations for all engines that produce considerable vibration should be made of concrete mixed in the proportion of 1 part cement, $1\frac{1}{2}$ parts sand, and 3 parts pebbles or stone, the sand and stone being graded as above. Care should be taken to mix the concrete thoroughly

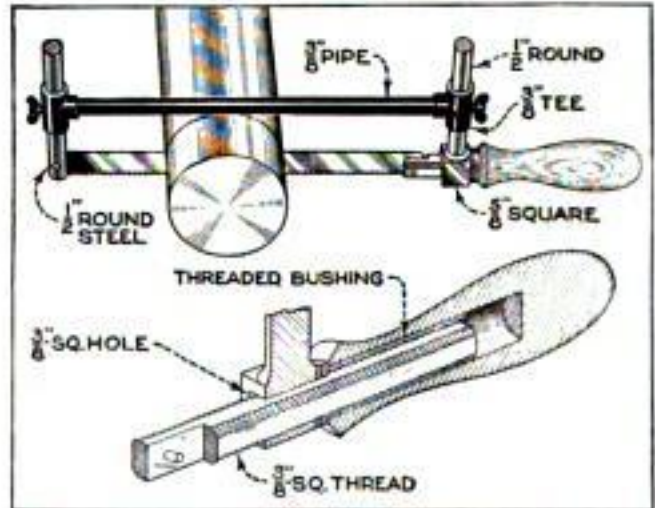
with sufficient water to make it of a quaky consistency, and to deposit the concrete in such a manner that a dense and compact mass will result.

Hacksaw Adjustable for Depth

As an ordinary hacksaw frame cannot be used for cutting in cramped places, because of its width, nor be set to cut to a certain depth, the frame shown in the drawing is of considerable advantage, because it can be adjusted for these purposes.

It can be made from two $\frac{3}{8}$ -in. tees, a length of $\frac{3}{8}$ -in. pipe, a short length of $\frac{1}{2}$ -in. round steel rod, and a piece of $\frac{5}{8}$ -in. square steel; the latter is turned and shaped as indicated, to fit the square screw and the tee. The pipe is cut and screwed so that the tees will be the correct distance apart for the saw; the tees are then screwed on, and drilled out to fit the $\frac{1}{2}$ -in. rods. A small hole is also drilled and tapped, opposite the side outlet in each tee, for the thumbscrews used for tightening the tees on the rods. The outer rod is shaped as shown, for holding the saw blade. The remaining parts can be taken from any common hacksaw, or made up, as desired.

When it is desired to saw to a certain depth, the pipe is fastened so that the distance from the teeth of the blade to the



A Hacksaw Frame That can be Adjusted for Depth of Cut, and can be Used in Places Where a Common Hacksaw would Not Enter

pipe is equal to the depth desired; the saw will then stop cutting when the pipe touches the work. It is an easy matter to saw in narrow places by reducing the distance between the blade and pipe to the minimum. With this type of frame, the blade can be held very taut and rigid, and this prevents it from being broken easily.



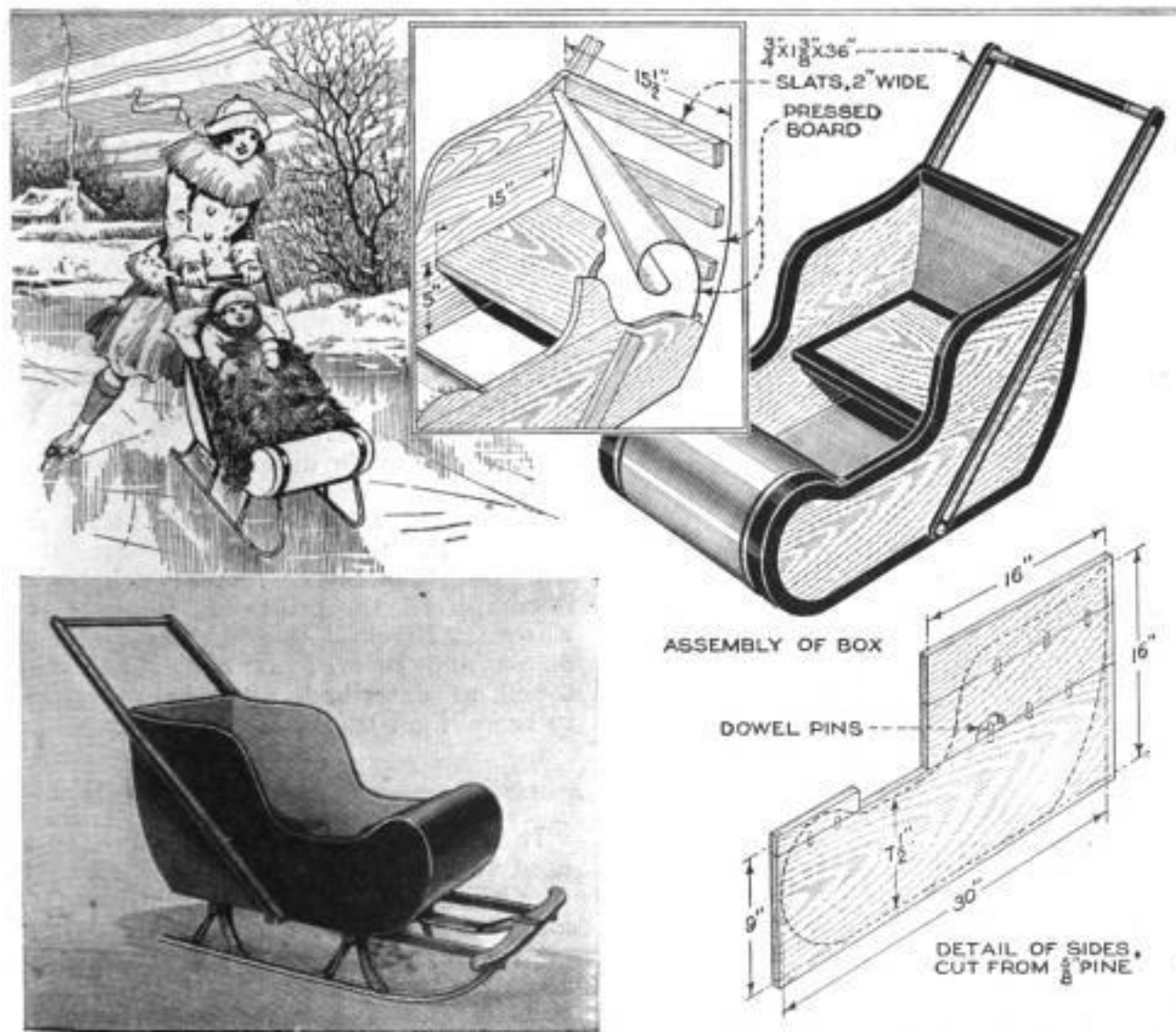
Making a Child's Carriage Sled

By E. E. SCOTT

ANY father, even if he is not the proverbial "handy man around the house," can in a short time make an attractive and serviceable sled for the baby, costing but a fraction of the price charged in stores, by following the method shown in the illustration.

The materials necessary are a common coasting sled, about 10 sq. ft. of $\frac{5}{8}$ -in. dressed pine, and some $\frac{1}{16}$ -in. cardboard, of the kind known as pressed board.

Four pieces of the lumber, of the size and shape shown, are doweled and glued together for each side. Hot glue should be used, and the pieces clamped firmly, and allowed to set overnight. A paper template, of the exact shape and size of the sides, is then prepared, and the sides marked out and sawed roughly to shape. A drawshave and sandpaper will complete the finishing of the outline. Bottom boards, reaching to the lower ends of the



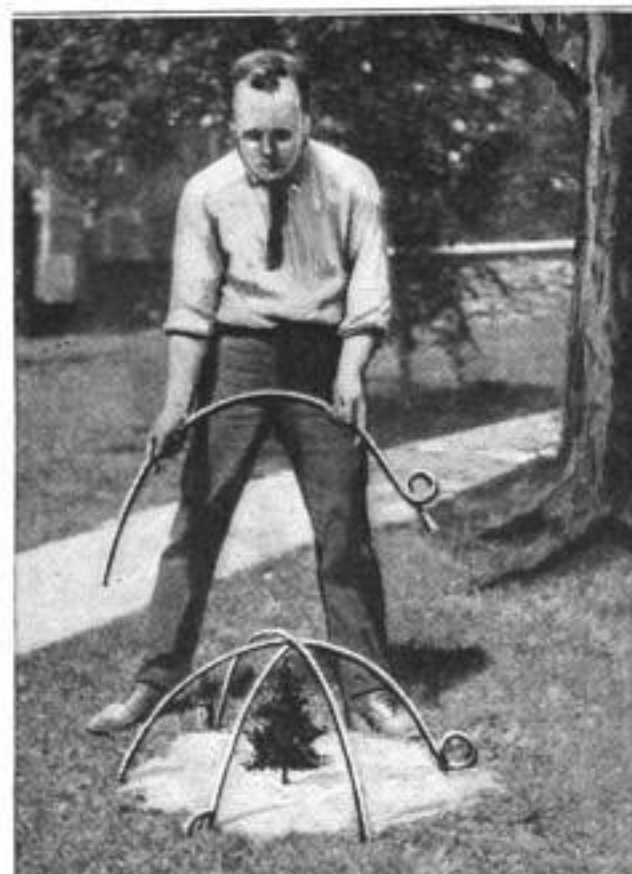
A Simple and Attractive Carriage Sled for the Baby: It can be Built by Any Handy Man, and the Sled can be Used by the Child When It has Outgrown the Body. The Construction of the Ends Eliminates All Difficult Wood Bending

curves at front and back, are then nailed on, and pieces of the pressed board cut to fit the curves. A strip of pine, about 1 in. thick and $15\frac{1}{2}$ in. long, is tacked to one end of the front cardboard, and, with the cardboard underneath, nailed to the inner ends of the front curve. The board is then bent around the front, and nailed to the sides and to the front bottom board.

The back is formed of two pieces of pressed board, three slats being nailed between the sides, to support them; the outer piece of board is tacked to the slats, and to the bottom and sides. The inner piece is tacked to the slats and bottom board. The outside pieces of board should be left about $\frac{1}{2}$ in. wider than the finished width of the box, and trimmed close after nailing.

Tree Guards from Hayrake Teeth

On many farms throughout the country are to be found piles of old hayrake



Discarded Hayrake Teeth, That are to be Found on Any Farm, Utilized as Guards for Infant Trees and Growing Plants

teeth, laid aside because "they might come in handy some time."

The man shown in the illustration has found that these old teeth make splendid guards for small trees and growing plants. The teeth are set into the ground, as shown.—A. Perry, New York City.

The seat and handle are then fitted. The latter is made from two pieces of pine, $\frac{3}{4}$ by $1\frac{3}{8}$ by 36 in., connected by a piece of broom handle. The sidepieces of the handle should be screwed to the sides of the box in such a manner as to help to hold together the pieces forming the sides. All nailing through the sides should be done with 2-in. brads, punched, and the heads puttied, to present a smooth surface when painted.

The complete body is bolted to the sled with four $\frac{1}{4}$ by $1\frac{1}{2}$ -in. carriage bolts, with the nuts and washers on the underside of the sled top. After the body is painted in the desired colors, several coats of good varnish should be applied, particularly to the pressed board, to prevent absorption of water, which would cause it to shrink.

Toning Prints Red

Fire-lit, lamp-lit, and outdoor-fire scenes are made much more realistic if the prints are toned red. The usual method of doing this, by dipping the prints in stains, is not at all satisfactory, because the high lights do not retain their natural values after being affected by the stain. A solution made up according to the following formula has been found very satisfactory and will not obscure the high lights: The solution consists of two preparations, mixed separately, and then combined. The first is composed of 5 dr. of water, 15 drops of copper sulphate (10-per-cent solution), and ammonium carbonate (10-per-cent solution). The second solution consists of 36 gr. of potassium ferricyanide dissolved in $4\frac{1}{2}$ oz. of water. When ready for use, the two preparations are mixed, and the prints immersed in the solution, where they will tone to a bright red. When toning is completed, the prints are removed and washed. Black-and-white prints are exposed and printed as usual, and then toned as described, after being washed to remove all traces of hypo.

Mercury Cleans Rifle Barrels

It has been found that mercury can be used very effectively to clean rifle barrels. The end of the barrel is tightly corked, and about $\frac{1}{2}$ fluid oz. of mercury is poured in. Then, after the other end is corked, the barrel is slowly tipped from end to end a number of times. The mercury amalgamates with the lead adhering to the inside of the rifle barrel.—J. J. Haas, Milwaukee, Wis.

Radio Cabinets Made from Battery Jars

It has been found that old rubber storage-battery jars can be used as cabinets for small radio sets. An average jar is 2½ by 6 by 7 in. in dimensions, and is quite large enough to contain either a crystal set or a vacuum-tube set of one or two-stage amplification.

The best way to assemble the set in the cabinet is to remove the bottom and top from the jar. Then, after the set is completely assembled, a new bottom and top can be made from another jar. These should be made slightly larger than the ones that were removed, and should have small wooden strips glued on the inside, just large enough to fit snugly in the ends of the jar. The surfaces of the jar are finished with fine sandpaper, then shellacked or varnished.

Improved Drinking Fountain for Poultry

The type of drinking fountain shown in the photograph has an advantage over

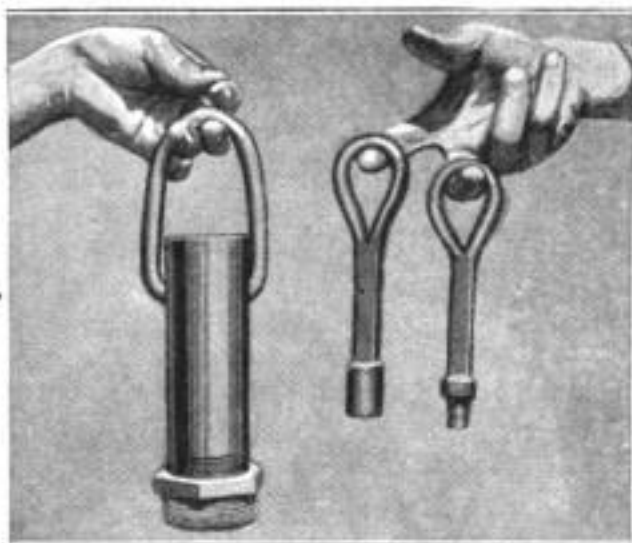


other types, as it can be refilled without turning it upside down. It consists of two galvanized-iron cylinders, about 10 in. in diameter and 16 in. high, one telescoping over the other. A round top is soldered to the larger cylinder, and a square bottom, with the edges turned up about 2 in., as shown, to the smaller one. Holes are punched around the side of the inner cylinder, at 5-in. intervals and 1 in. from the bottom.

Handy Tools for Windmill Owners

The photograph shows three tools that are of great use for drawing rusted pipes and rods from a deep well. The two smaller tools are designed to fish out the pump rod; one has threads on the inside and the other on the outside, to fit the male and female threads on the rods, the tool to be used depending upon which

thread is uppermost. The larger tool fits the thread on the pipe couplings, and is used in connection with a block and

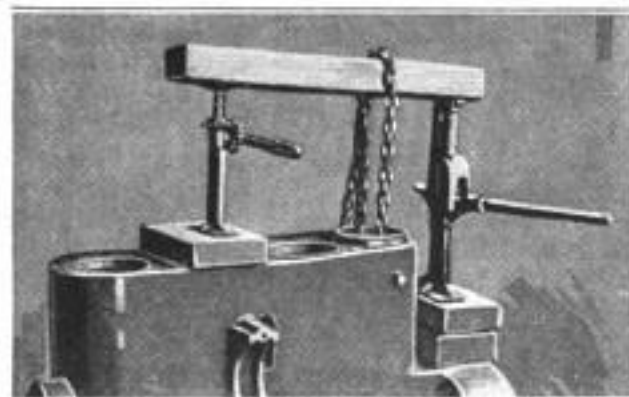


Three Tools That Are of Considerable Assistance in Removing Pump Rods and Pipes from Deep Wells: The Large Tool Handles Two Sizes of Pipe

tackle for lifting the pipe. This tool is fitted with a removable coupling so that it will fit two sizes of pipe.—H. J. Engel, New Braunfels, Tex.

Removing Sleeves from Cylinders

Sleeves can be removed from cylinders very easily by employing the method illustrated in the photograph. Arrange a 4 by 4-in. timber on two jacks, as shown, and place a steel bar under the sleeve, then pass a chain around the steel bar and over the timber, and lock it. The bar under the sleeve must be a trifle shorter than the outside diameter of the sleeve, and both ends must be rounded so that the bar cannot score the cylinder while it is being pulled through. Only one jack is operated when removing the sleeve, the other being placed at

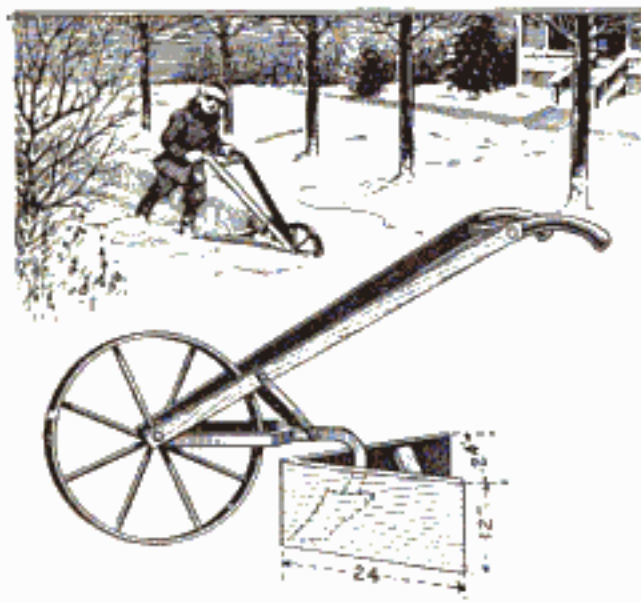


A Handy Rigging for Pulling Sleeves from Cylinders, Assembled from Tools and Materials to be Found around Any Garage

the proper distance from the chain to provide the necessary leverage.

Snowplow Made from Hand Cultivator

A hand cultivator can be used to advantage during the winter months, by at-

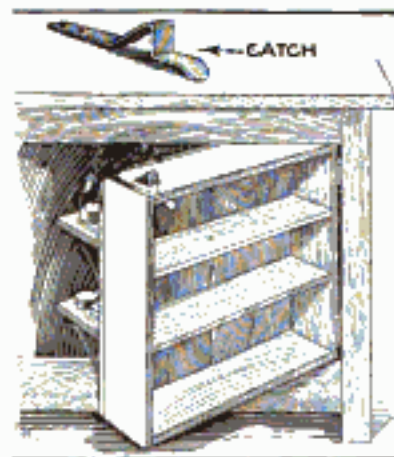


A Hand Cultivator with a Homemade Plow Attachment Which may be Knocked Together from Scrap Lumber, Is of Considerable Assistance in Clearing Snow

taching a simple wooden snowplow to the blade, as shown in the illustration. The wheel in front enables one to lift the plow over obstructions by raising the handles.

Secret Shelves for Chemicals

In the home workshop, it is advisable to have a secret place where poisonous chemicals and expensive small tools can



be kept out of sight of meddlers and children. To provide such a place without resorting to locked chests or drawers, with the accompanying necessity of carrying keys, a swinging cabinet, equipped with shelves both on the inside and on the back, has been found to be quite satisfactory.

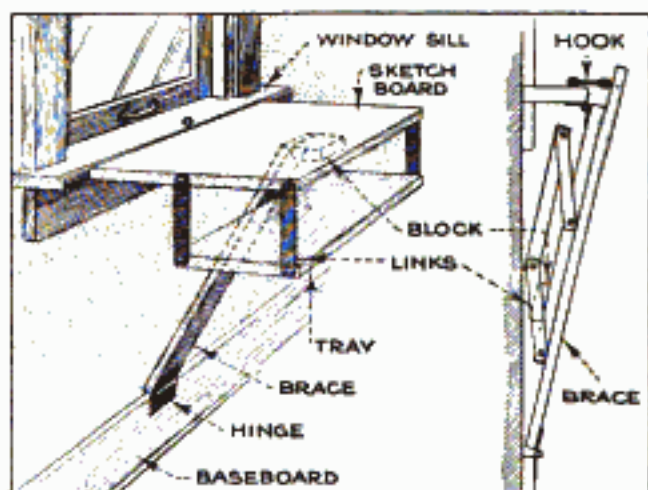
A packing box, fitted with shelves as shown in the illustration, is hinged to one of the legs of the workbench. Large hinges must be used, to provide sufficient strength for supporting the cabinet when it is heavily loaded. The shelves are attached to the back of the box with angle

braces, and are entirely out of sight when the cabinet is swung under the bench. A spring latch, made of brass, serves to hold the cabinet in place.—G. H. Hendrickson, Argyle, Wis.

Collapsible Sketching Table

A collapsible drawing or sketching table, attached to a window sill as shown, has the advantages of sufficient light and ventilation, and of folding compactly when not in use, so as to be almost completely out of the way.

The top is made of smooth white pine, 18 in. wide and 28 in. long. The shelf underneath is made of the same material and is of the same length, but only half as wide, and is hung to the top by means of four metal links, as shown. A brace holds the board in position; the lower end is hinged to the top of the baseboard, and the upper end rests behind a small block fastened to the underside of the top, when the board is in use. When not



A Collapsible Sketch Board That Folds Compactly Out of the Way When Not in Use, and That may be Attached to Any Window Sill

in use, the brace is hooked, as shown, to a screw-eye in the window sill, holding the drawing table and tray against the wall.

Saving Fuel in Furnace

When a furnace grate is of such a type that one half of it is shaken at a time, it is an easy matter to save coal by leaving one part of the grate covered with ashes after the fire has been started. This prevents the passage of air through half of the grate and consequently cuts down the fire considerably. This small fire is, however, sufficient to take the chill from the house during the fall and spring.—Geo. R. Brown, Bridgeport, Conn.

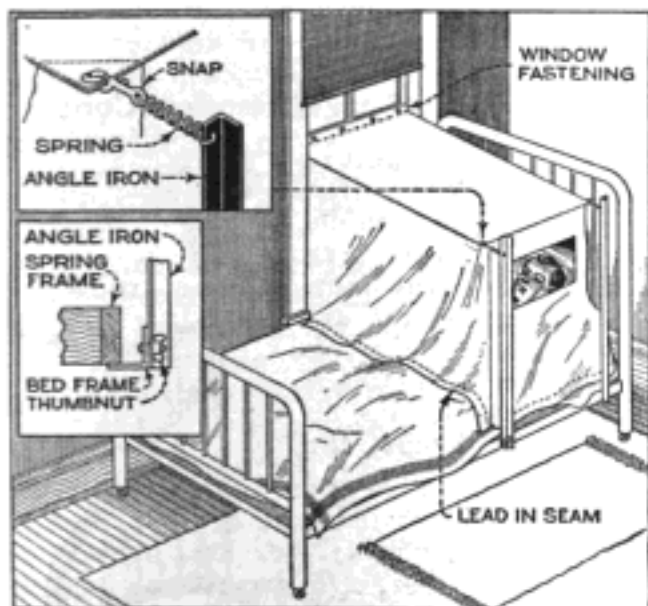
A Simple Radiator Compound

I have never been able to find a commercial antileak compound for automobile radiators that will stop small leaks as quickly and effectively as the white of two eggs, put in the radiator while the water is cold. This remedy is also much cheaper.—C. A. Sheely, Chicago, Ill.

An Open-Air Bed Tent

Confined to his bed on account of ill health, a World War veteran had several types of open-air bed tents made, with the result that the one shown in the illustration was selected as being the most practical and satisfactory.

Two lengths of 1-in. angle iron serve as uprights, and are fastened to the bed frame with small bolts and wingnuts, as shown in one of the detail drawings. Small coil springs and snaps are used to attach the tent top to the upper ends of these uprights. Fasteners, such as are used on automobile curtains, hold the other end of the top to the window and frame, as shown. A small piece of transparent celluloid is sewed in one side of the tent, to enable the sleeper to look into the room without raising the side. Short pieces of lead are sewed in the seam along the bottom edges to hold the sides down; this prevents the air from entering the tent and causing a draft over the sleeper. The material used for the tent was canvas, although "balloon cloth" or heavy silk may

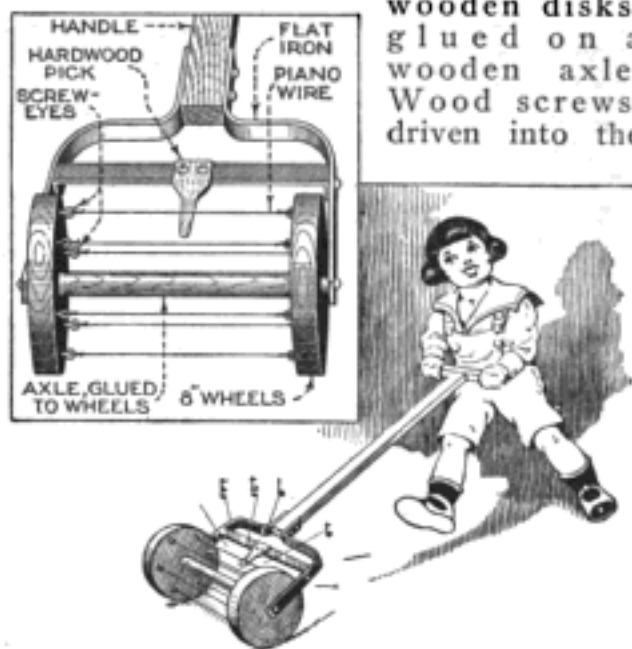


An Excellent Open-Air Bed Tent That Prevents Draft, Yet Provides Plenty of Fresh Air: It Is Especially Useful for the Convalescent.

be used as well, if care is taken to reinforce all parts subject to strain or wear.—Germain Caron, Ottawa, Can.

Homemade Musical Toy

Small children will find much enjoyment in playing with the "jingle bell" shown in the drawing. The wheels are 8-in. wooden disks, glued on a wooden axle. Wood screws, driven into the



A Musical Toy Equipped with Piano-Wire "Strings," Tuned to Various Pitches: It will Provide Much Entertainment for the Youngsters

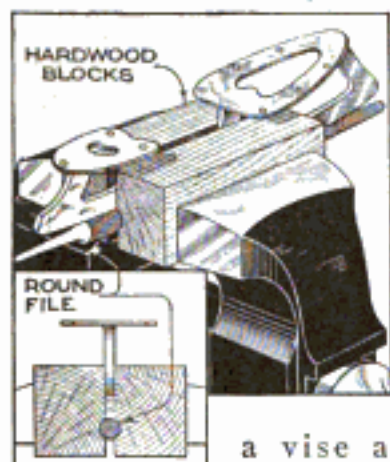
ends of the axle, through small holes in the flat-iron frame, serve as journals. Six or more lengths of piano wire are fastened between the wheels to screweyes, as shown. By turning the screweyes, the wires can be tightened or loosened as desired, and thus tuned to different pitches. The screweyes are spaced equally around the wheels, at the same distance from the edges, so that the hardwood pick, mounted on the frame, will bear evenly on all the wires. The frame is made of flat iron, riveted together, and is provided with a hardwood handle. The details of construction are clearly shown in the drawing.—E. K. Wehry, Cedar Rapids, Ia.

Silvering Clock Dials

An excellent solution for silvering clock and gauge dials, and the like, is made by grinding together in a mortar, 1 oz. of very dry chloride of silver, 2 oz. of cream of tartar, and 3 oz. of common salt, and adding enough water to make a pastelike mixture. The solution is rubbed on the work with a soft cloth. The resulting coating will tarnish and wear off, unless it is protected from the atmosphere by an application of lacquer. The mixture can be kept indefinitely by putting it in a dark-colored bottle. If left exposed to the light, it will decompose.

Simple Method of Sharpening Skates

To hollow-grind skates without special tools, is usually considered a difficult



task, but it is made comparatively easy when the method shown in the illustration is employed.

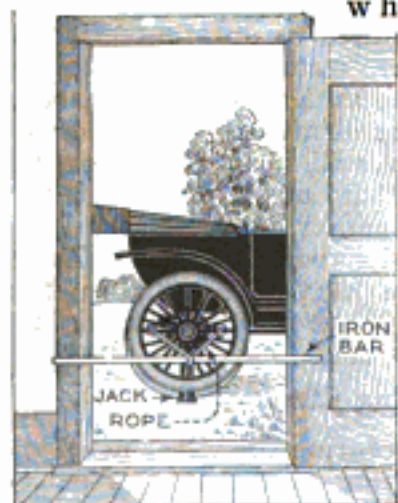
A $\frac{1}{2}$ -in. round file is clamped between two hardwood blocks set in

a vise as indicated. Grooves are cut in the

blocks so that the file will be held securely between them, while allowing sufficient space between the blocks to permit a free movement of the skate runner. To sharpen, move the runner back and forth between the blocks, pressing it against the file.

Improved Wheel Puller

When no wheel puller is available, the rear wheel of an automobile can be removed very easily by employing the method shown in the illustration. Run the car up alongside a doorway, with the



wheel to be removed next to the door, and jack up this wheel. Tie the ends of a length of strong rope to opposite spokes of the wheel, close to the hub, and bring the loop over a crowbar or pipe held across the

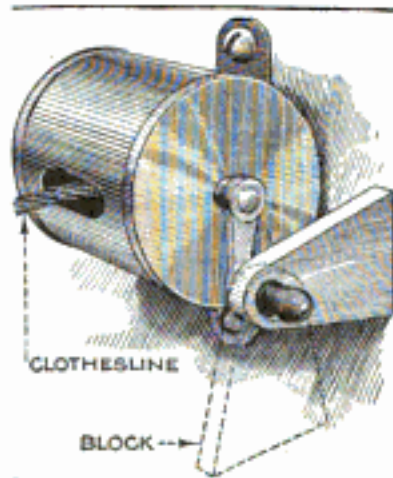
door jambs on the inside. After removing the cap and castle nut that holds the wheel on the axle, revolve the wheel, either by hand or by starting the motor. This will cause the rope to twist and to shorten. As soon as the rope is well twisted, but not to such an extent that it breaks, stop the wheel and tap the end of the axle with a hammer; this will usually loosen the wheel immediately.—Sidney Cornell, Wells Beach, Me.

Dress Snaps as Paper Fasteners

When only three or four paper sheets are to be fastened together, ordinary small-size dress snaps have been found to be very useful as fasteners. They hold the sheets together more securely than the ordinary paper clips and cannot slip off.—Robert Lee Bird, Roanoke, Va.

Lock for Clothesline Reel

The ordinary clothesline reel is not fitted with a ratchet for holding the line taut, but the simple attachment illustrated takes its place, and has been found very useful. Cut a



piece of wood as shown and drill a hole, just large enough to fit the handle, in one end. After the line is wound as

tight as possible, the block is fitted on the handle and placed against the wall as shown. The weight of the clothes on the line makes the handle bear against the block, pushing it tightly against the wall and thus preventing the reel from unwinding.

Handy "Reel" for Extension Cord

In garages, long extension cords are often a source of trouble, because they are dragged over the floor, and consequently are worn out very soon. The "reel" illustrated is very useful in such cases. It keeps the surplus cord out of the way and off the floor. The reel is made by running a length of No. 8 galvanized-iron wire through ordinary flexible loom, such as is used by electricians, and then bending it to the shape shown in the drawing.





HOMEMADE OIL BURNER FOR STOVE

By E. J. BACHMAN



HAVING had much difficulty last winter in obtaining sufficient coal for my cookstove, I made up my mind not to be placed in a similar position this season. To this end I constructed the oil burner shown in the illustration, which now has been in use for some time, and has given every satisfaction. It can be made at home by any amateur mechanic, with few tools, and at but a slight cost for pipe and fittings, and if means are available for bending the pipe, the only fittings necessary for the burner itself are a cap and regulating valve.

The burner shown in the photograph, and shown in position in the drawing of the stove, is made up of five ells, one tee, two nipples, and some short lengths of wrought pipe, all $\frac{1}{4}$ -in. The length of the burner is determined by the size of the grate, the dimensions of the one used by the author being given in the drawing of the one-piece burner.

One $\frac{1}{32}$ -in. hole is all that is necessary in each side of the burner, these holes being drilled, in the built-up type, before assembly, and, in the one-piece type, before the pipe is bent. If larger holes are used, the gas vapor will not issue with enough velocity, and will cause a smoky flame.

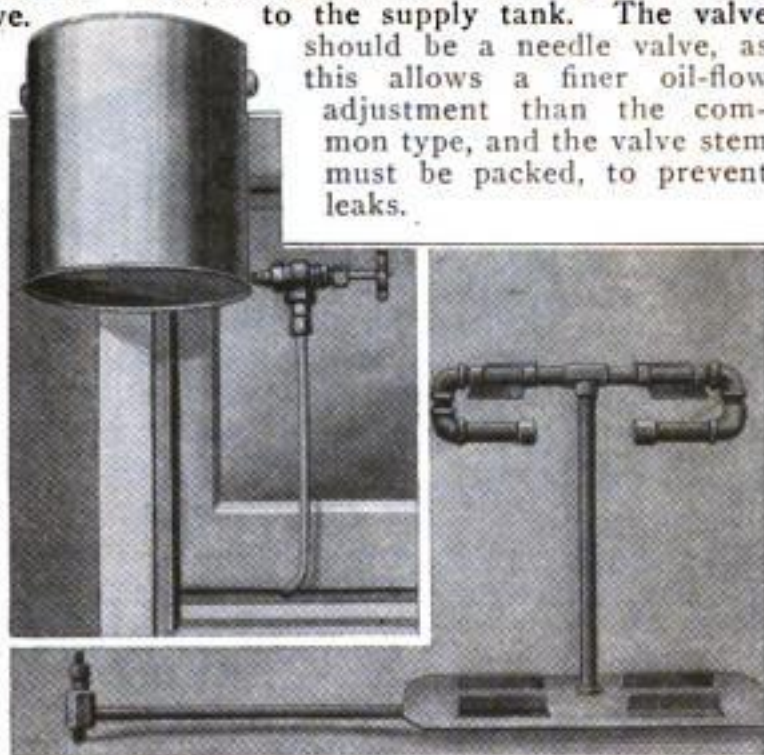
Flame spreaders are fitted on the burners, above the oil holes; these should be cut from heavy sheet iron, as indicated in the drawing, a strip on each side being gashed with a chisel, and bent around the upper pipe of the burner, as shown.

The "baffle" is also cut from heavy sheet iron, to fit the fire box, and gashed and bent, as shown, to form small ears under each burner. Asbestos wicking is fastened with wire in the troughs formed by these ears, directly under the burners.

The burner may be completely assembled before placing in position, and set up in the stove without drilling a hole in the front, as is necessary with some

burners. To set the burner, the baffle is placed in position, the stove lids removed, and the grate bars turned so that the pipe can pass between them. The valve end is then passed through the grate, the burner being held as shown at the lower right, and lowered into place. The grate bars are then closed again, to hold the pipe firmly; the baffle, of course, rests on top of the grate bars, and the ash door rests on the pipe.

Copper tubing, $\frac{1}{4}$ in. in diameter, is used to connect the valve on the burner to the supply tank. The valve should be a needle valve, as this allows a finer oil-flow adjustment than the common type, and the valve stem must be packed, to prevent leaks.



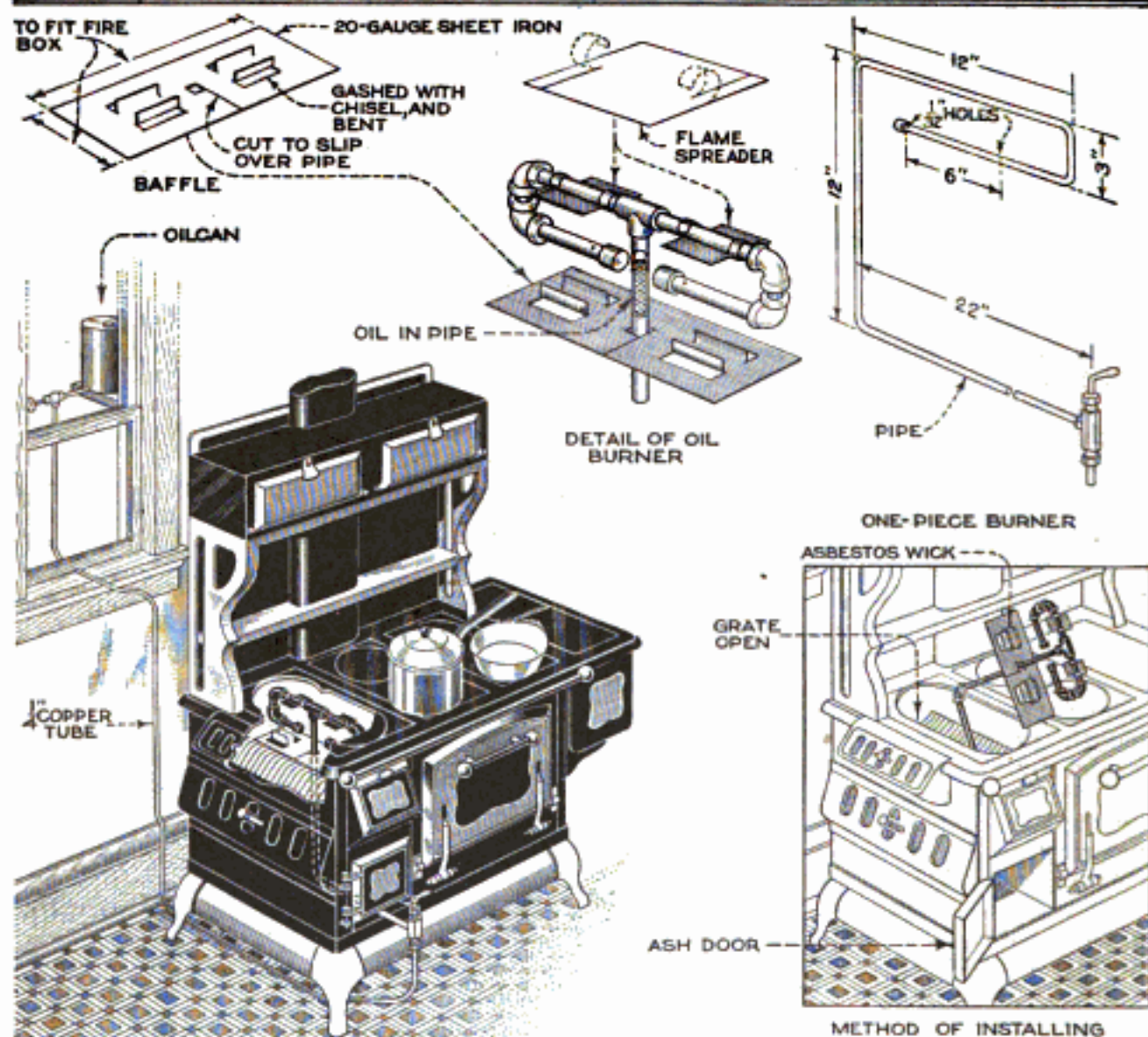
Left: The Oil Container, Fastened to an Outside Wall, the Copper Pipe being Led through the Window. Right: The Assembled Burner, before Placing in the Fire Box

The oil tank is placed at least 4 ft. higher than the burner, so that the fuel is fed by gravity. The tank may be placed in any convenient position; in the case illustrated, this was on an outside wall. The tank is fitted with a valve, as shown.

To start a fire, the needle valve on the stove front is opened, allowing some oil to drip from the burner holes onto the wicks; the needle valve is then shut, and the oil on the wicks ignited with a match. After this oil has been burning from one

to three minutes, the needle valve is again opened, slowly. The vertical pipe of the burner, surrounded as it is with

ever, and that is in relighting the burner while it is still hot from previous use. In this case, be sure to throw a piece



A Simple Oil Burner for the Cookstove: Details of Construction of Assembled and One-Piece Burners are Shown at the Top; the Complete Installation at the Lower Left, and Method of Placing Burner in the Fire Box at the Lower Right

flame when the burner is in operation, serves as a boiler or vaporizer, so that the oil issues from the holes in the form of vapor, is ignited, and the flame spread by the sheet-metal spreaders. It is astonishing how much heat this burner will generate; the writer has found that the stove lids quickly become red-hot when the burners are turned on full. The air supply must be regulated, by means of the ports in the ash door, to obtain a sootless flame, without allowing too much cold air to pass through the stove.

The burner may be allowed to burn all night with perfect safety, as all that happens when the oil supply is used up, is that the burner goes out. There is one precaution that should be observed, how-

of lighted paper into the fire box before turning on the oil. Should the oil be turned on first, the fire box will fill with vapor, and, upon a light being applied, this will flare up in a dangerous manner.

Emergency Fan Belt

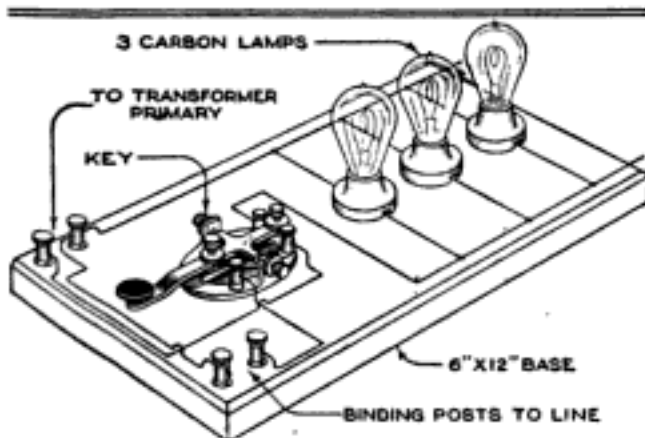
A fan belt, for use in emergencies, on automobiles using V-shaped fan pulleys, can be made from an ordinary screen-door spring. Fasten the ends of the spring together with a piece of soft wire, and slip the belt thus improvised over the pulleys. It has been found that such an emergency belt, if kept oiled, will outlast any leather belt, and it will not slip. —Harold Jackson, Kankakee, Ill.

Balance Stops Flickering Lights When Transmitting Radio Signals

The device shown in the drawing is suggested as a remedy for the flickering of electric lights while transmitting radio signals with power derived from the house-lighting system. Without this method, the change in the current flow, when the key is depressed, causes the lights to flicker, annoying the operator and frequently all who live near his station.

A wood base is used, and the key is fitted with extra silver contacts at the front end, the key being adjusted as close as possible; the back point is connected to one side of the bank of lamps while the other side is connected to one of the binding posts, as indicated by the diagram, leading to one side of the transformer primary. The center, or balancing, point of the key is connected to the binding post leading to one side of the 110-volt alternating-current lighting circuit; the other alternating-current post is connected to the transformer-supply post and the lamps. The lower contact point of the key is connected to the other binding post of the transformer primary.

When the key is pressed, the lights are cut out, and when it is released, the lamps are lighted, equalizing, or balancing, the load. The lamps used are connected in parallel, and are of the 100-watt carbon-filament type. This hook-up is now in use



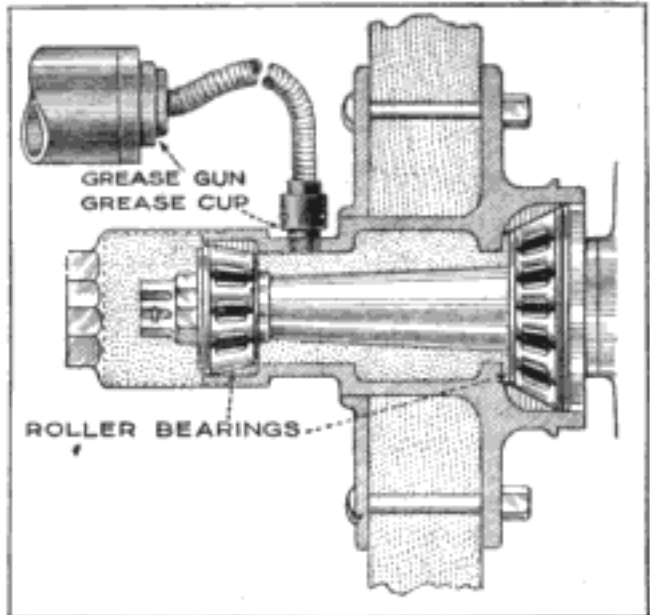
An Easily Constructed Balance That will Prevent the House Lights from Flickering When the Radio-Transmitting Set Is in Operation

on a $\frac{1}{2}$ -kw. transformer and gives good results; for larger powers, more carbon lamps must be used.

When the eye in the upper end of an umbrella rib breaks, a small cork or something similar should be placed on the end of the rib, to prevent it from punching a hole through the umbrella cover.

Greasing Front-Wheel Bearings of an Automobile

Bearings in the front wheels of an automobile are usually lubricated by filling



A Force-System Grease Cup, Fitted on the Hub of the Wheel, Insures Positive Lubrication of the Roller Bearings

the hub cap with grease, the grease being forced in as much as possible by the cap. Ordinarily, the grease is so hard that little, if any of it, is usefully applied, and the inside bearing is quite likely to run dry because of the lack of lubricant; besides, the dirt and grit thrown up by the wheel enter the hub and cut the bearings. To avoid these conditions, a car owner uses the device illustrated for periodically greasing the forward wheels of his machine. Each of the front hubs was drilled and tapped for a grease coupling, such as used in conjunction with the modern force-feed grease gun. This arrangement makes it certain that a proper supply of grease is forced into and around all parts of both bearings.

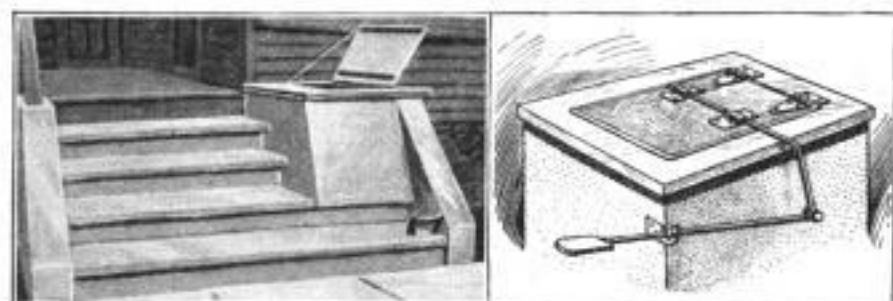
Quick Repair for Cracked Pump Cylinders

Concrete has been used successfully to repair a pump cylinder that was cracked for nearly its entire length and also about halfway around its circumference.

A sheet of galvanized iron was cut and bent into cylindrical form to fit around the pump cylinder, leaving a space of a few inches all around for the concrete. After the concrete had set thoroughly, the form was removed, and the pump was again in perfect working condition.—H. L. Wheeler, Westwood, Massachusetts.

Concrete Holder for the Waste Pail

The waste-pail holder shown in the illustration is a great convenience; it



A Concrete Box Incorporated in the Rear Steps, near the Kitchen Door, Provides a Clean and Sanitary Container for the Waste Pail. It Keeps the Flies Away from the Garbage, and can be Flushed Out Often

provides a neat and sanitary container in which the pail is out of sight and away from flies, yet in a position easily accessible.

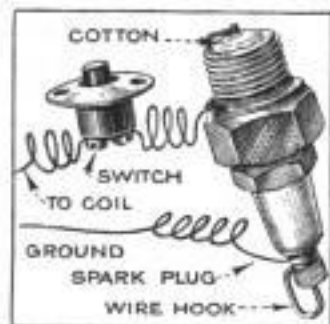
The construction of the holder is simple; it is made of concrete, large enough to contain two pails, and is incorporated with the concrete steps as shown. By slanting the bottom toward one side, and setting a 1-in. pipe through the wall, a drain is provided to carry off the water when cleaning the inside. In order to

attach the cover securely to the concrete, bolts are set in the form before pouring. To these bolts is attached the wooden frame that holds the cover. The frame is cut to project about 1 in. over the outer edges of the container, but is flush with the inner edges. The cover is made of the heaviest galvanized sheet iron obtainable; it is cut about 1 in. larger than the inside opening of the wooden frame, and hinged to it as shown. If extra-heavy sheet metal is not avail-

able, light stuff can be used, providing the edges are rolled around wire, or strips of flat iron are riveted to the edges, to make the cover rigid. A knob is fitted on the cover to facilitate lifting it, and a small chain is fastened between the wooden frame and inside of the cover, to prevent the cover from falling back entirely. If desired, a foot lever can be arranged as shown in the drawing. This is convenient, as it enables one to lift the cover without stooping.

Cigar Lighter Made from Spark Plug

An old spark plug, that will still spark in air, makes a convenient cigar lighter for the car. Connect a wire from a coil



terminal to a small switch or push button, and from the switch to the thread of the spark plug. Connect another wire from the terminal of the plug to a metal part of the car. Use heavy insulated wire between the coil, switch, and plug. Stuff the opening of the plug with cotton batting, packed as tightly as possible, and saturate this with alcohol or gasoline.

By closing the switch, a series of sparks will jump the air gap, lighting the saturated cotton batting. While doing this, the plug should be held by the porcelain, and care should be taken not to touch the other metal part of the plug, to avoid a shock. Provide a small wire hook on the terminal and another hook on the back of the instrument board, so that the lighter can be hung out of sight when not used.—Chas. I. Reid, Millersburg, Pa.

Changing Tires Increases Their Life

To secure uniform wear from a set of tires, change them around about once a month, putting the right-hand tires on the left side, and vice versa. The right-hand tires are subject to much more wear than the left ones, and changing them in this way will distribute the wear evenly, and enable the driver to obtain the utmost in service from them.—A. C. Cole, Chicago, Ill.

A Simple Fur Stretcher

A useful and inexpensive fur stretcher can be made by tacking a piece of galvanized-iron wire to a



wooden block, as shown. The size and shape of the stretcher are determined by the fur to be stretched. A specially commendable feature about this device is that the fur can be tacked down in the center of the block and is thus stretched evenly.—Mrs. Flora E. Booth, Edwardsville, New York.

Apple Corer and Cutter

The simple corer and cutter shown in the illustration has been found to be quite a timesaver. It is made from a length of tin tube, two pieces of heavy sheet tin, some wire, and a wooden handle. The piece of tubing is 2 in. long and $\frac{3}{4}$ in. in diameter. On the outside of this tube and directly opposite each other, two pieces of sheet tin, 2 in. by $1\frac{1}{4}$ in., are soldered. Two pieces of No. 10 gauge galvanized-iron wire, about 6 in. long, are riveted or soldered to the plates as shown, and are then bent at right angles and twisted together to form a tang, which is driven into a hole drilled in the handle. The edges of the blades are sharpened with a flat file, and the edge of



the tube with a round file. If desired, two more cutters can be soldered to the tube at right angles to the others so that the apples will be cut in quarters instead of in halves.

A Safe Chopping Block

A chopping block that prevents the flying of the cut pieces, and drops the chips out of the way, can be made in a few minutes with an ax and wedge, a few nails, and a hammer.

Split two logs, about 4 ft. long and 1 ft. in diameter, and nail the halves together as shown in the drawing, leaving a space of 4 or 5 in. between the top pieces, so that the chips can fall through. To chop

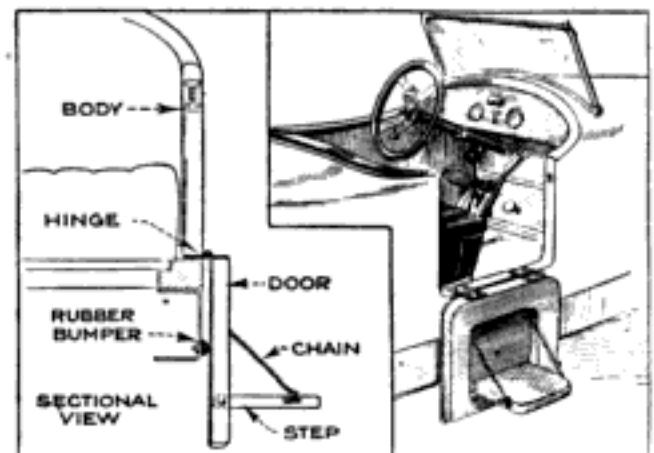


a length of wood, lay it across the top pieces. When the wood is cut or broken with the ax, the two pieces on either side of the cut will strike each other and fall harmlessly, while if the usual method of chopping is employed, by laying only one end of the wood on a block or log, and the other end on the ground, the upper piece has a tendency to jump.—Warren School, St. Ignace, Mich.

☞ Ordinary bright-finished horseshoe nails make excellent picks for removing nut meats.

Step on Speedster Combined with Door

In the construction of speedster bodies, it is desirable to avoid any projections



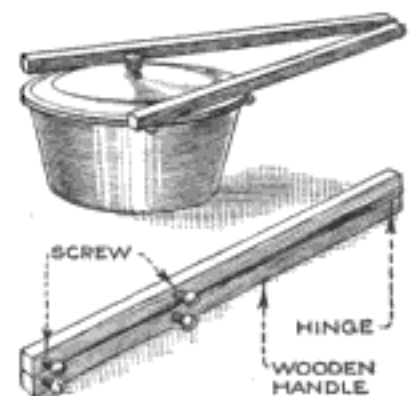
A Novel Combination of Door and Step for Speedster Where a Flush Appearance was Desired: The Step Drops Down When the Door is Opened

on the sides of the car, as these break the streamline appearance. For this reason a car owner, who was building a speedster, combined the step with the door, as shown in the illustration.

In doing so, it was necessary to attach the door hinges to the bottom of the door instead of to the side, as usual. Upon opening the door, the small aluminum step automatically drops down, and is held by means of two small chains. When closed, the chains are entirely out of sight and the step is flush with the covering on the inside of the door. Apart from the improvement in appearance obtained with this type of door and step, much less work was involved than if both had been constructed separately.

Handling Hot Pans

With the simple device shown in the illustration, hot pans can be removed from the oven or stove without danger of burns. Two pieces of wood, 1 in. square and about 14 in. long, a small hinge, and four 1-in. round-head screws, are required to make it. The screws are spaced about 6 or 7 in. apart, and the device assembled as shown. Pans and pots of various sizes can be lifted and carried with this holder with perfect safety.



Bobsled Driven by Motorcycle

More exhilarating sport than ordinary coasting is furnished by a bobsled driven by means of an old motorcycle; speeds of



A Bobsled, Driven by Means of an Old Motorcycle at the Rate of 35 Miles per Hour, Furnishes More Exhilarating Sport than Ordinary Coasting

35 miles per hour are easily attained with a sled of this type.

The bobsled shown in the photograph is specially constructed for this purpose and consists of three bobsleds joined together by a strong frame, to which the motorcycle is fastened. The front wheel fork is bolted to a crosspiece on the frame, while the rear wheel is fastened to the frame by means of two coil springs, 2 in. in diameter. These coil springs are detachable, so that they can be unhooked while the wheel stand is lowered to start the motorcycle, and can then be hooked in place so that the wheel is held firmly to the ground. The sled is guided by means of an old steering wheel taken from an automobile, and acting on the front sled, which is pivoted to the frame. The brake is attached to an extension, so that it can be controlled by the person who steers. The clutch and gasoline throttle are controlled by an occupant riding on the rear sled. Six passengers can be carried on this bobsled at once.—Margaret Richards, Evanston, Ill.

Spotlight Used to Light Cellar

An old spotlight, that had been replaced by a new one, was found to be still useful for lighting dark corners of a cellar. The lamp was connected to a 6-volt bell transformer, and the bracket holding it was attached to the cellar wall. Thus it could be swung around to illuminate any portion of the cellar not sufficiently lighted by the stationary cellar lamp.—Homer H. Knodle, Hamilton, Ohio.

Salt Solution Used as Decarbonizer

The effectiveness of salt in removing carbon from gas mantles, and soot deposits from chimneys, led to an investigation concerning its action upon the carbon deposits in gasoline engines, with the discovery that it could also be used successfully to remove these.

A small tank containing the salt solution was connected by a copper pipe to a spray nozzle tapped into the inlet manifold of the engine. After the engine had been operating for some time, and had become fairly hot, the valve of the tank was opened and some of the solution allowed to enter the combustion chamber at every intake stroke. The effect of the salt was soon noticed, as a cloud of powdered carbon was emitted from the exhaust. Apparently the salt did not remove the carbon in large pieces, but disintegrated the deposits gradually.

Previous to this experiment, the engine knocked badly, and when climbing a rather steep grade, it was necessary to use low gear because of preignition. After using the salt solution, however, the engine operated smoothly without knocking, and it was possible to climb the same grade in high gear without any trouble.

Applying Tire Chains in Mud or Snow

Where the wheels of an automobile or truck are hub-deep, or nearly so, in mud or snow, it is not necessary to jack up the wheels in order to apply the tire chains. A simpler method is to link the ends of the chains about the wheel, and, laying the chain out in a line squarely behind the wheel, back



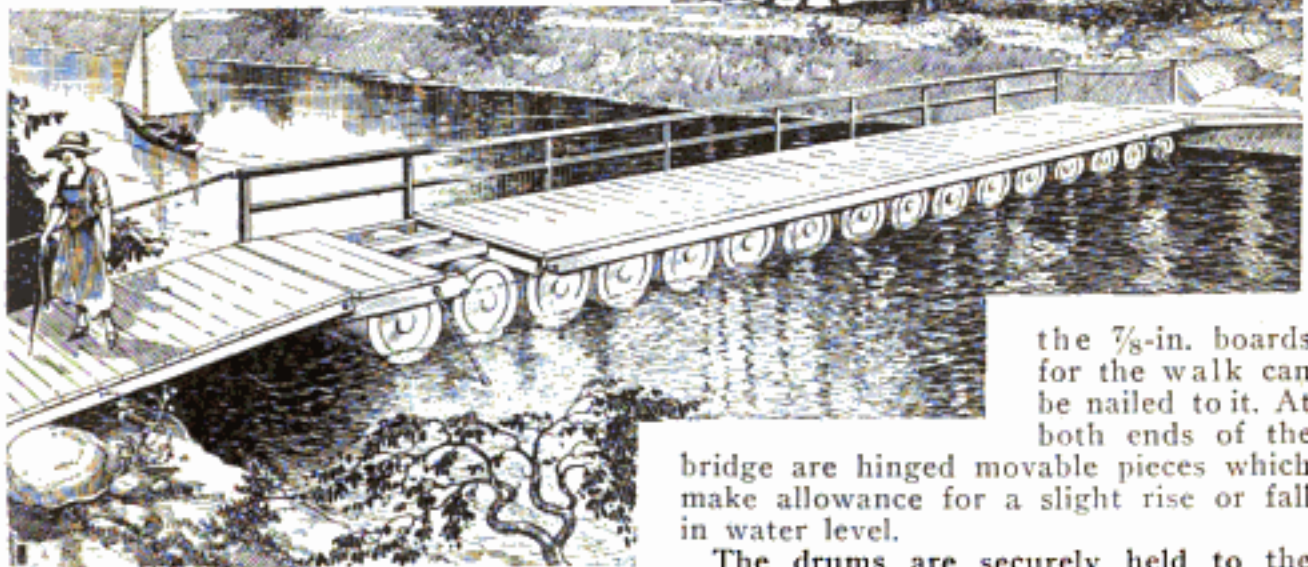
the car onto the chain. To do this, the gears are placed in reverse and the wheels moved only one turn. If the opposite wheel begins to spin it will be necessary to apply both chains, to make the car drag the chain under the wheel.

Simple Pontoon Bridge

While traveling through New York State, a tourist discovered a pontoon bridge over the disused Erie Canal, that interested him because of its simplicity of construction. It consisted of a number of old oil drums arranged side by side under a boardwalk, as shown in the illustration.

The frame by which the drums are held in place, and to which the walk and hand-rail are nailed, is made of 2 by 12, 2 by 6, and 2 by 4-in. planks. The outside planks are 2 by 12 in., and fit over the ends of the drums; the 2 by 4-in. planks

pairs of drums. The 2-by-4's rest on the latter and bear the entire weight of the walk. The frame is flush on top, so that



A Simple Pontoon Bridge over a Disused Canal: It is Made of Discarded Oil Drums and Heavy Lumber

are nailed on edge, between 2 by 6-in. crosspieces placed between successive

the $\frac{7}{8}$ -in. boards for the walk can be nailed to it. At both ends of the

bridge are hinged movable pieces which make allowance for a slight rise or fall in water level.

The drums are securely held to the underside of the walk with a chain, that is brought under them and fastened to the end and center crosspieces. Anchors are attached to the bridge with galvanized-iron cables, on the upstream side.

Treating Fence Posts against Decay

It is a well-known fact that oil-soaked wood resists decay much longer than dry wood, or even wood that has been painted. The oil, which is usually creosote, protects the wood against worms, ants, and other burrowing insects, as well as against water. For this reason one farmer determined to treat the ends of his fence posts before using them. The head of a 50-gal. steel oil drum was cut out and the drum filled with the old oil drained from a tractor, truck, and passenger car. The oil consumption of the three was sufficient to keep the drum full at all times. The posts were seasoned well before immersing, and they were then kept in the drum for several weeks, so that they were well saturated when needed.

Posts treated in this manner have been

found to be sound and solid after being in the ground for eight years. This process of oil-treating, while perhaps not so effective as creosoting under pressure, has the advantage of requiring very little labor and equipment, and involving practically no expense.

Improving a Clothesline Prop

The annoyance of having a clothesline prop blow down on a windy day, with the result that the clean clothes are dragged over the ground and soiled, can easily be prevented. Take a spring clothespin apart, and nail one half of it to the upper end of the prop, flush with the top. It is necessary to use small, thin nails for this, or the pin will split. Then assemble the pin. By snapping it over the line, the prop can be set at any angle.

A One-Step Spider-Coil Receiver

By F. L. BRITTIN

THE simplified receiver shown in the accompanying illustrations is especially adapted for receiving broadcasting stations. The well-known Reinartz circuit is employed in its construction, and the instrument can be built, from standard parts, by any amateur.

This circuit has proved superior, in many ways, to the variometer-vario-coupler hook-up; there are no critical adjustments of plate or grid circuits, and the set will oscillate well on any wave length to which the grid circuit is tuned. The wave-length range is from 150 to 400 meters.

The one-step receiver shown in the drawings, differs from the one shown in the photographs, only in the detail that phone posts are shown in the drawings, instead of a jack, as in the photo. The use of either is optional.

The instruments are mounted on a $\frac{3}{8}$ by 6 by 18-in. bakelite panel. The locations of the various posts, switch points, etc., are carefully marked, and the panel drilled, using twist drills for metal, and the instruments mounted as shown.

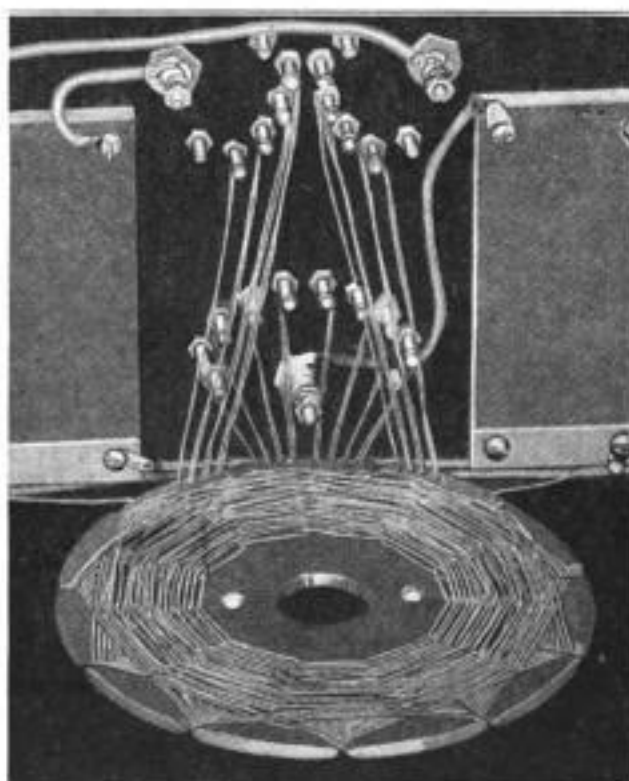
The variable condensers shown are of the screw-operated book type; these have a very wide range, and a fine adjustment. This type consists of a stationary and a movable piece of metal, separated by insulating material; the stationary plate is mounted on a small bakelite base, which is fastened to the rear of the panel. The dial on the panel front is fastened on a threaded $\frac{1}{4}$ -in. shaft, screwed through the back of the condenser. As the dial is rotated, the movable plate is forced away from, or drawn toward, the fixed one, and, as the screw on the shaft is of a fine pitch, the adjustment can be made very close, thus making the instrument much more selective than when using the common type of

condenser. It will be noted that several connections are made to the screws on the back plate of the condensers; this shortens the wiring. The rheostats used are of the vernier type, which allow close adjustment, but any standard type of rheostat can be used.

The bayonet sockets for the tubes are of standard type and the transformer is preferably of the two-window core type, but if this cannot be obtained easily, any good make of transformer can be used. The ratio used is 3 to 1. The tube sockets, spider-coil, amplifier, and grid condenser are mounted on a $\frac{1}{2}$ by 6 by 18-in. wooden base, fastened to the panel by angle brackets (not shown). The

detector tube is a U.V.-200, and the amplifier tube a U.V.-201 or V.T., class 2.

The spider coil is wound on a $\frac{1}{8}$ -in. bakelite disk, $5\frac{1}{2}$ in. in diameter. Eleven slots are cut around the disk, as indicated, $1\frac{1}{4}$ in. deep, and 85 turns of No. 26 single cotton-covered wire wound on. The plate coil is wound on first, toward the center of the disk, and consists of 45 turns. The starting end goes to the lowest contact point on the tickler switch, and a tap is taken off, by looping and twisting the wire as

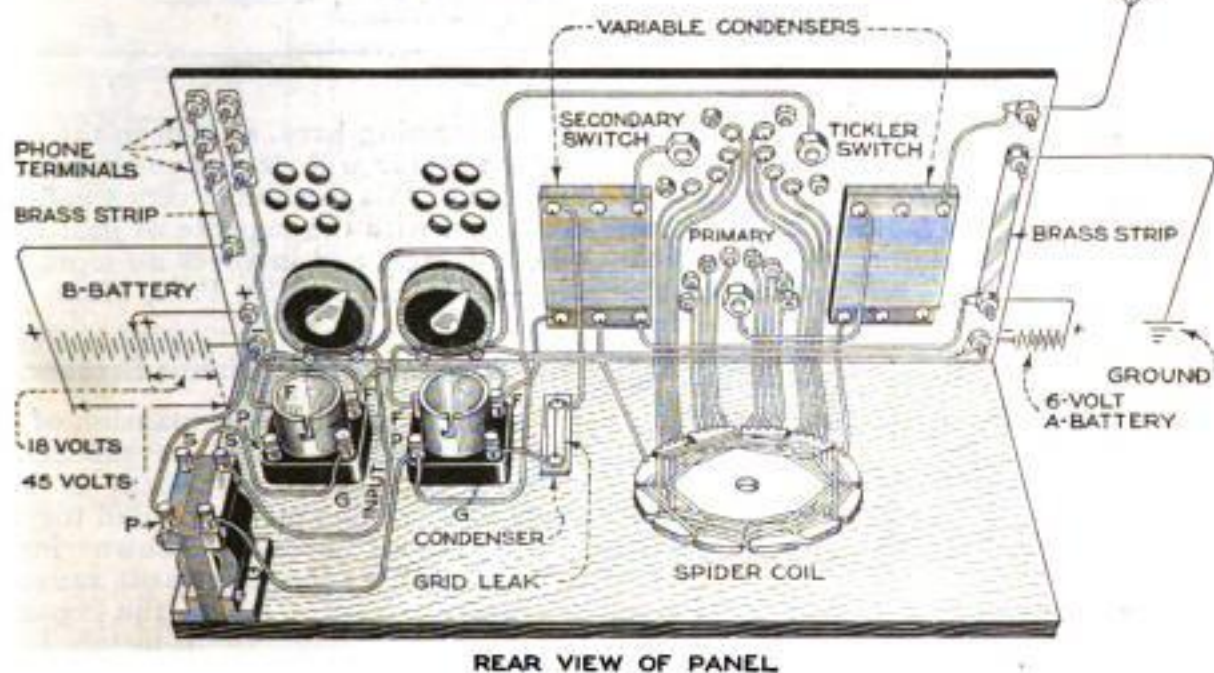
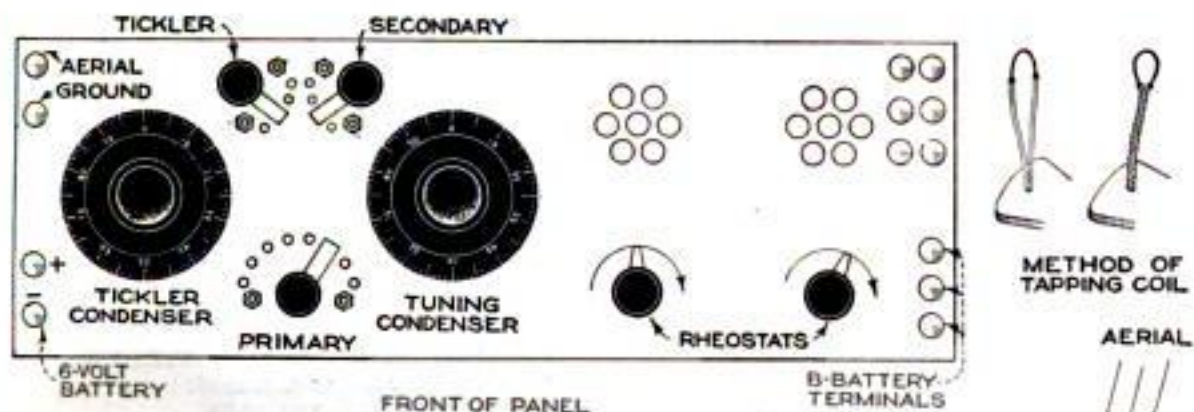
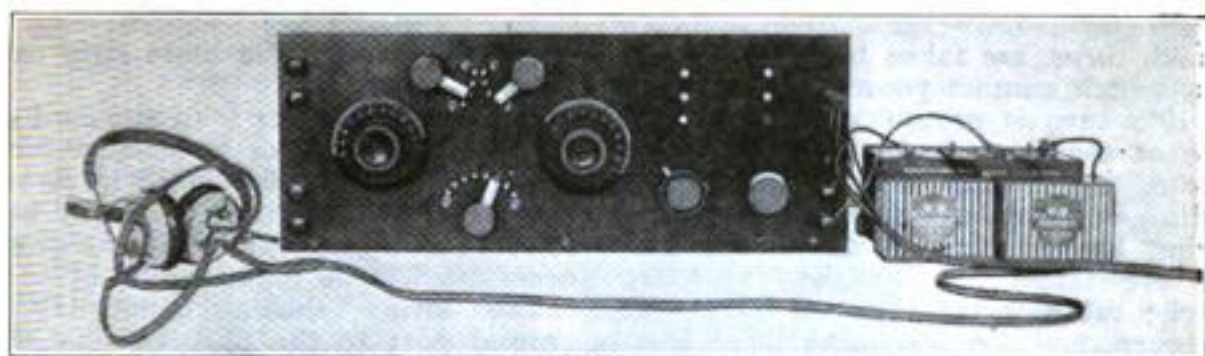


Close-Up of the Spider Coil, Showing How the Taps are Connected to the Switches, How the Coil is Wound, and How Fastened to the Base

shown in the detail, every 15 turns, to the remaining tickler-switch points, the finishing end going to the aerial condenser. Holes are drilled in the "spokes" of the disk for the taps, to hold them firmly.

When winding, the wire is brought through the first slot, carried over the next slot, and down through the third, carried over the fourth, on the other side of the disk, and up through the fifth. Always skip one slot, in winding.

The outer coil, of 40 turns, is divided into two sections, but the winding is continuous. The starting end of the coil, and taps at the 2d, 4th, 5th, 6th, 7th, 8th,



Above: Front View of Completed One-Step Receiver. Center: Details of Wiring, Assembly of Instruments, Method of Tapping Coil and Battery, Aerial and Ground Connections. Below: View of Rear of Completed Instrument; a Jack is Used for the Phones Instead of the Binding Posts Shown in the Drawings

and 9th turns, are taken to the eight primary-switch contact points, and a tap at the 10th turn is grounded, through one plate of the secondary condenser. The lever of the primary switch is connected to the aerial condenser, as shown. Continuing the winding of the outer coil, taps are taken off for the secondary switch; the first tap is taken off at the 26th turn, and the remaining three from the 33rd to the 40th turns, the last one being the end of the coil. The secondary-switch lever is connected to the other side of the secondary condenser.

It should be noted that one side of this condenser is connected to the positive side of the A-battery, which is also

grounded through the brass strip on the panel.

The grid condenser is of standard type, with a piece of paper fastened under the screws. A soft-pencil mark is made on this paper, connecting the screw heads, to serve as a grid leak. The size of mark necessary will be found by trial.

The strips shown connecting the ground post to the positive side of the A-battery, and the strips connecting the phone posts, are made of narrow brass ribbon; the six phone posts permit the use of three phones. The instrument can be placed in a cabinet, if desired.

A three-step instrument will be described in our March issue.

MATERIAL LIST

- | | |
|--|--|
| 1 bakelite panel, $\frac{3}{8}$ by 6 by 18 in. | 16 contact points. |
| 1 wood base, $\frac{1}{2}$ by 6 by 18 in. | 3 brass connecting strips. |
| 1 spider coil. | 13 binding posts. |
| 2 rheostats. | 1 detector tube, U.V.-200. |
| 2 tube sockets. | 1 amplifier tube, U.V.-201 or V.T., Class 2. |
| 2 variable condensers, book type. | 1 B-battery, 22 $\frac{1}{2}$ volt, tapped. |
| 1 audio-frequency transformer, ratio 3 to 1. | 2 B-batteries, 22 $\frac{1}{2}$ volt units. |
| 3 switch levers. | 1 A-battery, 6-volt, 40-amp. hour. |
| | 1 or more pairs, 2,000 or 3,000-ohm phones. |

Preventing Auto Radiator from Freezing

Very often the entire garage is heated in order to keep the auto radiator from freezing during winter nights, which means



a considerable expense for fuel. Quite a saving can be effected by using the method shown in the illustration.

A sheet-metal box, that has a large square "horn" projecting from the front, to fit snugly against the

radiator, is used to confine the heat of the oil stove and direct it through the radiator.

After driving the car into the garage early in the evening, the radiator is sufficiently hot to prevent freezing for several hours. Just before retiring, the oil stove is lit, and the box is moved so that the horn covers the radiator. The heat developed by the small stove will keep the radiator from freezing during the night, and will also prevent the oil

from becoming hard, so that in the morning the motor will start immediately. The expense of this method is very small when compared with the expense of heating the whole garage, and involves no more trouble.—R. L. Simons, St. Paul, Minn.

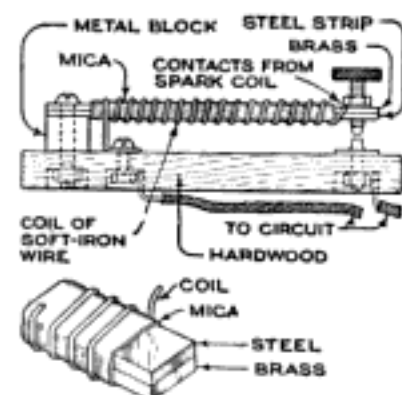
A Thermostatic Circuit Breaker

The difference in the expansion of steel and brass, when heated, is sufficient to cause a perceptible movement in a bar made of these two metals riveted together.

The circuit breaker shown in the drawing utilizes the movement caused by

the expanding metals for intermittently opening and closing the circuit of an electric sign, the lights of a display window, or for other purposes.

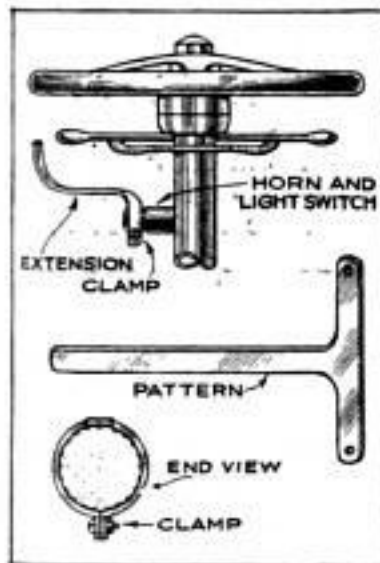
The construction is quite simple, and the necessary materials are generally obtainable from any mechanic's scrap box. A block of hardwood, or fiber, is used for the base, and the contact points can be taken from an old spark coil or doorbell.



The heating coil, surrounding the brass and steel blade, is made of soft-iron wire, and is insulated from the blade by a wrapping of sheet mica. The fixed end of the blade should be bolted down solidly. As the current flows through the iron wire, the resistance causes it to heat, the heat is transmitted to the bar, and the difference in expansion between the two metals causes the blade to spring up at the contact end and break the circuit. As the coil and bar cool, contact is reestablished, and this intermittent interruption of the circuit will continue without attention until the current is turned off. The rapidity of the flashes can be controlled by varying the number of turns of wire in the heating coil and by regulation of the contacts, or of the length of the bar.

Extension Lever for Horn Button

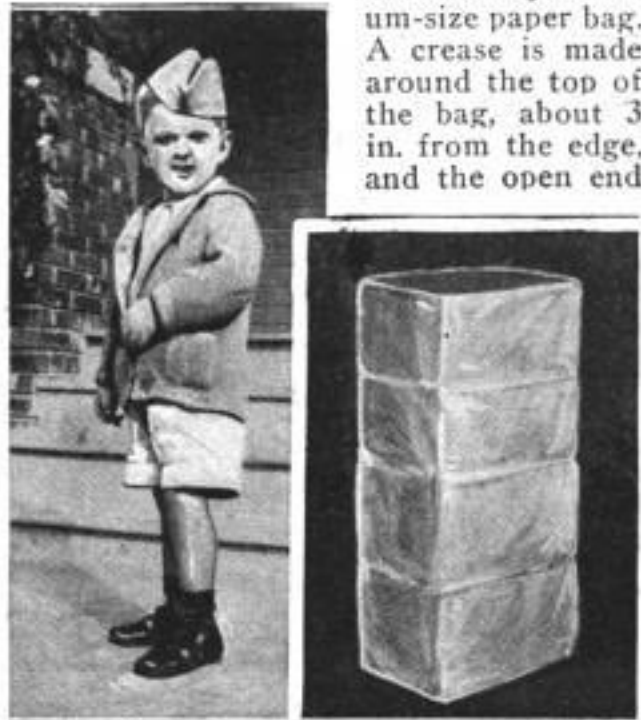
The horn button, often combined with a dimming switch, of a light car is located in a position requiring that the hand be entirely removed from the steering wheel



to blow the horn. An extension, such as illustrated, will permit operation of the horn with the finger tip, and thus the questionable practice of removing the hand from the wheel whenever conditions require the horn to be sounded, is avoided. This extension, which is made from a piece of sheet metal, is clamped about the button of the horn switch and projects outward after the manner of the spark and throttle-control levers, which are also operated by the finger tip. With this same extension the button may be turned for dimming the headlights. The material for the lever may be either sheet brass or steel, about $\frac{3}{16}$ in. thick, the clamp being secured by means of a $\frac{1}{4}$ -in. bolt. The projecting end should be left slightly longer than required and cut off to suit the average position of the hand on the steering wheel. With a slight amount of practice, sounding the horn and controlling the lights can be done as easily as opening the throttle.

"Overseas" Cap Made from Paper Bag

An attractive and good imitation "overseas" cap for children can be made from an ordinary medium-size paper bag. A crease is made around the top of the bag, about 3 in. from the edge, and the open end

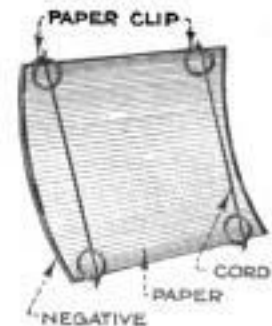


This Imitation and Attractive "Overseas" Cap Is Just the Thing to Please the Youngsters

of the bag folded down, at this crease, on the inside. The new top thus formed is folded down in the same way. This is continued until the bag is about $3\frac{1}{2}$ or 4 in. high. A fold is then made in the bottom and a paper clip used to hold it. A cap made in this way will fit almost any youngster's head.

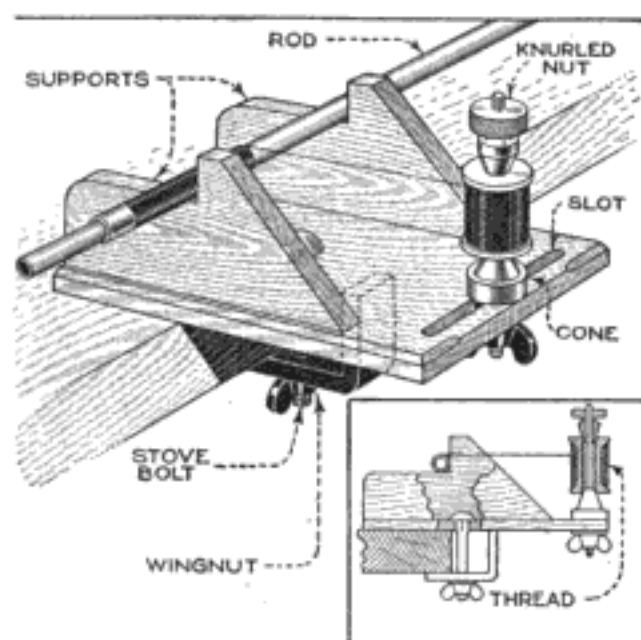
Printing without a Frame

Photographic prints can easily be made without a frame by employing the method shown in the illustration. Fasten paper clips to the ends of two lengths of string a little shorter than the width of the negative. Lay the paper, sensitive side down, on the face of the negative, and attach the clips to the corners, as shown, so that the paper and negative will be drawn into a curved shape, with the paper on the inside. The paper will thus be pressed tightly against the negative, and the exposure can be made in the usual way, taking care to keep the improvised frame moving in front of the lamp.



Winding Fishing Rods with Silk

A fishing rod can be strengthened considerably and made much more rigid by winding it with silk thread and then



An Easily Made Device for Winding Silk Thread on Fishing Rods: Both Hands Are Free to Rotate the Rod and Guide the Silk

applying a coat of shellac. The usual process of winding by hand is difficult and tedious, but the device shown in the illustration makes the winding comparatively easy and quick. It consists of a wooden frame, made up of two supports, and a base; a long slot is cut in one end of the base to take the spool holder and allow it to be shifted. This holder is made of brass, turned to the shape shown, and threaded a tight fit for a knurled cone nut. The pressure on the spool, and the tension on the silk, are regulated by turning the nut down. A stove bolt, a wingnut, and a small angle piece, made of flat stock and bent to the shape shown, are used to clamp the frame to the top of a bench or table.

When a stop is made in the winding, the silk thread is cut, slipped under the last turn, and pulled tight. Good shellac varnish must be used for coating the silk to preserve it against rotting. The great advantage of using a fixture of this kind is that both hands are free to turn the rod.—J. V. Romig, Allentown, Pa.

ⓄRugs on polished hardwood floors have a tendency to slip and wrinkle. This can easily be overcome by sewing pieces of tough cardboard underneath the rug edges. These can be removed whenever necessary, as, for instance, when the rugs are taken up for cleaning.

Alcohol in Antifreezing Solutions

In cold weather it is necessary to use an antifreezing solution of the correct proportions in the cooling system of an automobile, as the water will often freeze even though the engine is kept running continuously.

Use a mixture of denatured alcohol and water. The following table gives the freezing temperatures of denatured-alcohol and water solutions of varying proportions:

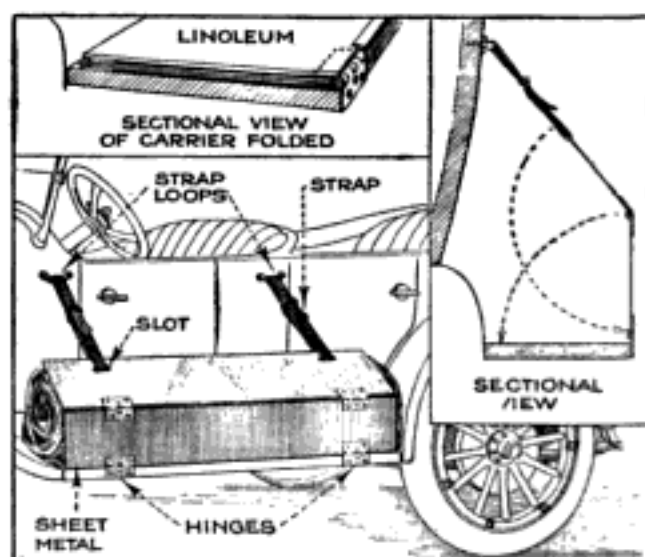
Alcohol, per cent by volume	Water, per cent by volume	Freezing temperature
20	80	+13°F.
30	70	-3°F.
40	60	-20°F.
50	50	-34°F.

Do not use a calcium-chloride solution, as it will injure the metal parts of the cooling system.

Attachment on Running Board for Carrying Luggage

The illustration shows a novel attachment devised by a motorist for carrying luggage on the running board of his car.

Two pieces of heavy sheet iron, slightly narrower than the running board, are hinged to each other, and one piece hinged to the outer edge of the running



Two Strips of Sheet Iron, Arranged on the Running Board, Provide an Excellent Attachment for Carrying Luggage, and can be Folded Down When Not in Use

board, as shown. Two leather straps, attached as shown, are used to hold these pieces tightly over the luggage so that it will not be jolted out on rough roads. A piece of linoleum is glued to the outer side of the strip hinged to the running board, so that when the attachment is folded, the linoleum is uppermost.

PRIZE OFFERS AND ANNOUNCEMENTS

ELECTRIC COMPANY TO AWARD PRIZES AND FELLOWSHIPS ANNUALLY

By action of its board of directors, the General Electric Company has set aside a fund of \$400,000 to be known as the "Charles A. Coffin Foundation," the income from which, amounting to approximately \$20,000 a year, will be available for rewarding distinguished service in the electrical field. This will be done by distributing the income of the foundation as follows: first, \$11,000 in prizes for distinguished service by employes of the company; second, a gold medal to be known as the "Charles A. Coffin Medal," for improvements in the use of electric light and power made during the year by a public-utility company, together with \$1,000 for its employes' benefit fund; third, a similar gold medal, with \$1,000, to the electric railway in the United States which during the year has made the greatest improvements in electric transportation, and fourth, \$5,000 to be awarded annually for fellowships to graduates of technical schools and colleges. Some portion or all of this fund may be used to further the research work at colleges and technical schools in the United States. The foundation was created as an expression of appreciation by the General Electric Company of the work of Charles A. Coffin, president of the company for 30 years, upon his retirement at 78 years of age.

U. S. CIVIL SERVICE EXAMINATIONS TO FILL VARIOUS VACANCIES

Competitive examinations will be held March 7 and 8, 1923, in various cities and towns throughout the United States to fill vacancies in the Coast and Geodetic Survey for duty at Washington, D. C., at a salary of \$1,400 a year, and for duty at Manila, P. I., at \$2,000 a year, plus a bonus of \$20 a month.

An open competitive examination will be held throughout the United States on Jan. 24, 1923, to fill a vacancy in the position of master electrician at the Navy Yard, Brooklyn, N. Y., at a salary of \$12.96 a day. The duties consist of the executive management of an electrical shop employing about 300 men.

Applicants for the above positions should write at once for form 1312, stating the title of the examination desired. Address Civil Service Commission, Washington, D. C., or the secretary of the U. S. Civil Service Board in the applicant's vicinity.

INCOME FROM "R-38" MEMORIAL FUND USED IN YEARLY AERO AWARD

Planning to use part of the income from the "R-38" Memorial Research Fund, the Royal Aeronautical Society of England has announced an annual prize of 25 guineas (about \$125) for the best paper on a technical phase of aeronautics. The contest is intended to be international in scope, and will close on March 31 of each year. Writers, however, are obliged to submit their names, together with information as to the nature of their subject, on or before the last day of the preceding December. Other things being equal, preference will be given to papers which relate to airships. Further information may be secured by addressing the secretary of the organization, at 7 Albemarle St., London, W. 1., Eng.

LEADING EXPORTERS WILL COÖPERATE TO GIVE TRADE-ADVISER SERVICE

More than 100 leading foreign-trade executives from all parts of the United States have agreed to cooperate in the formation of a national foreign-trade council to furnish a trade-adviser service. This service will enable the manufacturer entering the export field to obtain valuable advice from those of more mature experience. To secure the benefits of the service, the inquirer should submit his problems in writing to the Trade Adviser Secretary of the National Foreign Trade Council, 1 Hanover Square, New York City.

REQUIREMENTS FOR ELIGIBILITY AS FLYING CADET

Information regarding the requirements for eligibility for appointment as flying cadet has been issued by the Chief of Air Service. Applicants may be either enlisted men of the regular army, or civilians. They must be unmarried citizens of the United States, between the ages of 20 and 27 years, of good character and sound physique, and must be either high-school graduates, or have an equivalent education. Examinations will be held the second Tuesday in January and July. The base pay of flying cadets is \$75 a month, besides extra pay for flying risk, a ration allowance not to exceed \$1 a day, and allowances for clothing and equipment. Applicants from civil life will be required to pay all expenses incurred by them prior to enlistment. The term of enlistment for cadets is three years, and those who successfully complete the course of training will be commissioned 2d lieutenants in the Air Service Officers' Reserve Corps. Application blanks, which must be submitted in triplicate and accompanied by three letters of recommendation, may be secured from the Chief of Air Service, Washington, D. C.

NATIONAL FOREIGN-TRADE CONVENTION TO MEET AT NEW ORLEANS

The 10th annual convention of the National Foreign Trade Council will be held at New Orleans, April 25, 26, and 27, 1923. Of special interest to foreign traders in all parts of the Mississippi Valley is the rapid development of the shipping facilities of New Orleans, which in 1921 became the second port of the United States. As in former years, prominent foreign traders from every part of this country, as well as a considerable number of business men from foreign countries, will be in attendance at the convention.

PRIZES FOR MOST APPROPRIATE NAMES FOR TWO LARGE LAKE STEAMERS

To persons suggesting the names considered to be most appropriate for two large passenger steamers being built for the Detroit and Cleveland Navigation Co., a prize of \$50 for each name will be awarded. The names should have some advertising significance, and should convey an idea of the Detroit and Buffalo route, upon which the steamers will operate. They will be ready for the navigation season of 1924. Address: Detroit and Cleveland Navigation Co., Detroit, Mich.

ALLIED CHEMICAL AND DYE CORPORATION OFFERS ANNUAL PRIZE OF \$25,000

The Allied Chemical and Dye Corporation, of New York, has established an annual prize of \$25,000 to be awarded to the chemist, residing in the United States, who, in the opinion of a properly constituted jury, has contributed most to the science of chemistry, and to the benefit of mankind in general. Steps are being taken to carry this matter into effect, beginning with the year 1923. A committee has been appointed that is now framing the rules to govern the board of judges which will make the award in due time.

BUILD COOKHOUSE FOR WOMEN'S SCHOOL IN INDIA BY SALE OF RECIPE

By the sale of a recipe for making a very superior kind of strawberry shortcake, Mrs. Lucy W. Peabody, chairman of the joint committee of international boards that is directing the raising of a fund of \$2,000,000 for seven Oriental colleges for women, has collected \$1,500 in cash. This money is to be used for building a memorial cookhouse at the college for women in Vellore, India.

When answering prize offers please mention Popular Mechanics Magazine

CONTESTS PREVIOUSLY ANNOUNCED

Medals, Diplomas, and Money Awards: Announced August issue, 1921; awards offered by the Franklin Institute. The Franklin medal is for workers in technology; the Elliott-Cresson is for original research work and invention; the Howard N. Potts is for important development of previous discoveries and inventions. Each award consists of a gold medal with a diploma. There are also a silver medal, and a Certificate of Merit awarded for meritorious discoveries, and cash premiums for certain work in optics.

One Million Francs for Best Motor: Announced January issue, 1922; closes June 1, 1923; address, Aero Club of France, Paris.

Research Thesis by a Woman: Prize \$1,000; announced October issue, 1921; awarded annually; address, Dr. Lillian Welsh, Goucher College, Baltimore, Maryland.

Annual Commercial Airplane Contest for "Italy's Great Trophy": Announced July issue, 1922; address, Aero Club of Italy.

Best Novel by an American Author: Prize \$2,000; announced August issue, 1922; closes March 1, 1923; address, Harper & Brothers, New York City.

National Contest for Professional Musicians: Announced January issue, 1923; closes March 1, 1923;

address, Mrs. Charles A. McDonald, 205 Shorb Ave., Canton, Ohio.

Best Treatise Regarding Immortality: Prize \$1,000; announced January issue, 1923; closes Dec. 1, 1923; address, Contest Editor, 2 West 47th Street, New York City.

Stories and Pictures of Notable Buildings: 77 prizes from \$250 to \$5 each; announced January issue, 1923; closes Feb. 1, 1923; address, Prize Committee, Save the Surface Campaign, Box 50, The Bourse, Philadelphia, Pa.

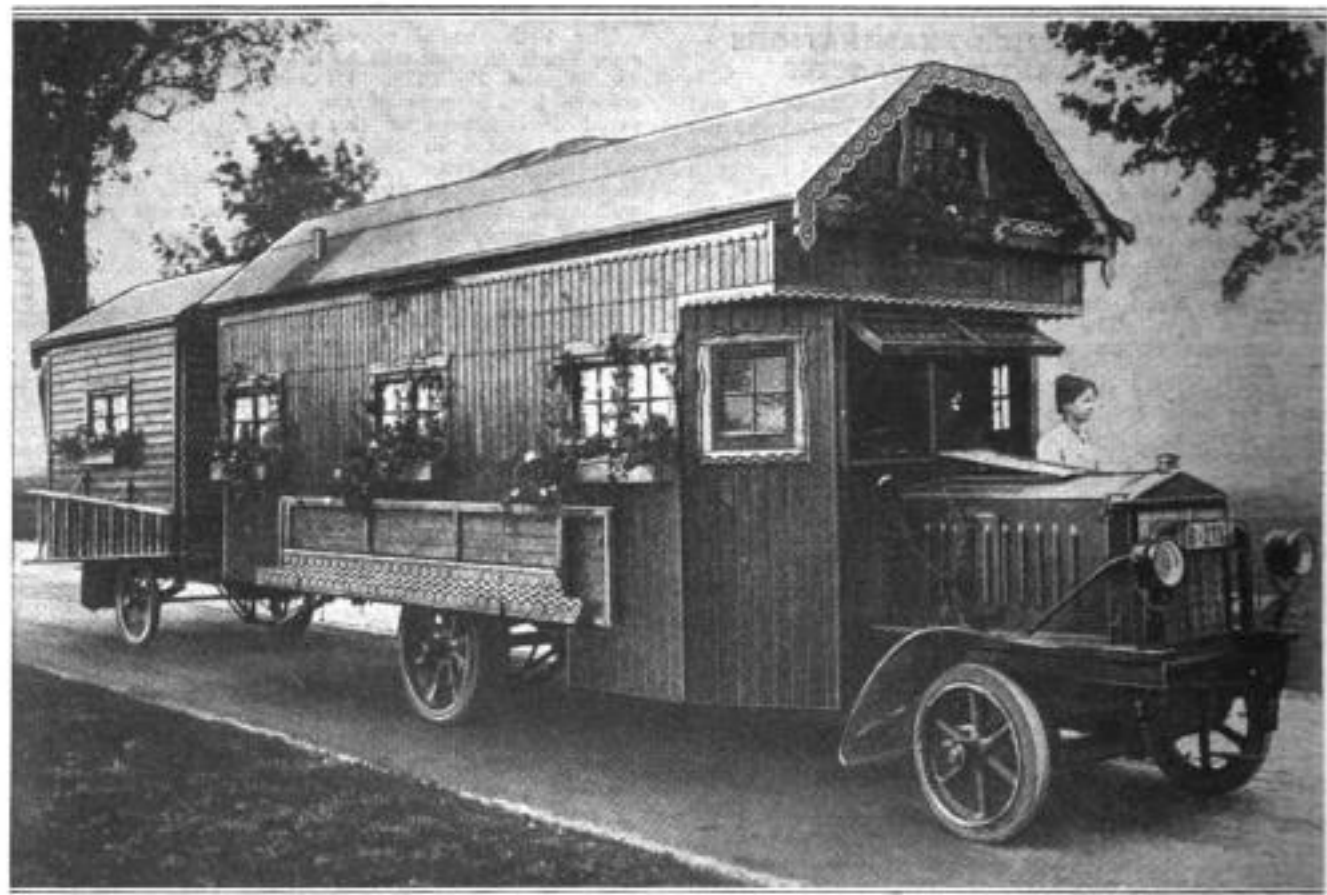
Best Essay on Medical Research: Prize \$500; announced January issue, 1923; closes Feb. 1, 1923; address, Reid Hunt, M. D., Harvard Medical School, Boston, Mass.

Play Suitable for Outdoor Presentation: Prize \$100; announced January issue, 1923; closes Feb. 1, 1923; address, Mrs. V. M. Porter, Secretary Forest Theater, Carmel, Calif.

Best Short Story or Poem: Prizes \$100 and \$25; announced January issue, 1923; closes March 1, 1923; address, Contest Secretary, Kansas City Chapter, Missouri Writers' Guild, Kansas City, Mo.

Articles on Chemistry: Prizes \$50 and \$25; announced January issue, 1923; closes May 1, 1923; address, Secretary, Canadian Institute of Chemistry, Toronto, Ont.

TRAVELING CANDY STORE OF "NEWLY POOR" NOBLE



THE high cost of living was the reason for the construction of this elaborately equipped and curiously proportioned motor car. An impoverished Austrian nobleman designed the vehicle as a dwelling for himself and family of three, in addition to which he sells candy from the detachable trailer seen at the rear. Business was so poor in his own country that the titled shopkeeper drove his odd-appearing shop and home on wheels out of his native land. He is now touring on the highways of other parts of Europe with the intention of recuperating, if possible, his finances.

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