January

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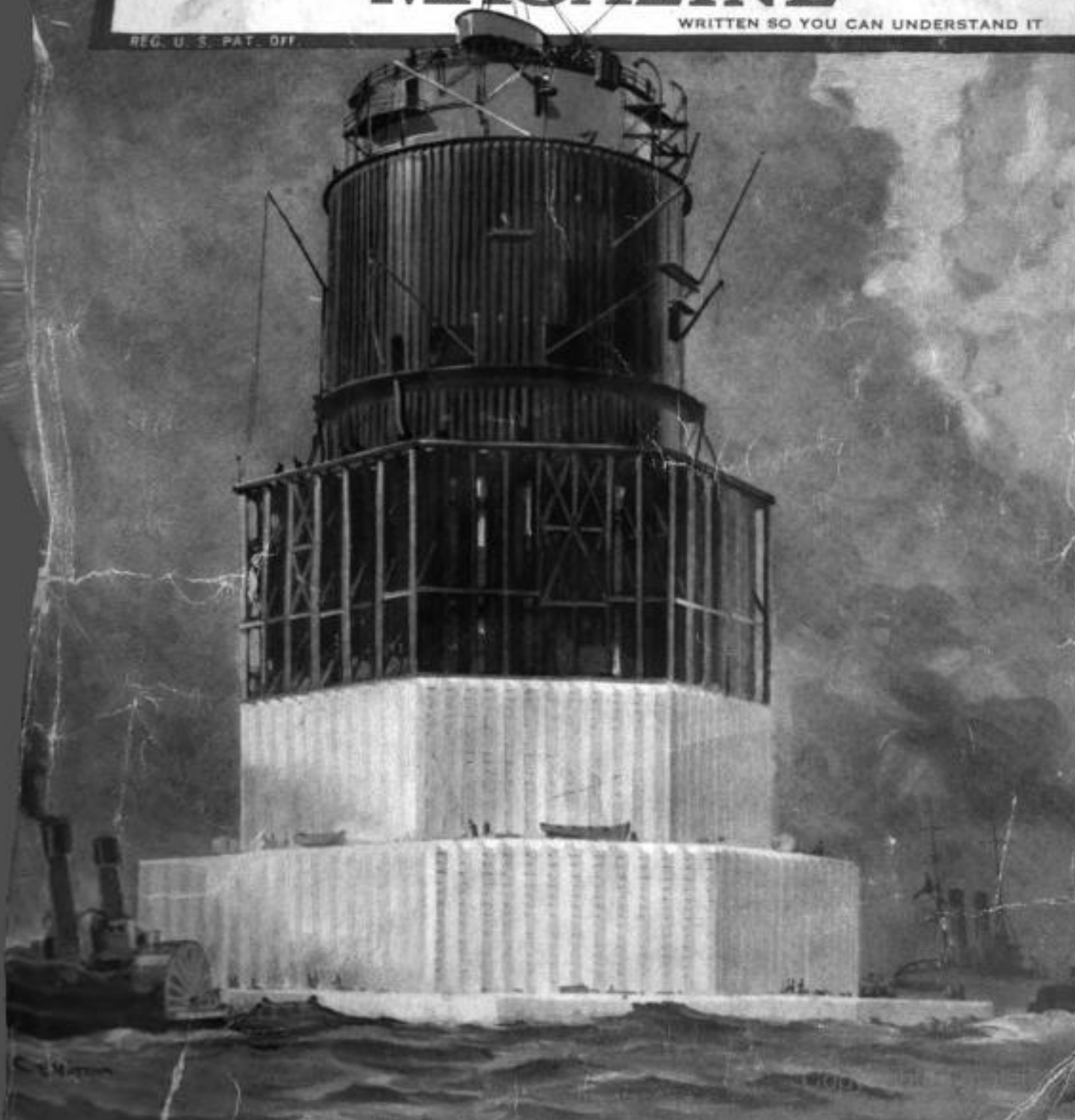
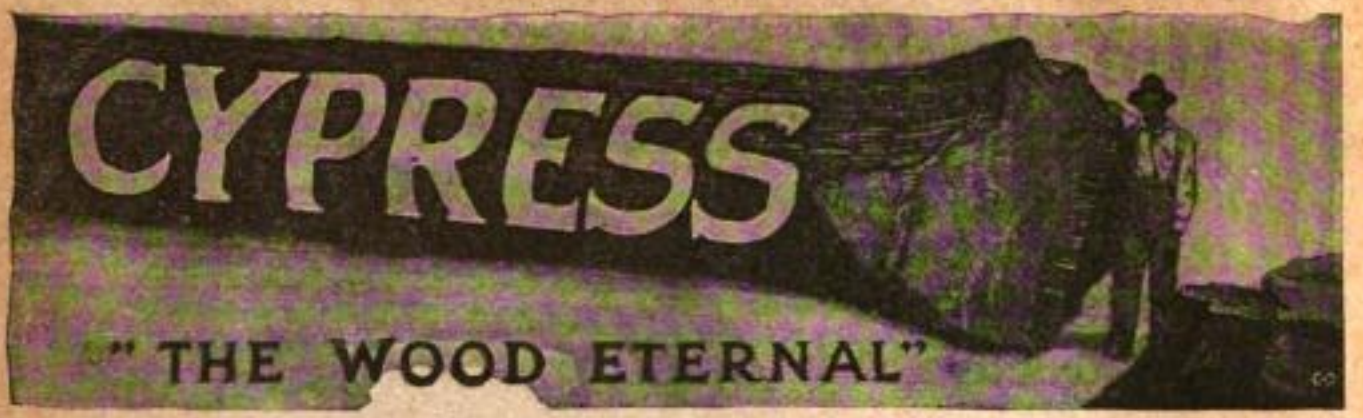
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



HE WHO USES CYPRESS LUMBER BUILDS BUT ONCE



SO MANY PEOPLE KNOW
so little about woods
(and their relative values—How is it with you?)

SO MANY PEOPLE THINK
that "LUMBER IS LUMBER"—(How often do YOU *specify the kind* of wood you want used by your builder?)

SO MANY PEOPLE BELIEVE

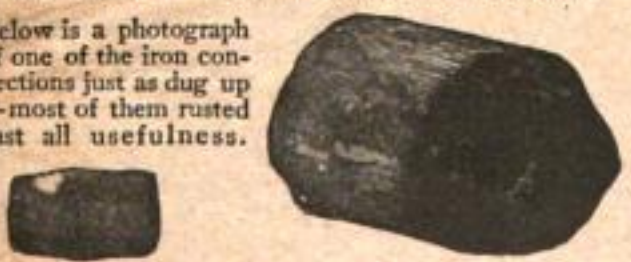
that frequent *Repair Bills* are *"Necessary Evils"*—
that we believe we are doing a public service in informing you and other intelligent people on

CYPRESS

("THE WOOD ETERNAL")

HERE IS CYPRESS *VS.* AN IRON PLUG: About 120 years ago, when Louisiana was a French Province, the Water Mains of New Orleans were CYPRESS logs, 18 feet long by 22 inches diameter, with a 5-inch hole bored lengthwise. These were joined by short iron tubes, tapered at both ends. Not many years ago these were replaced by the most modern system. Below is a photograph of a section of one of the CYPRESS mains just as it was dug up—as sound as ever after over 100 years' contact with wet earth.

Below is a photograph of one of the iron connections just as dug up—most of them rusted past all usefulness.



HERE IS CYPRESS *VS.* WEATHER: A photograph of a CYPRESS SHINGLE from the Austen Homestead, Staten Island, N.Y. built in 1710, and at last accounts still occupied by descendants of its original builders, with the original CYPRESS roof practically intact.

"He who uses CYPRESS *builds but once."*

CYPRESS is in truth "the wood eternal." If you are putting up a palace or a pasture-fence, and want to build it "FOR KEEPS"—USE CYPRESS.

There is a liberal education (and a wonderful INVESTMENT value for you) in the CYPRESS POCKET LIBRARY—43 volumes all without cost on all phases of building and home carpentry—some with plans for CYPRESS bungalows and other delightful things. Vol. 1 (*free*) tells all about it. Good idea to send for it.

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION
1219 Perdido Building, New Orleans, Louisiana, or 1219 Heard National Bank Building, Jacksonville, Florida

INSIST ON TRADE-MARKED CYPRESS AT YOUR LOCAL LUMBER DEALER'S. IF HE HASN'T IT, *LET US KNOW IMMEDIATELY*

Index to Volume XXXV, 1921

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

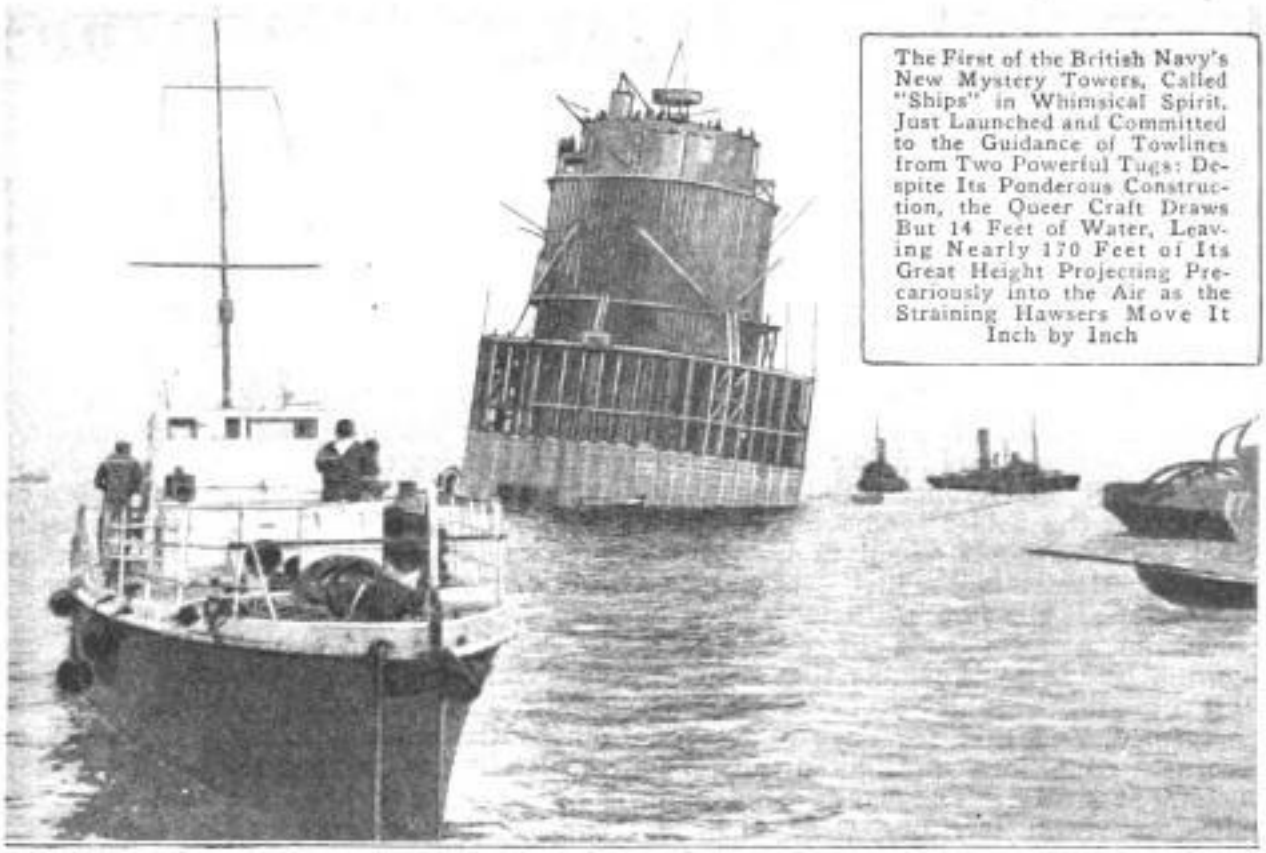
WRITTEN SO YOU CAN UNDERSTAND IT

VOL. 35 JANUARY, 1921 No. 1

Army Airplanes Complete Alaskan Trip

THE four army airplanes which undertook the round trip to Nome, Alaska, from the Mineola, L. I., flying field, scored their victory on October 20th, when they alighted at the field after having covered 9,000 miles of flight, equal in hazard to the transatlantic flight, in the actual flying time of 110 hours. That the trip consumed a total time of over three months is due to the facts that a great deal of photographic-survey work was performed, and that for days at a time weather conditions prohibited any attempts at flying. Thousands of square miles of virgin territory were mapped, and the supremacy of the airplane for this service was conclusively demonstrated. Aside from a damaged landing gear, some blown-out tires, and some propeller breakage, the trip was without a mishap. This is most remarkable, as many of the landing fields were hastily prepared clearings in the forests and were full of rocks and stumps. The officer-airmen are enthusiastic in their praises of the planes and engines, one of them declaring that it had not been necessary even to change a spark plug on his engine during the entire journey. Witnesses of the landing state that the planes looked as though they had just undergone an overhauling for inspection and not a grueling, such as no machine has ever before been required to pass through.

The Mineola-Nome Air Pioneers, One of the Planes, and a Couple of Mascots: The One Held under the Airman's Arm Is an Eskimo Husky Puppy, Picked Up in Alaska and Given His Air Education on the Return Trip. Neither the Men nor the Machine Exhibit Evidences of the Strain of the Epoch-Making Flight



The First of the British Navy's New Mystery Towers, Called "Ships" in Whimsical Spirit, Just Launched and Committed to the Guidance of Towlines from Two Powerful Tugs: Despite Its Ponderous Construction, the Queer Craft Draws But 14 Feet of Water, Leaving Nearly 170 Feet of Its Great Height Projecting Precariously into the Air as the Straining Hawsers Move It Inch by Inch

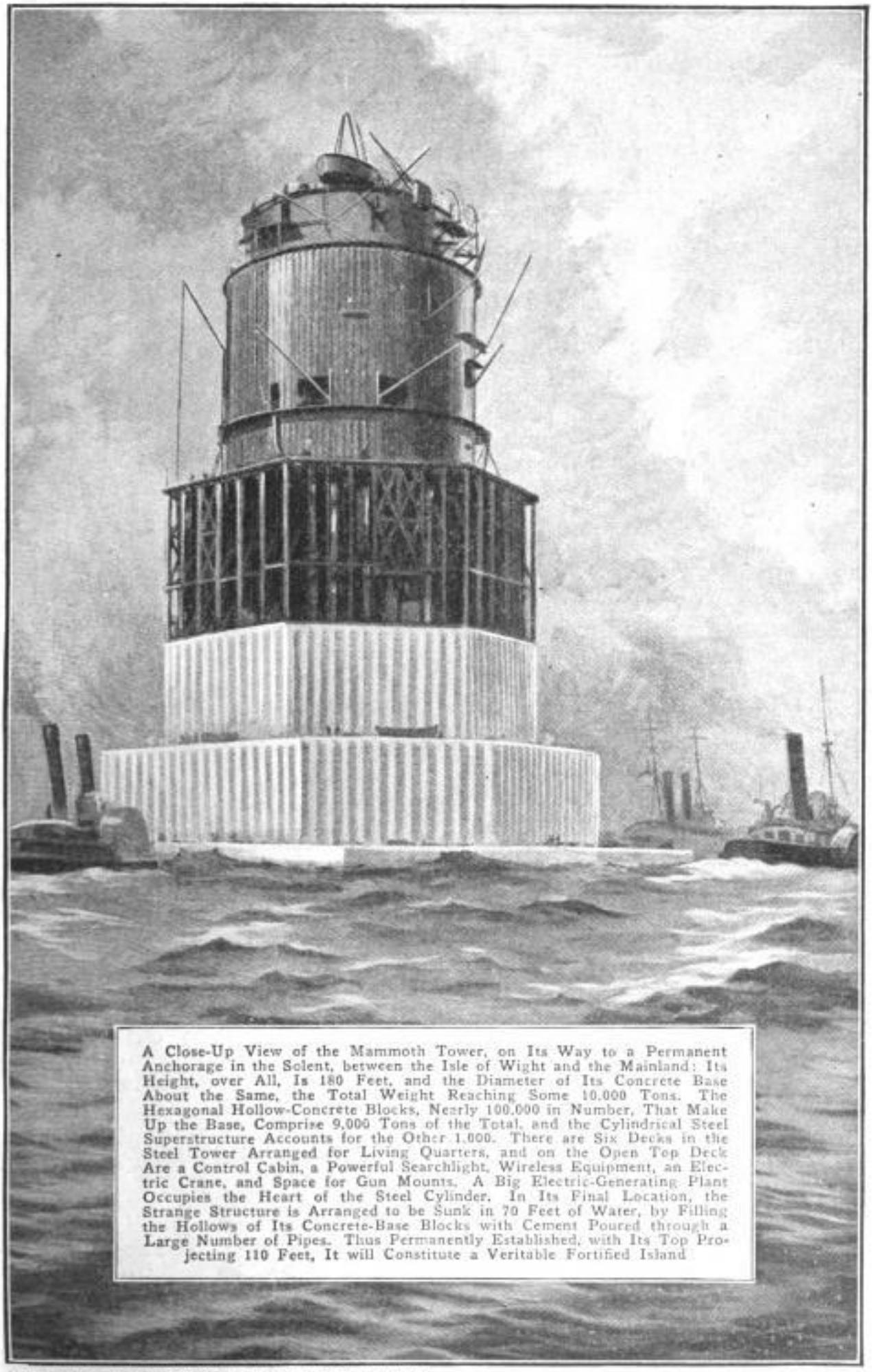
STRANGE CONCRETE BATTLESHIPS BUILT ON OCEAN'S FLOOR

By PAUL H. WOODRUFF

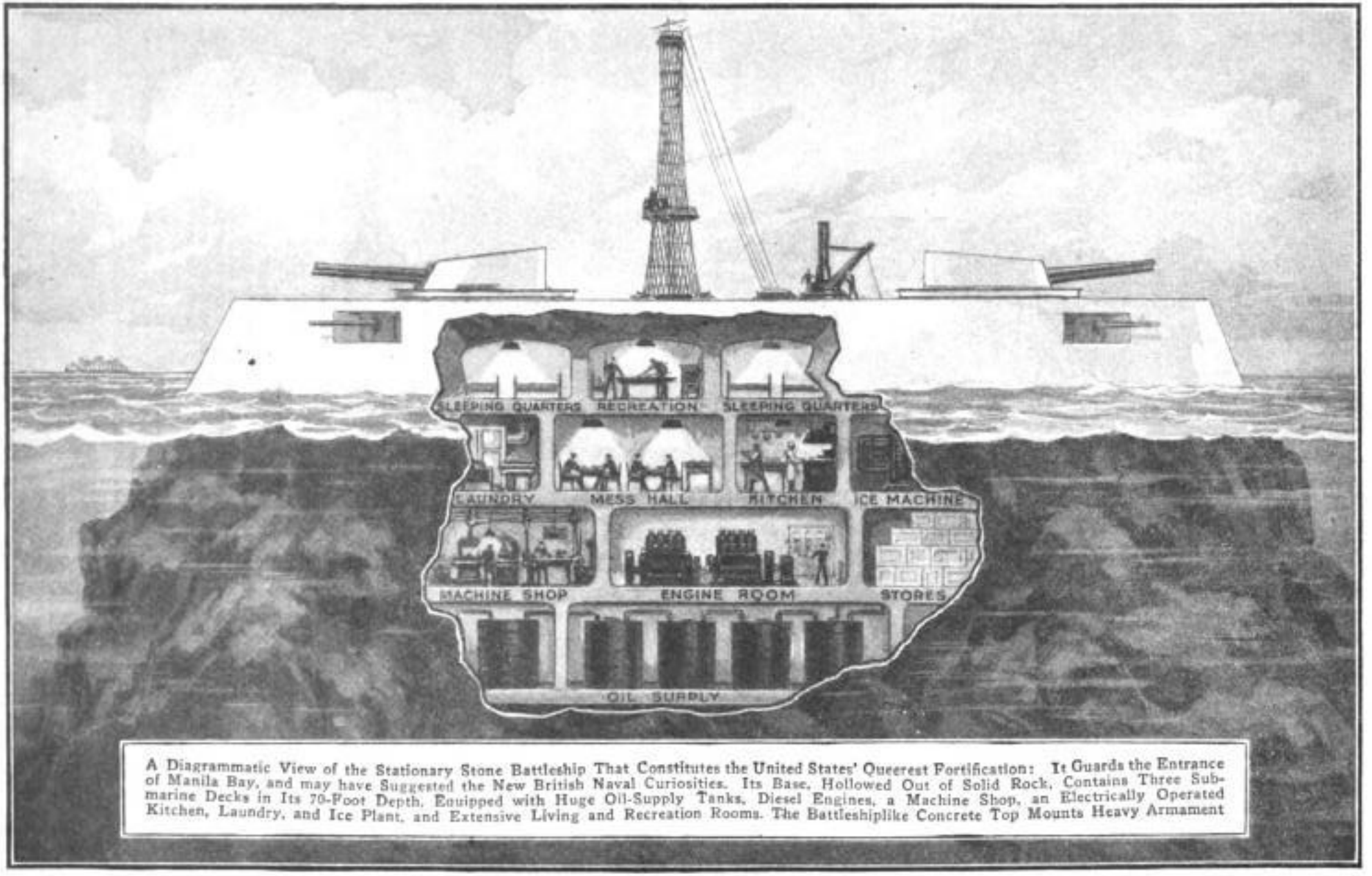
MYSTERIES of the sea are generally concerned with loss, not with new construction, and with the action of unknown forces rather than the functions of the world's greatest naval power. Yet the fact that the British Admiralty has just completed two of the strangest marine structures ever fashioned, without divulging what vital purpose may lie behind the project, has given the people of England as exciting a mystery as ever came out of the ocean. For with all the secrecy of the undertaking, the huge bulk of the new naval units has prevented their concealment from curious eyes. From the first laying of the broad foundations, described in this magazine in September, 1919, speculation has been rife as to their probable use, reports then having it that they constituted an ingenious scheme for the salvage of sunken British shipping.

Only in a whimsical spirit are these queer structures called "ships." Properly, they are towers, 180 ft. high, with concrete bases perhaps as great in diameter, each weighing 9,000 tons, and with huge, cylindrical steel superstructures that add another 1,000 tons to the dead weight. That so massive and inappropriately shaped a "craft" should float at all is remarkable, but the fact is that, at the launching, its buoyancy was great enough to keep nearly 170 ft. of its height out of water, the draft proving to be but 14 ft. In building the immense base and the four lower tiers of the superstructure, hollow reinforced-concrete blocks of hexagonal shape were used, to the number of nearly 100,000. Six decks in the steel tower are equipped for living quarters, while the open top deck carries a control cabin, the wireless apparatus, a giant searchlight, and an electric crane, with plenty of space for the mounting of guns. In the core of the big cylinder is a huge electric generating plant, adequate not only for the visible equipment, but also for the secret uses that constitute the mystery of the installation.

Launching the first of these queer edifices was an impressive spectacle, witnessed, despite its secrecy, by thousands of wondering citizens. Two powerful tugs, pulling with the tide, strained at their hawsers until the mammoth tower, almost imperceptibly, began to move. Slowly and steadily, with gathering headway, it was towed by masterly seamanship through the harbor entrance, clearing by only 2½ ft. at each side. Then,



A Close-Up View of the Mammoth Tower, on Its Way to a Permanent Anchorage in the Solent, between the Isle of Wight and the Mainland: Its Height, over All, Is 180 Feet, and the Diameter of Its Concrete Base About the Same, the Total Weight Reaching Some 10,000 Tons. The Hexagonal Hollow-Concrete Blocks, Nearly 100,000 in Number, That Make Up the Base, Comprise 9,000 Tons of the Total, and the Cylindrical Steel Superstructure Accounts for the Other 1,000. There are Six Decks in the Steel Tower Arranged for Living Quarters, and on the Open Top Deck Are a Control Cabin, a Powerful Searchlight, Wireless Equipment, an Electric Crane, and Space for Gun Mounts. A Big Electric-Generating Plant Occupies the Heart of the Steel Cylinder. In Its Final Location, the Strange Structure is Arranged to be Sunk in 70 Feet of Water, by Filling the Hollows of Its Concrete-Base Blocks with Cement Poured through a Large Number of Pipes. Thus Permanently Established, with Its Top Projecting 110 Feet, It will Constitute a Veritable Fortified Island



A Diagrammatic View of the Stationary Stone Battleship That Constitutes the United States' Queerest Fortification: It Guards the Entrance of Manila Bay, and may have Suggested the New British Naval Curiosities. Its Base, Hollowed Out of Solid Rock, Contains Three Submarine Decks in Its 70-Foot Depth, Equipped with Huge Oil-Supply Tanks, Diesel Engines, a Machine Shop, an Electrically Operated Kitchen, Laundry, and Ice Plant, and Extensive Living and Recreation Rooms. The Battleshiplike Concrete Top Mounts Heavy Armament

in the open sea, it started on its way to its final anchorage in the Solent, between the mainland and the Isle of Wight. At that point, in 70 ft. of water, it was sunk to the bottom by the simple method of filling the hollows of its thousands of base blocks with concrete, poured through pipes leading from an emergency deck above. Thus established, as solidly as an island of rock, it still projects 110 ft. above the surface, to serve whatever purposes of defense and guidance its builders had in mind.

New and strange as these British naval units are, it is not impossible that their construction was suggested by an equally curious, and scarcely better-known, marine fortress of the United States Navy, erected not long ago between Luzon, P. I., and the island of Corregidor. This extraordinary defense is nothing less than a huge, stationary stone battleship, built upon a stub of rock whose surface area is practically no greater than the concrete hull of the propellerless vessel itself. Much engineering ingenuity and some millions of dollars were expended in leveling this rocky islet, and excavating in it a pit 70 ft. deep, with walls 15 ft. thick. Far down in the "stokehold" of the immobile craft are big oil-storage tanks for the Diesel engines of the powerful generating plant on the next deck above. On that deck, also, are storage rooms for emergency ammunition and food supplies, and a complete machine shop. The higher decks are occupied by the electric kitchen, laundry, ice plant, mess hall, and the living quarters and recreation rooms of the crew, all mechanically ventilated and electric lighted day and night.

Two turrets on the main deck, forward and aft, mount 14-in. naval guns, and there are 6-in. guns in four other turrets, two on each side. Both supplies and men are loaded and unloaded by means of a big electric crane, and a powerful searchlight is carried on a fighting tower of regulation battleship style. Manned by soldiers who serve but six months at a time, because of the tropical heat and the unusual character of the mode of life, this remarkable fortification, known as "El Fraile," guards the entrance to Manila Bay like an artificial Gibraltar.

RAMIE UNDER NEW TREATMENT YIELDS COTTONLIKE FIBER

Valuable fiber has long been obtained from the Asiatic plant known as ramie, but only by a laborious manual process of separating the bark and the 10 to 22 per cent of gummy resin in which the fibers are imbedded. Now it is reported that an English textile worker has developed a successful system by which the sticky gum is completely removed in a short time. In an experimental demonstration, the entire process from the plant to the pure-bleached fiber occupied but two hours. The finished material is declared to be superior to cotton for surgical dressings, having better absorbent qualities and withstanding sterilization without injury. The inventor, however, purposes to use the long, light fibers for many other manufactures, including fabrics of various kinds.

NEW POWER SILO TAMPER IS A WALKING MACHINE

An electrically driven silage-tamping machine, for packing green vegetation into silos, has six flat feet which move up and down and from front to back, each stamp delivering a blow, over a surface of 390 sq. in., equal to that of a 200-lb. weight falling 9 in., or 150 ft.-lb. Two of the feet, being outside the framework of the machine, enable it to work very close to the silo walls. The motor is wound for the standard isolated power-plant voltage. For use on farms that are not equipped with power plants, a small dynamo is supplied, which may be driven by any small gasoline engine. Control is by means of a switch in the steering lever; only one man is needed to guide it.

A Power-Tamping Machine Designed to Pack Silage Simulates the Stamping Action Usually Performed by the Feet of the Packer. Being Tilted at a Forward Angle, the Apparatus Walks and Requires Only to be Steered

GIRLS MAKE ATTRACTIVE HATS OF VENEER AND SHAVINGS

Rough hats made of wood shavings are not new, but the idea of using ligneous materials for more pretentious head coverings seems to have occurred recently, and almost simultaneously, to a young woman in Wisconsin and another in Arkansas. The girl of the apple-blossom state used long pine shavings to make a simple bonnet, coated with a dark-yellow enamel that gives it a velvety finish. The badger-state girl made her roll-rimmed sailor of thin strips of waterproof poplar veneer, colored with rose dye and lined with silk crêpe. The results are so satisfactory that interested observers now are talking of mahogany and rosewood creations, with painted designs.

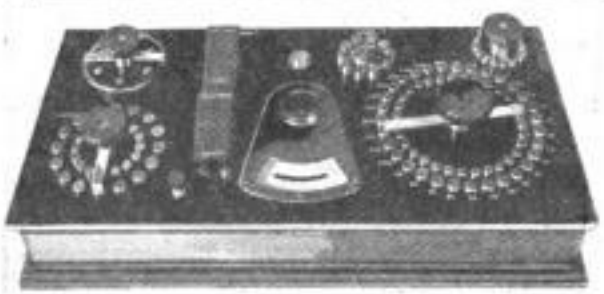
Left: The Pine-Shaving Bonnet of the Arkansas Designer. Right: The Waterproof Veneer Sailor of Wisconsin

NEW MOTOR-CAR FENDER PICKS VICTIM UP

To demonstrate his faith in the device, the inventor of a new automobile fender recently allowed himself to be struck by a car equipped with it. Although the car was traveling at a speed of 25 miles per hour when the "accident" occurred, it is said that the inventor suffered nothing more serious than the shaking up which was to have been expected. The device, weighing only 75 lb., is said to be capable of raising and sustaining a dead weight of four tons. It is entirely automatic in action, picking up whatever it may strike. The design is such that it permits of easy, quick attachment to passenger cars and trucks.

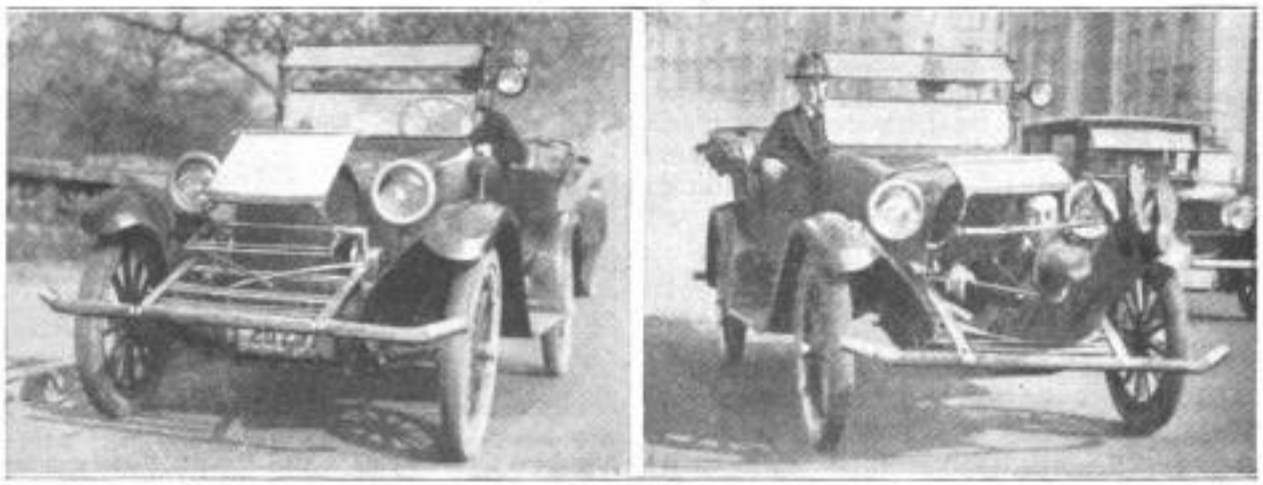
NEW ELECTRIC POTENTIOMETER WORKS BY DEFLECTION

For use in testing electrical measuring instruments, and for other laboratory purposes, a new form of deflection potentiometer, made after the design of a government scientist, has many advantages over the usual "null" type of instrument. The range is 0 to 1.5 volts. A special volt box gives ranges up to 300, and with a series resistance, up to 750 volts. The galvanometer, built into the case, swings its needle to the deflected position about one second after the circuit is closed.



The New Deflection Potentiometer, Giving the Accuracy of the "Null" Type with Greater Working Speed

Coarse and fine rheostats for the adjustment of the potentiometer current are included. A high-resistance model suitable for photometric work also is made.



Two Views of a Safety Device for Motor Cars and Trucks: At the Left, a Car with the Apparatus Installed. At the Right, Picking Up a "Victim" without Injury

THE AIRPLANE DUCK PATROL OF THE SACRAMENTO VALLEY

By John Edwin Hogg

A View of the Rice Country from an Airplane Flying at 1000-Feet Elevation: The Grain Grows in the Water, but Most of It is Screened from View by the Vegetation. The Lines in the Field Are Water Trenches

SAVING a rice crop valued at millions of dollars annually, with an investment that is but the merest fraction of the value of that crop, and at the trivial expense of only 50 cents an acre per year to the growers, is the newest use to which airplanes have been applied. The rice fields were planted to provide human food, but wild fowl ate the crop, and scores of farmers were ruined. Airplanes now patrol the rice fields, and have been as successful in saving the rice as the airplane forest patrol has been in protecting our forests from fire.

Man has seldom harvested any kind of a crop without having to contend with some natural enemy that has sought to ruin or starve him. The boll weevil has destroyed our cotton, grasshoppers have ruined our wheat, army worms have eaten our corn, and in the Sacramento Valley—the nation's greatest rice field—wild waterfowl have devoured our rice. They "puddled" the rice fields, consumed the grain by hundreds of tons, and ruined tens of thousands of acres sometimes in a single night. This was before the airplane patrol was instituted. A few years ago this land was a worthless lowland hardpan. Weeds and cactus were about all that would grow there until somebody conceived the idea of flooding the land and planting the vast areas to rice. The rice throve, and in a few years a great barren valley was transformed into rippling fields of emerald green. But as the first season's rice crop neared maturity, the annual southward migration of waterfowl set in. Down from the summer breeding grounds, the swamps and lakes of northern Canada, Alaska, and the Arctic Islands beyond, came ducks, geese, brant, and other wild fowl. They swooped down into the rice fields in flocks that darkened the sky—wandering freebooters taking advantage of an open "free lunch" established by man apparently for their special use. A few days after the migration began, countless fields of standing grain became mud puddles of desolation. Scores of rice farmers faced ruin, practically overnight. Others who sought to protect their crops with shot-

A Healthy Rice Field Protected by the Airplane Patrol: It has been Unmolested by Waterfowl. A Few Years Ago This Land Was a Worthless Lowland Hardpan

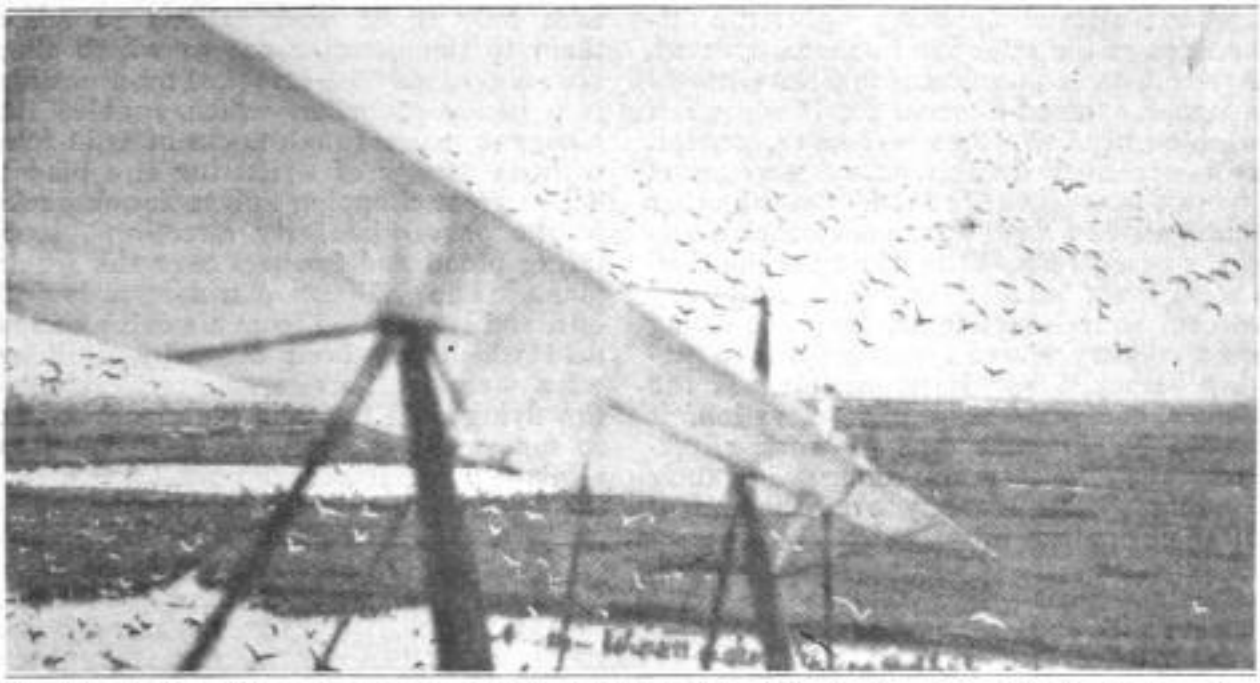
guns and artillery were promptly arrested for violation of the state game laws. The following year the game laws were modified to enable the rice growers to protect their crops. Men were hired, furnished with guns and ammunition, and sent into the rice fields. They banged away day and night into the myriad of wild fowl, but the birds soon learned that a hunter on foot in a boggy rice field travels very slowly, and that a shotgun is harmless even at a comparatively short distance. When scared out of one field, they merely flew into the next, and went on with their favorite meals of rice. Obviously, this method was costly, and cut deeply into the dwindling profits of the rice men. In desperation, some of the farmers mined their fields with detonating torpedoes which were set off at intervals by means of electrical-timing apparatus. This plan, however, met with only partial success, because the wild fowl simply flew into the next field when the torpedoes exploded, and thus it was practiced by one farmer at his neighbor's loss. Again, the expense of torpedoing made effective riddance of the wild-fowl plague almost prohibitive.

The Heavy Propeller of a Rice-Patrol Airplane, Known to the Airmen as "The Duck Slaughterer": A Lighter Blade would be Shattered When Tearing through the Flocks of Wild Fowl

In the several years of rice growing that followed the loss of practically all of the first year's crop, various methods of driving the waterfowl away were given a try-out. There were many kinds of mechanical scarecrows, torpedoes, and fire flares sent aloft with toy balloons, rockets at night, and the usual array of pot shooters with shotguns. None of these methods, however, was fully successful, and partial success was accomplished at heavy expense. By the fall of 1919 the problem of saving the rice crop became so serious that the growers were ready to listen to anybody who came along with a new "duck-shooing" idea. About that time a trio of airmen flew into the valley. They were looking for business in their chosen line, and as they flew low over the rice fields, sending cloud after cloud of wild fowl scurrying skyward ahead of the roaring airplanes, they were quick to realize a business opportunity.

That was the beginning of the airplane

View on One of the Rice-Patrol Flying Fields: Two Airmen are Watching a Huge Flock of Migrant Waterfowl Preparatory to Going Aloft to Chase Them Out of the Country. The Patrol is Maintained Both Day and Night in All Weathers



Rounding Up the Ducks Preparatory to Chasing Them Out of the Rice Country: Note That the Airplane from Which This View was Taken Is Almost on the Ground

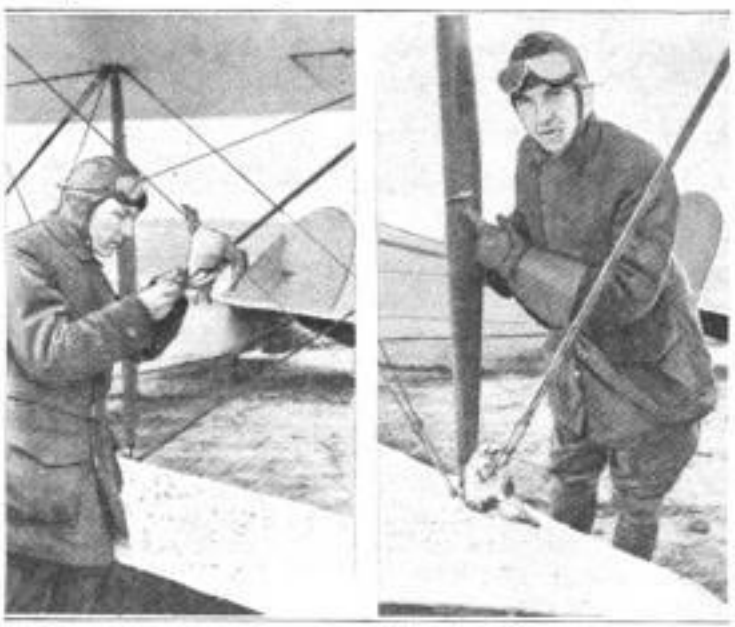
rice patrol, or the duck patrol, as it is commonly known in the Sacramento Valley. The airplane men established flying fields at convenient points about the rice country, and entered into contracts with the rice men to save them from crop losses in so far as damage from waterfowl is concerned. The farmers pay 50 cents per acre for the airplane patrol, which begins with the wild-fowl migration, about September 1, and is continued until after the rice harvest, about December 10. By reason of its great speed, one airplane can patrol a tremendous acreage of rice, and three planes can effectively keep the ducks out of 35,000 acres. The three-plane patrol over 35,000 acres thus gives the airplane men a gross income of $17,500 for approximately 100 days of flying, and in return for the money they spend, the farmers are saved a loss that can only be estimated in tens of thousands of dollars.

A single duck, or even a flock of a few hundred, will do no appreciable damage to a rice field; but it is when the flocks congregate by the millions that the real damage is done. The airplane patrol is thoroughly effective in breaking up these large flocks, chasing them out of the country, and preventing their congregating again. The duck patrol is thus a profitable institution for the rice growers as well as a good business venture in aviation.

Before the airplane patrol was instituted, a scientific study was made of the habits of the birds. This included a careful analysis of crop and stomach contents of wild fowl killed in the rice fields. It was revealed that the average duck consumes 6 oz. of rice per day, and that in getting this ration, he will tramp down, pull up, or otherwise destroy, another 10 oz. This means that each duck destroys a pound of rice each day, or 100 lb. during the migratory season of 100 days. With the value of rice at 16 cents a pound, each duck inflicts an annual loss of $16. This loss, heavy as it is, would not be serious if the ducks came into the fields in only a few scattering flocks, but when they wing their way in from the north in flocks that can only be estimated in millions, the havoc increases to an almost complete ruination of the rice fields.

To do effective work, the rice-patrol airplanes must fly day and night, in all sorts of weather, and over country where landing fields are conspicuously absent. In view of the adverse conditions under which the flying is done, the institution is an epoch-making development in aviation. By reason of greater experience, wild fowl know a great deal more about flying than do men. Furthermore, ducks and airmen have exactly opposite viewpoints in many respects. Windy, rainy days are a curse to the airman—but the duck loves them. Those are the days when it goes to the rice fields full of pep, and with a healthy appetite. Ducks are past-masters at night flying, and making landings in rice fields and bog holes—but not so the airplane. Night flying with airplanes is at best a ticklish proposition,

and on dark, windy, rainy nights the difficulties of the pilot are further increased. A rice field is unquestionably very nearly a duck's idea of heaven, for there it can dabble in the water to its heart's content, and, screened by the heavy vegetation, indulge in its favorite food. On the other hand, a rice field is a cemetery for an airplane in distress. From the time the rice-patrol fliers leave their bases until they return, four hours later, they are flying over country where landing without getting "cracked up" is impossible. If the planes could fly at a high elevation, it would be different, but to work effectively they must scoot along with their landing wheels scarcely over the top of the growing grain. Thus, if anything goes wrong with the "ship" there is no possibility of gliding to a safe landing place. The only chance is to set the plane down tail first, and "pancake" into the rice, which means doing a "nose-over" into the mud. During the two seasons that the rice patrol has been in existence, the flying has been done through the 24 hours of the day by birdmen working in four-hour shifts. In that time there has been only one forced landing. The airman escaped without injury, but the plane had to be abandoned in the rice field until the water was drained off for the harvest.

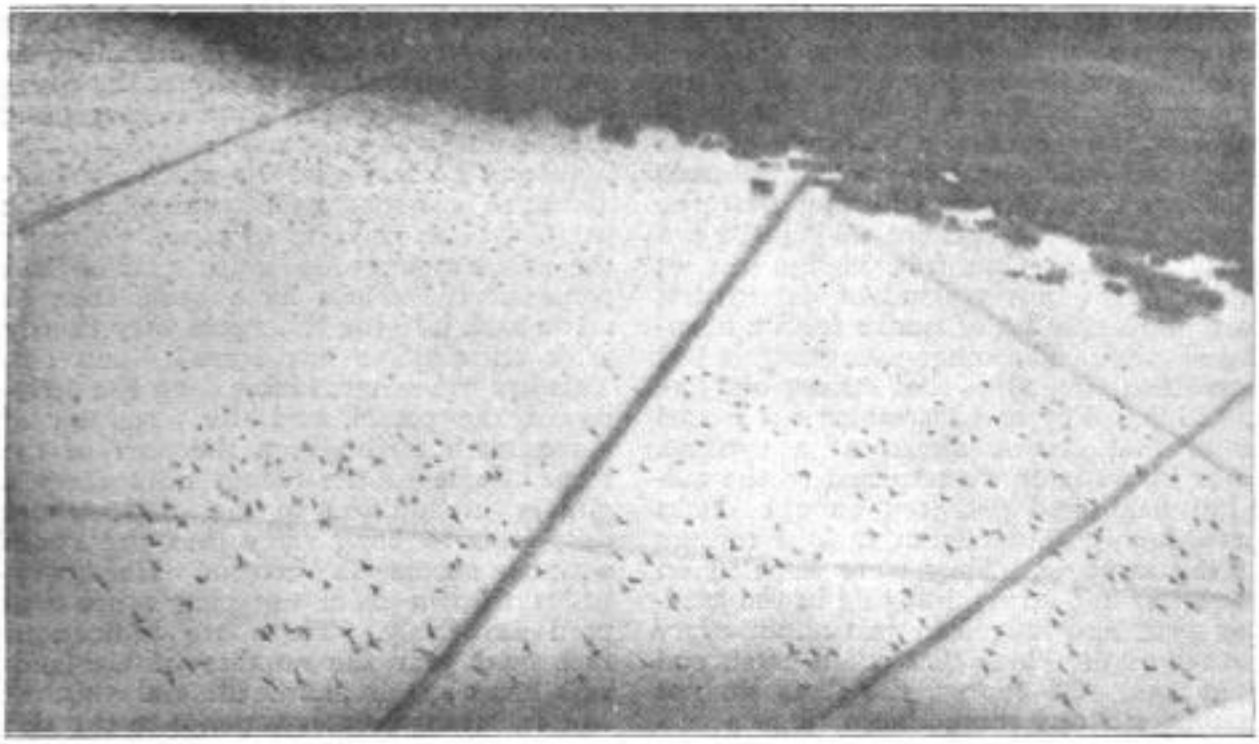


Left: A Mangled Teal Duck Caught in the Rigging of a Rice-Patrol Airplane. Right: After Coming In off the Rice Patrol. A Dead Duck is Caught in the Wing-Strut Wires, and a Tuft of Feathers Shows Where Another Duck Perished against the Same Strut. After a Four-Hour Trip, the Clumsy-Looking Propeller Was a Mass of Gore

Flying the rice patrol is one of the most thrilling of airplane rides. In making this statement the writer speaks from experience, for he spent 10 hours in the air with the patrol airplanes for the purpose of taking the photographic illustrations which accompany this story.

After traveling over the rice country at a very high elevation in a privately owned airplane, we landed at Willows, in Glenn County, a point that is the center of the rice industry, and from which a three-plane patrol is operated. The airplanes used there are ordinary touring planes, with only slight modifications to adapt them to the peculiar use to which they are being put. The principal modification is a heavy propeller, which enables the planes to tear through flocks of wild fowl without danger of shattering the blades. These great chopping knives knock ducks in the proverbial forty directions, spattering blood and feathers over the whole plane. The Willows patrol is a typical one, and is operated from a small aviation field which has been made by draining off a piece of the rice country. Around the flying field there is nothing but rice as far as the eye can see, even from an airplane flying several thousand feet above the fields. This patrol is keeping the ducks out of 35,000 acres of rice, but since all the farmers have not yet "been sold" on the value of the system, the area that must be flown over is somewhat scattered, and calls for a much greater mileage than would be necessary if the fields were closely grouped.

The rice-patrol plane in which we left the field had just come in from a four-hour trip. It was spattered with blood and feathers, and its rather clumsy-looking propeller was a mass of gore. Before adjusting my life belt, the pilot (a former ace in the British army) handed me a blood-spattered raincoat, which he bade me put on to protect my clothing when we went through a flock of ducks. A few minutes later we were soaring along a thousand feet above the rice fields. I was reveling in the beauty of the bluish-green fields below when the plane suddenly dived nose downward. Up came the landscape with a dizzy rush; the pilot tapped me on the shoulder, and pointed to a rice field which was now directly under the nose of the plane. It was black with ducks, and resembled a piece of sticky flypaper which had caught all the flies that could find standing room on it. In a few seconds more we had



View Taken from a Rice-Patrol Airplane While in the Act of Diving Down over a Water Puddle in the Rice Fields: Note the Ducks "Traveling for Their Health"

"flattened out" with our wheels almost on top of the rice, and were going through the cloud of ducks which rose out of the marshy rice land like dust before a windstorm. They whizzed between the planes, spattered against the struts and rigging like hailstones, or disappeared as a puff of feathers as they were sucked into the propeller. Something warm and wet struck me in the face, and my goggles became so dim I could scarcely see through them. I wiped my face with my handkerchief. The warm, wet substance was blood hurled backward by the draft from the propeller. Ducks by the million were winging their way with all the speed they could develop right in front of the plane. As they flew, they kept looking back at their pursuers with their bills opening and closing. Of course we couldn't hear them above the roar of the motor, but it was evident that the great mechanical bird was giving them a scare they wouldn't soon forget, and they were literally "quacking" their heads off in terror. A few thousand birds managed to outmaneuver the airplane, and winged away in every direction. Others, seeing they were outstripped for speed, dove headlong into the rice. Most of the flock, however, hung together, and for 15 minutes we chased them until they disappeared in a bank of fleecy clouds that hung over the mountains that bound the west side of the Sacramento Valley. Chasing a huge flock entirely out of the rice country is one of the favorite practices of the duck-patrol men. Often two or more airplanes work together in this fashion, rounding up the flocks much the same as ranchmen round up herds of live stock, and then chasing them clear out of the valley.

Some of the Rice-Patrol Airplanes Now Carry a Gunner in Addition to the Pilot, Whose Duty It Is to Bang Away into the Flocks as the Airplane Goes through Them. The Gunner Stands Up in the Rear Cockpit, and Fires over the Top of the Plane. Note the Blood Stains Spattered over the Plane from Ducks Mangled by the Propeller

After chasing the first cloud of ducks over the mountains we winged our way back over the rice fields, and for mile after mile skimmed along over the top of the grain. The speed of flying at this low

elevation seemed terrific. The human eye cannot record such speed, and the landscape below was simply a blur of green. It was only by looking ahead that flocks of waterfowl could be distinguished as they rose from the rice fields, scattering in every direction or whizzing past the plane. Off in the distance we sighted two other planes. One was in the act of diving down into a cloud of ducks, that rose like a column of smoke from a burning oil well. The other was going in hot pursuit after a flock that strung out like the Milky Way and resembled the funnel cloud that travels ahead of a cyclone. Four hours later we returned to the aviation field, and gathered enough ducks for a family dinner from various corners of the airplane. They were impaled on the wires and struts, hanging in the landing gear, and lodged in just about every corner of the plane that could catch and hold one. Of course, the fliers do not aim to kill any more ducks than necessary, but since the success of the rice patrol depends upon driving through and breaking up the flocks, some are bound to be killed by the propellers or caught on the plane. The airplane patrol of the rice fields seems to have refuted much of the popular theory of the terrific speed of the flight of waterfowl. The fastest plane in the service will not fly over 75 miles an hour, yet that speed is sufficient to enable the airmen to run down the geese and ducks. They can outmaneuver, but cannot outfly the airplanes.

Just at present there is much speculation as to how successful the airplane duck patrol will be in years to come. Already the ducks seem to be "getting wise," and some of the flocks have been seen to settle back into the rice again very shortly after an airplane has scared them out. This has necessitated increasing the activity of the patrol, and the adoption of more harsh methods on the part of the men. Some of the planes now carry a gunner in addition to the pilot, whose duty it is to bang away into the flocks with an automatic shotgun. Hand grenades thrown from the planes are also used effectively. There are indications that next year the number of airplanes will have to be increased, and this, of course, means greater expense to the rice growers. The airmen, however, are convinced that if the patrol is continued with a sufficient number of planes, and on a financial basis that will make the necessary activity possible, the waterfowl will eventually come to regard the rice fields as an "unhealthy place" for them, and will voluntarily seek other feeding grounds.

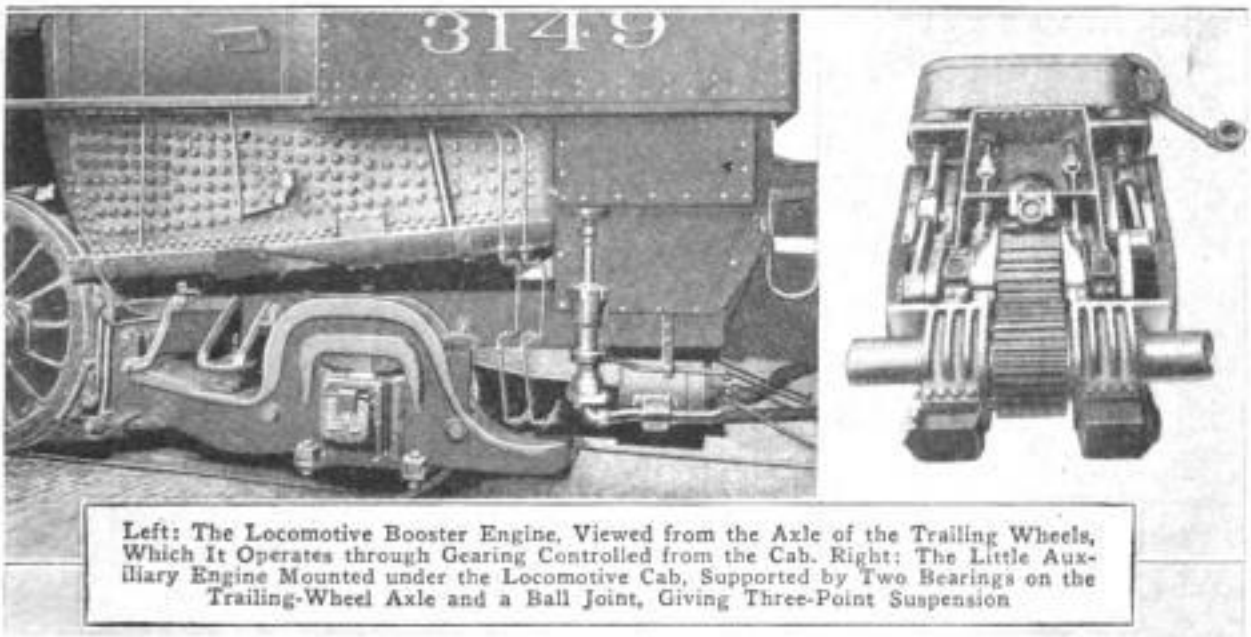
REPRODUCTION OF OCEAN BED SHOWS UNDERSEA LIFE

The American Museum of Natural History has on exhibition an exact reproduction of an undersea scene magnified more than 15,000 times. The work in its entirety is in glass and wax, and is two inches in thickness. Owing to the enormous magnification, microscopic creatures of marvelously beautiful and delicate structure and tint, which, it is needless to say, are invisible to the unaided eye, are disclosed. Of these, a tiny individual known as the "plumed worm," on account of its peculiar form and especially beautiful coloring, attracts the most attention.

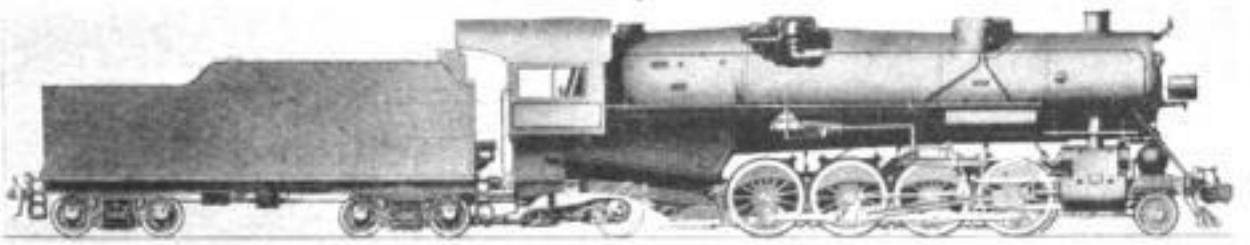
A Wonderful Reproduction, in Glass and Wax, of a Section of the Ocean Bed Magnified Over 15,000 Times

TINY AUXILIARY ENGINE AIDS LOCOMOTIVE IN STARTING

To give an ordinary railroad locomotive the starting and accelerating power of one perhaps 50,000 lb. heavier is the function of an ingenious attachment recently developed by a supply manufacturer. The device, applicable to any locomotive having trailing wheels, consists of a small two-cylinder engine, weighing 3,900 lb. with its frame. It is mounted beneath the cab, on a ball joint near its center of gravity and two bearings on the trailing-wheel axle, giving a three-point suspension. The engine crankshaft drives the



Left: The Locomotive Booster Engine, Viewed from the Axle of the Trailing Wheels, Which It Operates through Gearing Controlled from the Cab. Right: The Little Auxiliary Engine Mounted under the Locomotive Cab, Supported by Two Bearings on the Trailing-Wheel Axle and a Ball Joint, Giving Three-Point Suspension



A Standard Form of Locomotive of the Trailing-Wheel Type, Equipped with a Booster Engine: Starting and Acceleration are Materially Aided by the Attachment, Which is Automatically Thrown Out of Gear

trailing wheels through an idle gear that is thrown into working position by an air-controlled mechanism operated from the cab. It is automatically thrown out of gear at the proper moment, and constitutes no load on the regular pulling power. Only spare steam is needed by the little engine, which is declared to assure smooth starting, reduce the time of acceleration to road speed 50 per cent, and prevent slipping of drivers.

LOG-SPLITTING CANNON CONCENTRATES FORCE

Blasting powder has been used for years to split up tough logs and annihilate stumps. A great deal of danger has always been attendant upon the practice, as time fuses are not always dependable. An Oregon man has invented a gun to be used for these purposes, which should go far toward minimizing risks, as the blasting charge is fired by a percussion cap, the latter being detonated by a hammer, which, in its turn, is released by a cord, 200 ft. long. This distance affords ample protection for the operation. By the older method of blasting, it was not unusual for the blast to blow out the tamping instead of performing the desired work. The inventor claims to have overcome this fault by so designing the log-

A Simple Log-Blasting Cannon: Above Is a Log Section Split Out Cleanly

splitting gun that it cannot leave the log. The charge is light, being ½ lb. of common black blasting powder.

NEW TEXAS SKYSCRAPER HAS TWENTY-FOUR STORIES

There are only a few cities in the world where the erection of a 24-story office building might pass without comment, and when so relatively new a community as Fort Worth, Tex., acquires such an edifice, the event is worthy of special record. The new building, asserted to be the tallest in the entire South, is L-shaped, and has 7,481 sq. ft. of office space on each floor. All its appointments are of the most modern character. Besides the large battery of service elevators, tenants occupying more than one floor can be provided with the unusual convenience of a private intercommunicating elevator.

The New 24-Story Office Building in Fort Worth, Texas, Declared to Be the Tallest in the South

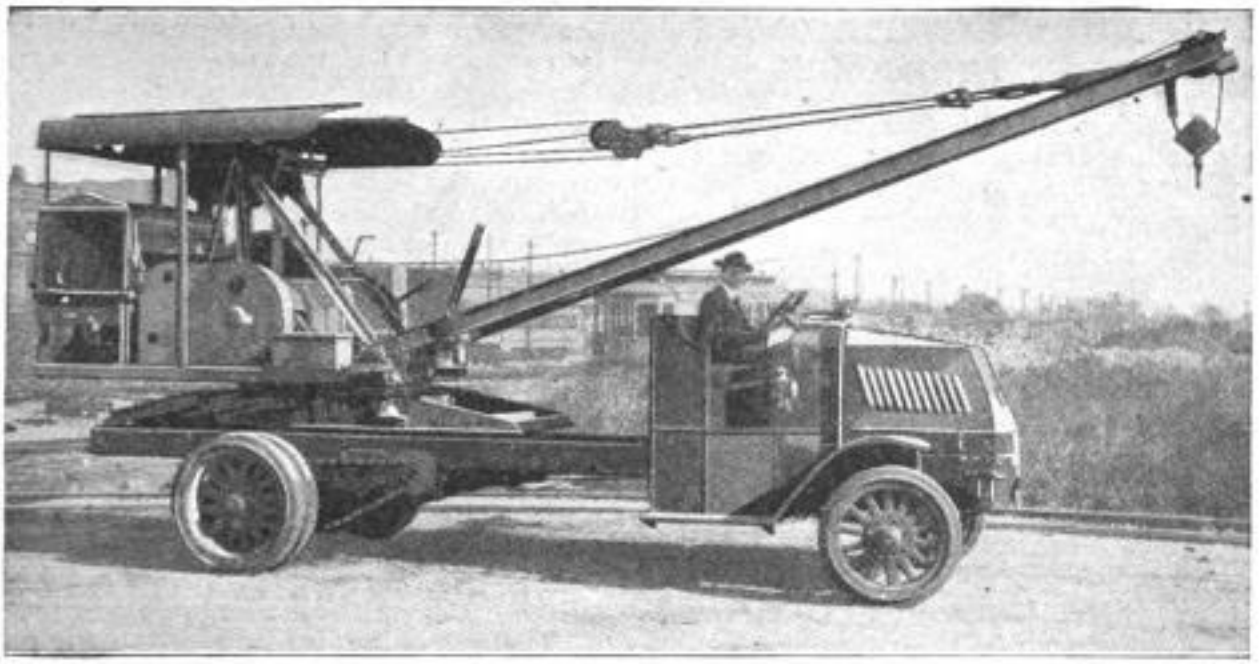
CATTLE IN TSETSE-FLY LAND PROTECTED BY CLOTHING

Flies, in certain parts of Africa, mean something more to cattle than a mere seasonal annoyance, for the pestilential tsetse visits disease and death upon those that enter its domains. The avid attacks of the dangerous insect were circumvented in a curious manner recently, however, when a number of shorthorn bulls were driven overland through three tsetse-fly belts, one 21 miles wide. The bulls were completely clothed, from muzzle to hoofs, in sewn suits of heavy fabric, and their noses, eyes, horns, and hoofs, the only parts exposed, were coated with wagon grease. Incased in this remarkable armor, and traveling only at night when the tsetse is least active, they succeeded in escaping the menace.

COMPARE RAIL-MAKING INGOTS OF DIFFERENT KINDS

For the purpose of testing the effect of ingot practice upon the condition of rolled-steel rails, 35 English ingots of 5,300 lb. each, cast large end up by the sink-head process, were recently imported for comparison by a government bureau. Fifteen 7,300-lb. ingots were then cast in the usual way, small end up, with three different compositions of steel. Rails rolled from these varying ingots were cut into test specimens for thorough physical, chemical, and metallographic examination. Of the rails from the sink-head ingots, the average discard for piping and segregation was only 18.4 per cent, as compared with an average but highly variable figure of 43.9 per cent for the usual type of ingot.

Girls as well as boys in Chicago schools may now resort to the "manly art" to settle their differences. An official of the board of education has provided a set of boxing gloves for that purpose, deliverable by auto, wherever needed.



What at First Glance Appears to Be a Gigantic Automobile Wrecking Truck Is Really a Portable Crane Especially Designed to Set Telegraph and Trolley Poles Quickly. The Independent Crane Unit, Having Its Own Engine, may be Demounted When Used on Extensive Jobs, Thus Releasing the Truck Chassis for Other Duties

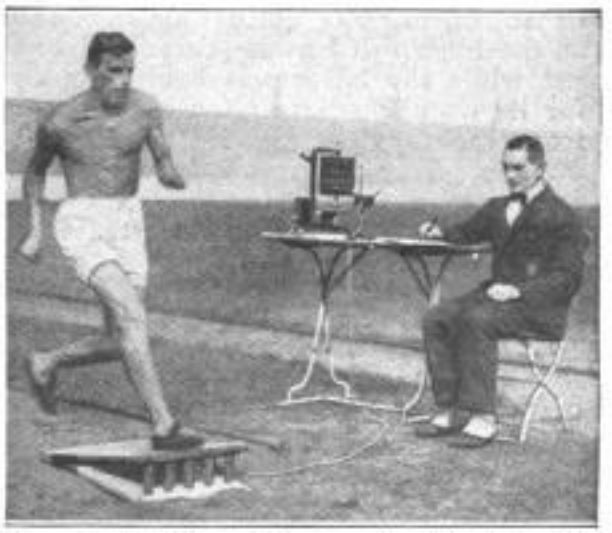
LARGE-CAPACITY PORTABLE CRANE IS A LABOR SAVER

A completely self-contained, 8,000-lb. crane, mounted on a heavy-duty truck chassis, has been built by one of the large motor-truck manufacturers. The machine was especially designed for the rapid setting of telegraph and trolley poles, but is also efficient as an excavator and in the loading and unloading of cars of gravel, sand, etc., as it is equipped with a clam-shell type of bucket. In the former service it is said to displace 30 men. For comparatively light lifting and short jobs the crane unit is left on the chassis. Should it be desired to use it as an excavator or in the handling of loads up to its full capacity, it may be readily dismounted, as it has its own base and power plant. The latter is a four-cylinder gasoline engine with an extra-large flywheel to absorb the shocks resultant from sudden changes in load. With the crane dismounted the truck is released for other service. The quick mobility of the whole, and the fact that the crane operates over a full circle, render the apparatus peculiarly adaptable for clearing the wreckage resulting from fires and collisions.

¶American and British wireless amateurs will attempt to establish radio communication on the first day of February. Should they succeed, it will be a signal achievement in low-power transmission, as the power of the apparatus of American amateurs is held to a low limit by law.

ATHLETIC EFFORT IN GERMANY SCIENTIFICALLY STUDIED

Determined to overlook no influence that bears on the development of German manhood, the scientists of that nation are busily engaged in making precision tests of various athletic performances. In studying the running broad jump, for example, a form of short springboard is employed, connected by wires to a registering mechanism on the observer's table. With this apparatus, the force of the jumper's take-off can be checked against the distance he covers,

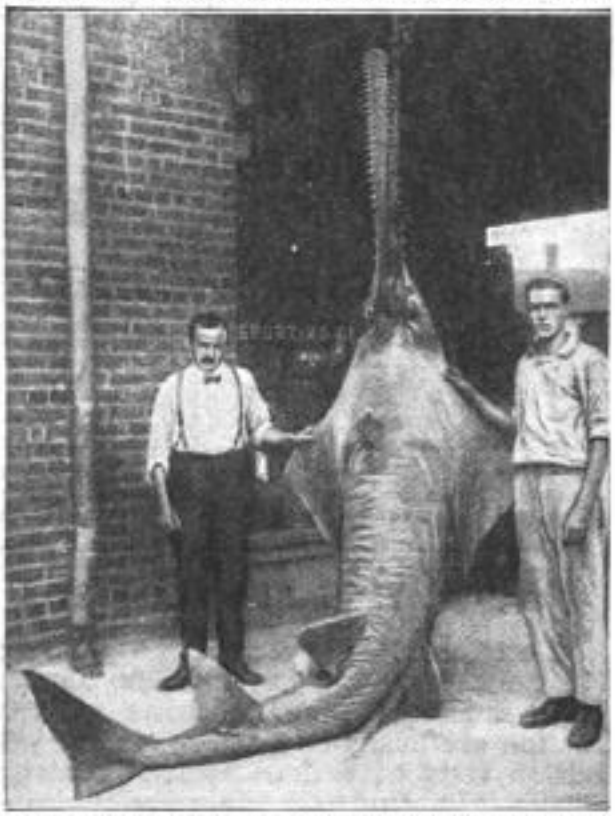


Measuring the Force of a Jumper's Take-Off with a Special Springboard and Registering Device

and the effect noted of different jumping positions in gaining the maximum result from the minimum effort.

HALF-TON SAWFISH CAUGHT IN A SHRIMP NET

Catching 15-ft. fish with rod and line is no unusual proceeding in these days, when scientific angling is a popular pur-



The Big Sawfish, 15 Feet Long and Weighing 1,140 Pounds, That Fell to the Net of a Florida Shrimp Fisherman

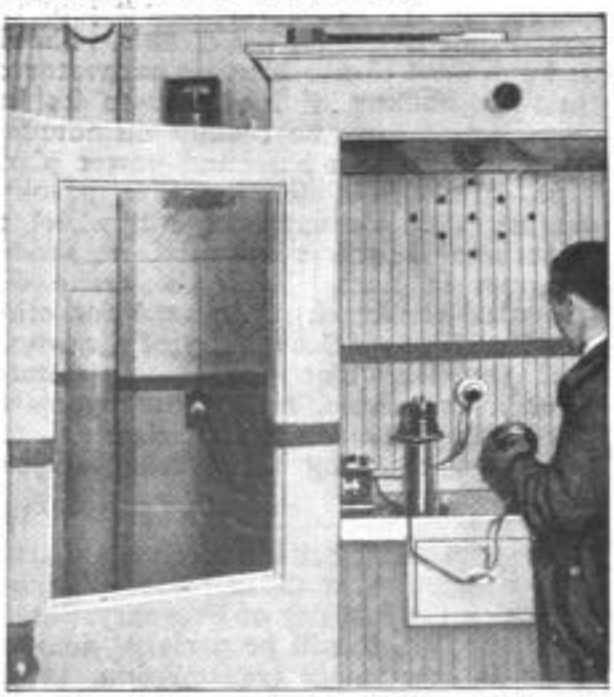
suit of the Florida coast. But to make such a capture with a shrimp net, with the victim a 1,140-lb. sawfish, is a more remarkable feat. The sport, if it could be so called, was quite unpremeditated, as the huge fish became entangled in the net while the latter was being employed for its usual purpose about 20 miles out from Jacksonville, a short time ago. It was necessary to fire two shots into the formidable prisoner to complete the capture and save the net from destruction.

ATTACK PROBLEM OF SHIFTING MISSISSIPPI CHANNEL

State and city officials of Louisiana to the number of about 300 recently met, as announced in the article in this magazine last month describing the possible plight of New Orleans, to consider the serious situation created by the Mississippi River's latest attempt to change its channel. The problem of turning the big stream back from the new outlet it is seeking through the Red and Atchafalaya rivers is to be placed in the hands of a committee of competent engineers, whose appointment is requested of Congress. Meanwhile, the Mississippi River Commission is asked to fill in, at once, a seven-mile break in the west-bank levee system north of the original mouth of the Red River. Three methods have been proposed for stopping the flood and reclaiming some 3,000 square miles of cultivated land: The Red River may be separated from the Atchafalaya, and permitted to flow into the Mississippi; the Red and the Atchafalaya may both be separated from the Mississippi; or reliance may be placed on a new system of levees along the Black, Red, and Atchafalaya rivers.

SOUNDPROOF BOOTH TO KEEP NOISE IN INSTEAD OF OUT

The campaign for the suppression of useless noise has struck the western coast, and a large garage and service station has originated a plan which avoids the annoyance to workmen and customers occasioned by the prolonged sounding of motor horns undergoing test and adjustment. The horn-testing room is a soundproof booth equipped with a bench, vise, tool drawer, and a small transformer for the stepping down of the commercial current to the voltage suitable for use in testing. The testing circuit is wired by way of contact points in the door in such a way that it remains inoperative until the door is closed. During testing operations a pilot light, on the front of the booth, indicates that it is occupied.



The Noise of Automobile Electric Horns Undergoing Test is Confined in This Soundproof Booth

Part of a Grove, on a Farm near New Orleans, of Hybrid Mulberry-Osage Orange Trees: The Unusually Large Leaves of These Trees Constitute the Food of the New Breed of "Super-Silkworms" That Weave Colored Cocoons

WORMS THAT SPIN COLORED SILK

BY H. H. DUNN

THE United States government has just set the seal of its approval and belief on one of the most remarkable discoveries regarding silk since Si-Ling, a queen of China, found out that the cocoon of a worm could be converted into a shimmering garment for herself. This is the production, without the use of dyes, of colored silks, spun direct, in 18 colors, by the worms themselves.

The discovery, which deals with the food fed to the worms before they commence to spin their cocoons—since they eat nothing after they start spinning—was made in New Orleans by Dr. Vartian K. Osigian, son of a family of silk producers of Harpoot, Armenia, who is now producing colored silks and experimenting in other lines of sericulture within the city limits of New Orleans.

Dr. Vartian K. Osigian, Discoverer of the Method of Producing Colored Silk Directly from the Worm

The attention of the Department of Commerce was drawn by Doctor Osigian's claim before the Louisiana Academy of Sciences and other similar organizations, that he had bred silkworms which produce 1,800 yd. to a cocoon, compared with the 1,000 to 1,200 yd. spun by Chinese and other silkworms, and that he had discovered a method whereby the worms can be so fed as to produce colored silks, ranging through 18 distinct colors. Daniel Waters, trade commissioner of the Department of Commerce of the United States Bureau of Foreign and Domestic Commerce, was sent, early in August, to investigate Doctor Osigian's announcement. Under date of Aug. 18, 1920, Mr. Waters reported the result of his findings to the Department of Commerce, in part as follows:

"This is a short report of the largest silk farm in the United States, now well established at New Orleans, La. . . . I inspected not only the growing trees, but the worms in all their various stages, the cocoons, and the weaving of silk. The production of worms which will actually spin silk of 18 different colors is a scientific achievement, likely to revolutionize the industry. Connected with this farm is a Mrs. Olivia Blanchard, who has been engaged in federal work for several years, and who is now making a thorough research in sericulture. She has books, printed at the beginning of the nineteenth century, showing that silk-growing in Georgia and Louisiana at that time was of considerable importance and, from all these volumes say, the American silk was then not only equal, but superior, to the imported."

The feeding formula is secret, in so far as it concerns the production of the colors, which range from the natural snowy white to the deepest black. All the colors are fast, and far superior to the present-day dyed silk of commerce. One of the most beautiful of all these silks is a rich, deep gold in color, just as it comes from the spinnerets of the worm. No chemical is fed to the worms,

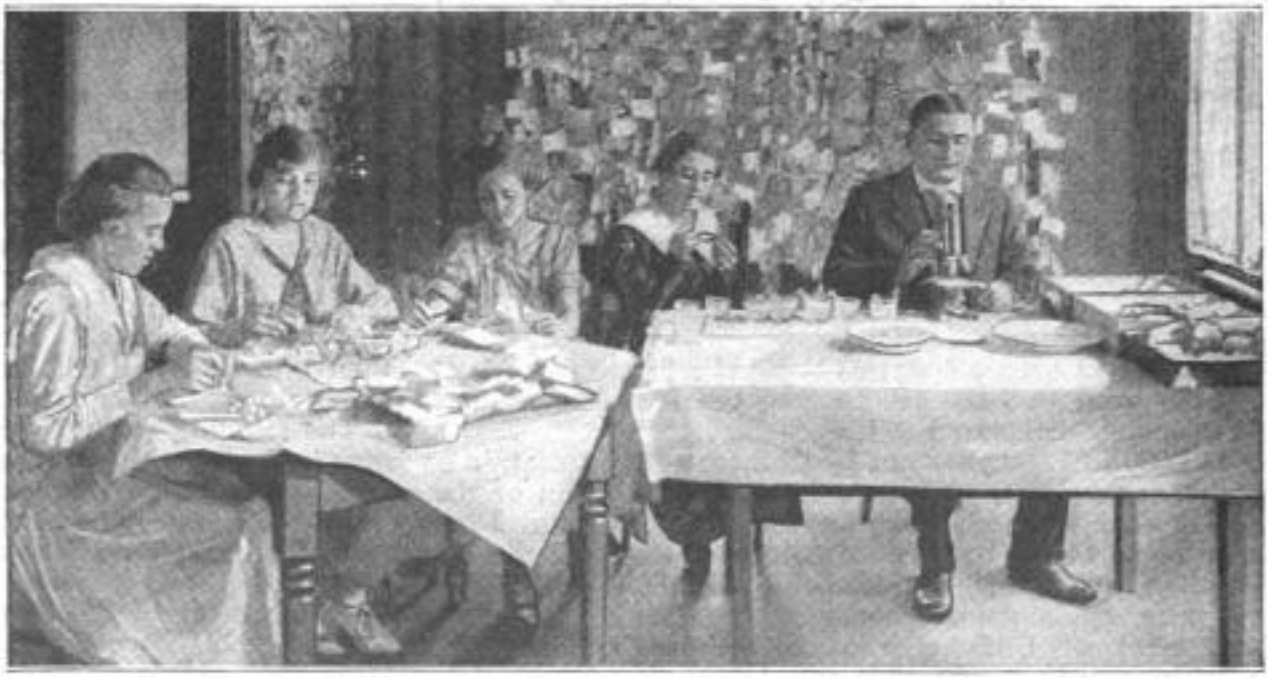
states Doctor Osigian, but the difference in color is due to variations in quantity and quality of food given before the worm ceases eating and begins work on its cocoon.

A Tier of Working Silkworms: Those on the Bottom Shelf are Feeding, on the Second Shelf They are Nearing the Spinning Stage; on the Third Are Finished Cocoons, and, at the Top, Worms Spinning on Branches

The matter of the difference in production, however, is an "open secret." It is due to a new food tree, produced by the discoverer for the first time in New Orleans. The tree is a graft of the mulberry on the osage orange, producing a larger, more succulent leaf than the mulberry tree, and one of different shape. Feeding on leaves from this tree, the silkworms produce from 600 to 800 yd. more to the cocoon.

Contrary to a general belief, the silkworms are not reared on the trees, but in trays in the house, where the temperature can be maintained at the necessary degree day and night, and all the year around. Here the worms are fed on fresh leaves plucked from the trees, which are clipped down to four feet every two years, as, on further growth, the leaves become tough and hard, and the worms, fed on these older leaves, gradually reduce their production of silk, the cocoons become smaller, and the fiber coarse.

"Foreign countries produce only one crop of silkworms each year," said Doctor Osigian, as we looked at a worm spinning a brilliant purple thread, "but here in New Orleans I have produced eight crops of worms, which are equivalent, of course, to eight crops of silk, where the keeper has proper facilities for maintaining an equable temperature at all times. I believe Louisiana and the adjacent southern states are the best region for silk production in the world, for the worms can be hatched, fed, and made productive here for every

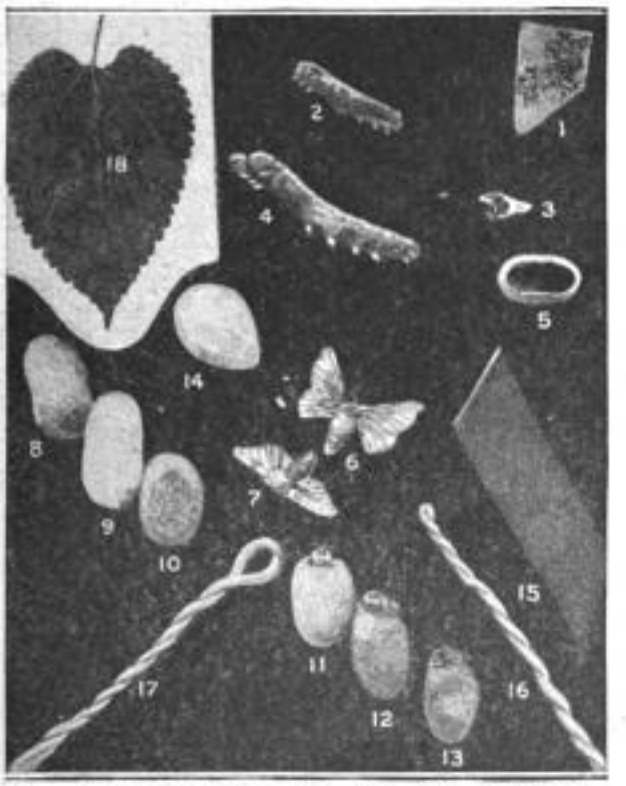


Inspectors Examining the Silk Cocoons for Imperfections Before the Thread is Unwound from Them, and Selecting Those Which are to be Allowed to Produce Moths for the Perpetuation of the Spinning Worms

month in the year except December and January. The 'super-silkworm,' as I have called the one which produces 1,800 yd. to the cocoon, is merely the result of abundant feeding on the leaves of the new combined mulberry-osage orange tree. The control of the colors is a secret, which you will not ask me to reveal. I have offered the whole discovery to the United States government free, as a return for the rescue of myself and my family from a band of Turks by an American consul in Harpoot. The government may do as it chooses in regard to making public the secret of the color control, but I will not reveal it until the government has accepted or refused my offer. Government investigators have declared my discovery a practical scientific fact, and have so reported to their departments. The new food tree and the super-silkworm produced thereby are free to anyone who wants them.

"The life of the silkworm is most interesting. The eggs of the moth may be kept in cold storage for years; in fact, I have 4,000,000 eggs here now, so stored. To hatch them they need merely to be exposed to the temperature of an average day, anywhere from 75 to 85 or 90°, when, in three to eight days, they emerge. As soon as they leave the tiny eggs, the worms, then only a fraction of an inch in length, must be fed, immediately and incessantly. If our chickens and cows had the proportionate appetites of newly hatched silkworms, all the world would be a barren desert inside a month. On the first day hatched, each worm eats from 15 to 30 times its own weight, and maintains this appetite until the time it begins to spin the cocoon.

Workers Sorting and Threading the Unusually Large Cocoons Woven by the Super-Silkworms: In These Cocoons the 18 Shades of Natural Color First Appear



Stages in the Production of the New Silk: 1, the Eggs of the Silk Moth; 2, the Ordinary Silkworm; 3, Magnified Spinnerets at the Mouth of the Worm; 4, the Super-Silkworm; 5, an Empty Cocoon of the Ordinary Silkworm; 6 and 7, Silk Moths; 8, 9, and 10, Black, White, and Orange Cocoons; 11, 12, and 13, a Worm Closing Its Cocoon; 14, Magnified Silk-Moth Egg; 15, Cloth Woven from Natural Black Silk; 16 and 17, Silk Spun from Cocoons; 18, a Leaf of the Hybrid Mulberry-Osage Orange Tree

"As soon as the worms are hatched, they are transferred to trays, about 15 in. square and 3 in. deep. These trays must be kept as clean as your dining-room table, for nothing living is more delicate than young silkworms. They eat continuously for five days and nights; then they sleep from 18 to 24 hours, waking to shed their skins. Three times more, during the next 17 days, each worm casts its coat, eating in between, and growing remarkably. During the last five days of this larva stage the worms eat constantly, even while the process of skin-shedding is going on.

"On the twenty-fifth day the worm starts to spin its cocoon. The liquid silk, drying almost as soon as exposed to the air, comes from two tubular glands, which pass the entire length of the body, meeting at the mouth. With its mouth the worm spins the two threads produced by the glands into a single thread, and with this thread spins around its own body the cocoon which man wants from the worm.

"As soon as this cocoon is finished, man interferes. Fed on the improved hybrid mulberry tree, the silkworm becomes nearly twice its ordinary size and, in order to cover itself perfectly, must produce more silk. This is the reason why the super-silkworm spins more yards of fiber than the smaller worm. Man makes a larger worm, needing a larger cocoon, and nature produces more silk to meet the necessities of the worm. Bisulphide of carbon is passed through the cocoon as soon as it is completed. If the moth were allowed to develop, it would ruin the silk. Then the single strand of silk is taken unbroken from the cocoon, by floating it in hot water, brushing it over with a small broom, thus picking up the loose ends. These ends are transferred to bobbins, operated by machinery, which unwind a half hundred cocoons at a time.

"The largest of the cocoons, to the number necessary to maintain a constant production of worms, are allowed to grow into moths. The moth devotes three days entirely to egg laying, and, as the moth eats nothing during this period, the requisites are the maintenance of the proper temperature and soft-lined trays. Both moths and eggs, as well as the worm, of the new super-silk-producer are larger than the ordinary silk moth and her eggs. The different colors of silks appear first on the cocoons, but from external appearances, there is no difference between the worm that spins black silk and the one which spins white, gold, brown, red, blue, or any other color. If the worms were left to their own devices, the silk would be uniformly snowy white; however, qualitative and quantitative feeding changes that. Silk cloth of any color wanted is woven directly from the bobbins on which has been reeled the silk from the cocoons, without any intermediate handling or treatment.

"The history of silk is a romance in itself. It dates back to Si-Ling, according to Chinese myths, a queen of China who flourished about 20 centuries before the beginning of the Christian era. Walking in the palace gardens one day, she found some cocoons of the silkworm, and carelessly began to unravel their threads. All at once she conceived the idea of having them spun into cloth for a gown for herself. It was done, and the result was such a success that, for thousands of years, the Chinese guarded sericulture as a secret. King Lavon of Armenia, however, about 14 centuries ago, sent two trusted men into China, through Persia. In disguise they traveled on foot, and eventually brought back eggs of the silkworm and seeds of the mulberry tree concealed in hollow staffs they carried.

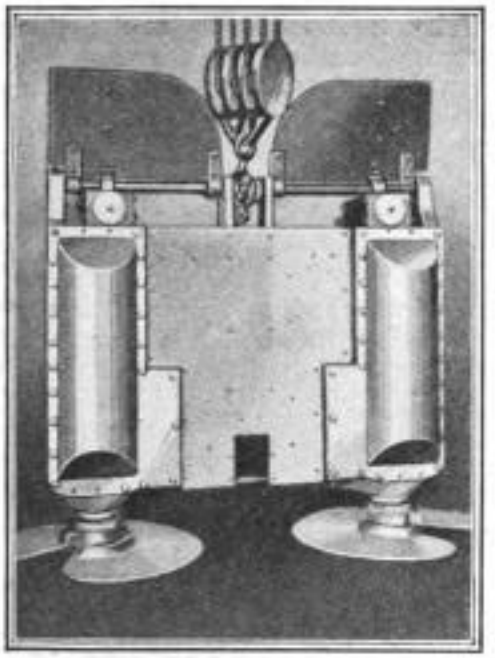
"The industry was thus established in Armenia, and from there spread to Italy, France, England, Turkey, Persia, and, about 260 years ago, to the southern part of the United States. The silk industry today yields more wealth to France than all her agricultural pursuits combined. The United States alone imports approximately $400,000,000 worth every year.

"In 1655 Edward Diggs brought several Armenians to Virginia, and started the first silk farm in America. From that time to the beginning of the Civil War, it was a profitable industry in Virginia, and the territory which is now the Carolinas and Georgia, the latter state exporting, according to existing records, $75,000 worth of silk as early as 1759, while, in 1840, the United States produced $250,000 worth of silk. After the Civil War, however, the industry gradually fell away in the United States, through lack of people who understood the cultivation of the proper food and the handling of the worms. Today it is being revived, with every prospect of success, in Louisiana, Florida, Georgia, and Texas."

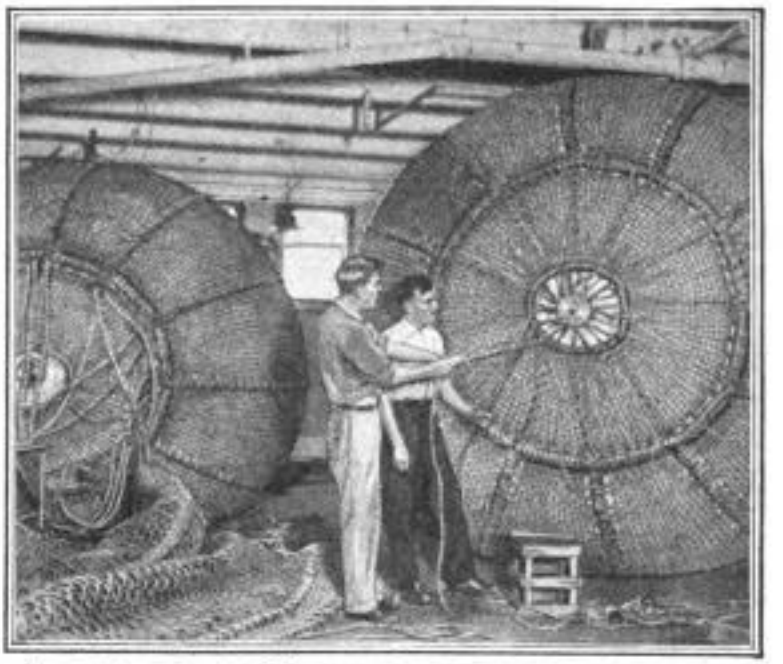
STUDY MARKET PRODUCTION OF SIRUP FROM GRAPES

Commercial manufacture of sirup from grapes has received much attention from California scientists since the experiments announced in this magazine, in November, 1918. It is reported now that production may be undertaken by any large winery, by the addition of vacuum pans faced with noncorrosive material. A form of deep-red sirup, of rich berry flavor, is recommended, though other varieties may be produced. The price prevalent last season, of $3 or more per gallon, is equivalent to $125 to $150 a ton for the grapes. The color comes from the skins of the grapes, and is readily extracted by heat. A vacuum of 28 in. is employed for the best results. It is suggested that milk canneries and breweries might profitably engage in the industry.

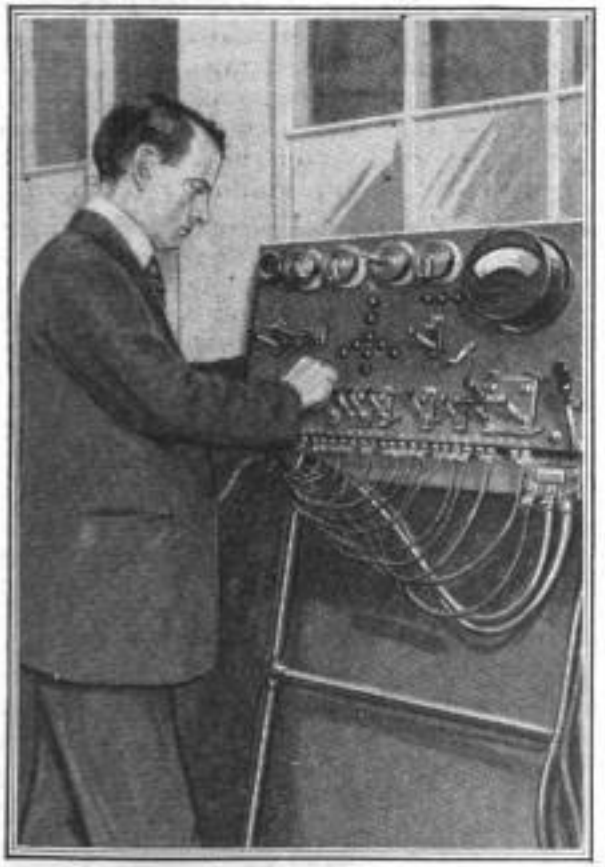
SALVAGE MACHINE BORES UNDER SUNKEN SHIPS



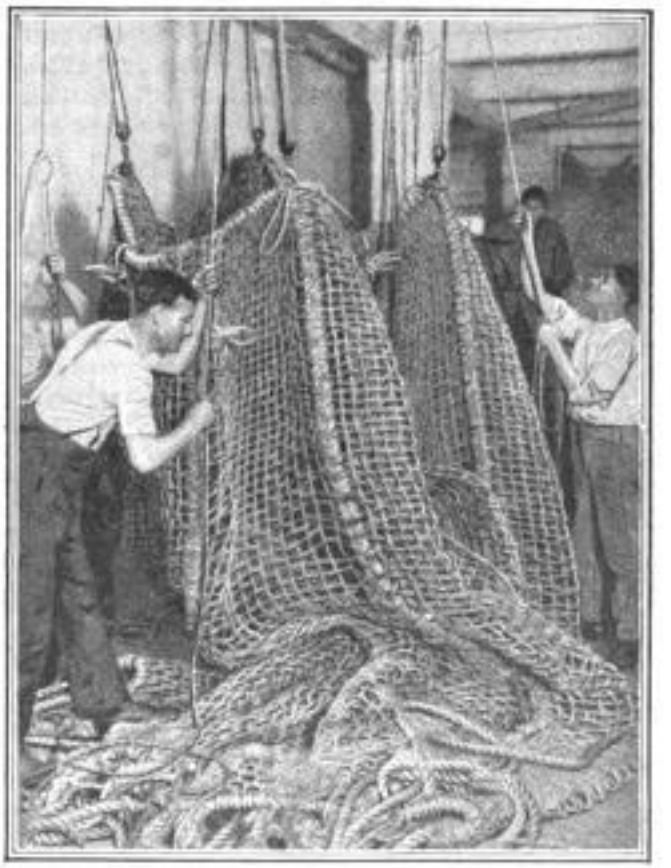
The Revolving Screwlike Blades of the Machine, Electrically Driven, Bore Their Way along the Bottom under a Sunken Ship and Come Out on the Other Side, Dragging the Salvage Cables Through after Them



Instead of Hauling Directly on the Cables to Lift the Wreck, They are Attached to a Number of Buoyant Pontoons, Closely Resembling So Many Balloons. These Huge Bags are Then Inflated with Air, and Assume the Proportions Seen in the Picture, Easily Lifting the Sunken Craft



A Completely Equipped Electric Switchboard, in the Cabin of a Ship on the Surface Above, Permits Close Control of All the Boring Machine's Actions Below, and the Work of Tunneling under the Submerged Hull, and Getting the Lifting Cables around It, is Quickly Performed



The Pontoons, being Made of Flexible Material, are Protected by Netlike Coverings of Woven Cordage, Which Enable Them to be Pulled About without Injury, When Deflated. The View Shows the Preparation of These Big Covers. The Pontoons Continue to Support the Ship While It is Towed into Port

BROOM-BUNCHING AND SEWING MACHINE IS A LABOR SAVER

A new machine which bunches the fibers of brooms tightly together and drives the long needles through by foot power, is designed for use in broom factories. The apparatus consists of an upright carrying a screw-operated clamp, the needles, and guides at the top. The whole is supported, at a comfortable working height by a pedestal. At the base of the pedestal is the foot lever, used to force the long needles through the fibers. Since the brooms are placed on a bench within easy reach of the operator, and the laborious hand method of sewing has been eliminated, the device effects a noticeably increased speed of production.

SIMPLE DEVICE MOLDS COAL DUST INTO BRIQUETTES

If coal slack or dust is mixed with tar, cement, lime, or other binding material and is molded into briquettes of the proper size, it burns almost as satisfactorily as the same size of lump coal. This fact has been taken advantage of by many of the inhabitants of Germany, and a simple molding device has been developed for home use. It consists of a cup and two plungers, all mounted on a wooden upright. After the cup has been packed full of the mixture by a top plunger, the resulting briquette is ejected by another plunger, actuated by a foot lever, and working through the bottom of the cup. The briquettes are formed with a hole through the center to assure a free and complete burning.

MILK-SERVING URN TREATS ALL CUSTOMERS ALIKE

A new design of milk-dispensing urn has been devised in which a float supports a tube in such a position that it always draws a supply from the surface of the fluid. This skimming tube is connected to the upper one of two chambers in the body of the faucet. The other faucet chamber passes the thinner milk from the bottom of the tank. As the proportions in the sizes of the skimming tube and the milk outlet are accurately calculated, the claim is that every glass of milk will contain the legally required quantity of cream. This avoids the necessity of frequently stirring the milk.

LIGHT AND SIGNAL ON PUMP FOR GASOLINE CUSTOMERS

A Missouri garage owner, forced by circumstances to locate his gasoline-filling station some distance from the building, has obviated the necessity for an outside attendant by mounting an electric light, with reflector, and a push button, above the pump. The lamp does double duty, attracting customers at night and indicating that the garage is still open. The push button, pressed by the waiting customer, calls the attendant from the office.

COMMENT AND REVIEW

[These pages were printed November 24, 1920]

THE housing question is scarcely, if any, less important than it was; perhaps we only hear less of it. In motoring through New England and the Central West, one cannot fail to be impressed with the large number of very comfortable vacant houses, most of them of fair size and apparently not badly out of repair, which are found along the country highways in every state. It would seem there must be thousands of these houses. Michigan alone reports 18,000 abandoned farms. Their dusty windows and grass-grown steps tell the simple but mournful story of neglect. All around are productive fields, often orchards, willing to yield abundance, if only given a little help. They tell the story of the boys and men gone to some city to work in a factory. One of these days, surfeited with the relentless grind of the town, many will heed the invitation which now vainly waves to them from the orchard boughs and, returning, will wonder how the lure of the bright lights could ever have prevailed against the red and gold with which Nature paints apples and a summer sunset.

Where Empty Houses Are

ENGLAND is credited with now being the nation in the front rank as to aviation, and is not only leading all the rest in the development of military craft, but passenger and express as well. In 15 months, the record shows, 82,000 passengers and 200,000 pounds of freight traveled 1,000,000 miles in 48,000 flights. The package rate is comparatively low, and also a great saving in time can be shown, for I recall sending a suitcase in 1913 from Rome to London by fastest rail express, and the surprise I caused by demanding an investigation when it had not reached destination after 29 days en route, the distance being equivalent to that between New York and Tampa, Florida. Here we seldom miss a day that does not record one or two deaths of pilot or passenger; apparently over there they have a better something—it can hardly be the fliers themselves—for in 15 months the fatalities are reported to be only one for every 1,500 flights. We have, of course, curiosity riding at resorts, but for short distances; the traveling public here still prefers to trust itself to the steam cars. The trans-ocean passenger schedule, which was so confidently predicted as almost ready several years ago, is still remote. It will doubtless come some day, but, as this magazine has predicted, it is yet a long way off, in spite of the fact that a round trip from London to Paris (574 miles) can be made in six hours instead of 24, at a cost of about $90 for plane, against $40 by rail. The aero company which is operating a passenger service between Key West and Havana charges $150 for one passenger one way from New York to Boston (260 miles).

Air Freight Lines

The British Aircraft Ministry is quoted as saying, "There is a wonderful future for aircraft," to which the average man will heartily agree.

ONE of the most needed and hoped-for reliefs which the business world expects of the new administration is a reorganizing of the postal service. During the past few years this department, once the most praised of all, has been steadily going down in efficiency until now little dependence can be placed upon it. A few years ago a letter mailed in the ordinary way to another part of any large city would not only be delivered the same day, but frequently the reply received, all within the space of a few hours. Now several days are apt to be required. Recently a letter took eight days to reach me at New Haven, Conn., from Chicago; but examples are needless—we all have had enough. A poor and sluggish mail service hardens the arteries of business throughout the whole country. Not in 50 years, if indeed ever, has it been so poor as this past year, and the improvement which a new postmaster-general cannot fail to make will be a great relief.

Revive the Postal Service

The pyrotechnic, but largely undependable, air service has been increased at the expense of other branches. The sender has no choice, and however much he may want his mail to go via the railway service, as likely as not it is thrown into

an air-line pouch. This is no reflection on the brave men who pilot the mail planes, far too many of whom have lost their lives in what is largely an unnecessary service, for in these days most matters of great business importance do not wait for mails but are transacted by telephone or telegraph. In times of peace, and with the flying art far from stabilized as a commercial enterprise, it seems a sad and unnecessary risk and loss of precious life as the price of bringing a pitifully few important letters to their destination an hour or so sooner than by train.

It has been the dominating head and not the employes, who has brought low a service which was once our pride and the wonder of the world. We might well leave the flying for a time to the army and use the money thus saved to lessen the hundreds of cars of mail being hauled in freight trains, and to make the compensation paid the force sufficient to hold the tried, experienced men, who are now constantly leaving to seek more remunerative occupations.

Our Colleges Crowded

THE army of young men who this year applied for admission to the freshman class of our colleges and universities was large, in many cases breaking all records. Our inquiry addressed to the presidents of leading educational institutions as to the reason for this, brought many replies. One attributes the interest in college education to "the work of college men in the war, which emphasized the fact that a trained mind more readily attacks with success new problems, and is better equipped for leadership." Another says: "There has been a larger application list than usual, due to the fact that there has been an increasing educational standard and a general recognition, due to war experience, that a college education is a real asset." Several presidents share the opinion of one who writes: "There is apparently an increasing desire on the part of high-school graduates to attend college. This is particularly noticeable since the war." While another says: "I presume there is more money available in many families for sending boys to college than has been the case in previous decades." One president, also of national reputation, frankly says: "After much speculation and after consultation with many men, I am still without any satisfactory answer as to the reason for the unusual number of applications."

Not only has there been at nearly all the colleges and universities an unprecedented number of freshmen, but these new men come with a tremendous enthusiasm for work. The sale of books for self-instruction is also enormous, especially the books issued by correspondence schools. Books of all kinds are selling in greater volume than ever before, and at the highest prices in many years. It cannot be called a revival of learning, but rather a wonderful expansion of the desire to learn.

Don't be Robbed

OUR readers are warned against paying any money to canvassing agents for subscriptions to Popular Mechanics, thinking they are dealing with agents of its publisher. We have no such canvassers and have not had one for a great many years past; in fact, such a notice has appeared on the front cover of more than 50,000,000 copies of Popular Mechanics. And still the complaints of victims come in—more of late than usual. The old story of trying to earn a college course is being worked overtime by both young men and women, and it is hard to apprehend these people. They buy copies at newsstands to canvass with, sometimes even leaving a first copy with the "subscriber." This insures them four to six weeks' escape before the victims wake up. It is then too late for a publisher to secure any arrests. The most recent victims were induced to part with 55 cents each, on the plea that this sum paid the postage and the publisher did the rest. The old humbug of something for nothing.

The safe way is to buy your copy each month of your newsdealer, which is just as cheap as subscribing by the year. If you must have it come by mail, hand your subscription to your newsdealer. In the past 18 years during which newsdealers have sold Popular Mechanics, we do not recall one single instance of money paid for a subscription intended for us that failed to reach us.

Dream Saves Sailors

HERE is a thoroughly vouched-for account of how a dream saved the lives of 37 men imprisoned in the submarine "S-5." Capt. Ernest A. Johnson, who had just returned from receiving a gold watch and decorations from the Secretary of the Navy, on taking command of a recently launched ship at Camden, Me., described his experience to some brother sea captains.

The night before the submarine was discovered, Captain Johnson was asleep in his cabin when he dreamed he was in a submarine and that something very important had gone wrong. He awoke about midnight with the dream so impressed on his mind that he was unable to sleep. He therefore dressed, went on the bridge, and inquired if any submarines had been sighted. Upon being told "No," he ordered a sharp watch kept. In the morning he was still depressed with his dream and during breakfast he could not refrain from looking out through the porthole to scan the sea. Finally a tiny speck caught his eye. It was only a mere speck and might easily have been any of the floatage seen at sea. However, he could not resist the impulse, and rushing on deck changed the course of the "Alanthus." As the steamer came nearer, the speck assumed the appearance of a small sailboat, but the quest was continued.

Within an hour the work of rescue had begun, and not a minute too soon.

Tidal Wave Again

THE tide of emigration, which during the war set so strongly toward Europe, has now turned and is sweeping back again, only it is bringing us comparatively few of those who left, for they had made their money here and can now live in comfort there. Instead of the return of a majority of those who had the advantage of more or less training and Americanizing, we are being deluged with first-timers, few of whom understand what America really stands for, or can even speak or read our language. The most of them are all that the word immigrant ever spelled, and it is reported that some of them are no better than the handful who arked to Russia, and that the Government is far from watchful, allowing many a singed cat to get through. There are some excellent people, of course, among so many, but the report is we are once more being made a dumping ground for distinct undesirables. Let us hope a radical reformation will be made in our immigration regulations and practice. Instead of allowing them to gum up our Atlantic-coast cities, why not follow the Argentine plan, which determines to what part of the country new arrivals shall go and settle, in the absence of relatives or friends? A drop of poison is much less harmful in a tub than in a spoonful of water.

It has also been suggested that immigrants coming to our shores to live should be—as a very modest price for their privileges here—required to learn to read and write our language, to do which suitable time and opportunity be given: at intervals of, say, six months, or even less, the newcomers to present themselves for a practical examination in their progress toward Americanization; this to be followed by easy lessons in our city, county, state, and national government, and some simple lessons on the Constitution. If this could be accomplished, doubtless the number of adherents to un-American bodies would be reduced at least one-half. As it is, the disturbers, speaking and printing the language of the fatherland, have things pretty much their own way. Many a man walks under the shadow of the red flag because he has absolutely no conception of what the Stars and Stripes mean to him.

If we cannot require immigrants to speak and read our tongue as part of the price to land here, we should at least compel them to do so as the price of remaining and making this their home.

H. H. WINDSOR

ELECTRICAL PRUNE HARVESTER GATHERS FRUIT ON GROUND

Shaking the fruit from the trees and gathering it from the ground by hand is the customary method of harvesting prunes, but a new electrical picking machine, invented by a California grower, promises to save most of this labor. A motor-driven conveyor belt of canvas, with shallow pockets at intervals, passes rapidly over rollers at the ends of a metal frame, about 4 in. wide and 4½ ft. long. As the pockets pass down around the lower roller, they scoop up the prunes, carry them up to a canvas chute at the top, and dump them into a bucket strapped to the operator's leg. The machine weighs about 6 lb., is supported just clear of the ground, and steered by a pair of handlebars. Current is supplied by a generator on a truck.

The Electrical Prune Picker in Operation: The Pockets in the Belt Scoop the Fruit from the Ground, and It is Carried Up to a Canvas Chute at the Top, and Dropped into the Bucket Strapped to the Operator's Leg. A Generator Mounted on a Motor Truck Supplies the Current through a Cable

QUEER BUSINESS CARD BEARS OWNER'S FINGER PRINT

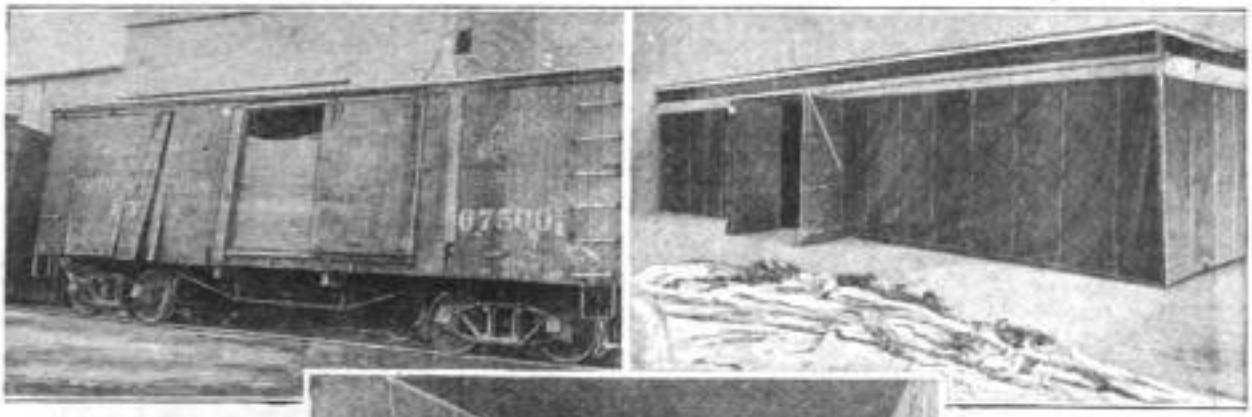
A finger-print expert in a large eastern city uses a business card bearing in its upper right-hand corner a tiny facsimile reproduction of the specialist's own finger print. The little cut, roughly only 5/16 in. square, is etched from a drawing of the original print, and retains all the lines and whorls that render the mark itself so infallible a means of identification. It is an interesting fact that removal of the outer layer of cuticle in no way affects the nature of finger lines, or the print they make. The origin of finger-print identification is extremely ancient.

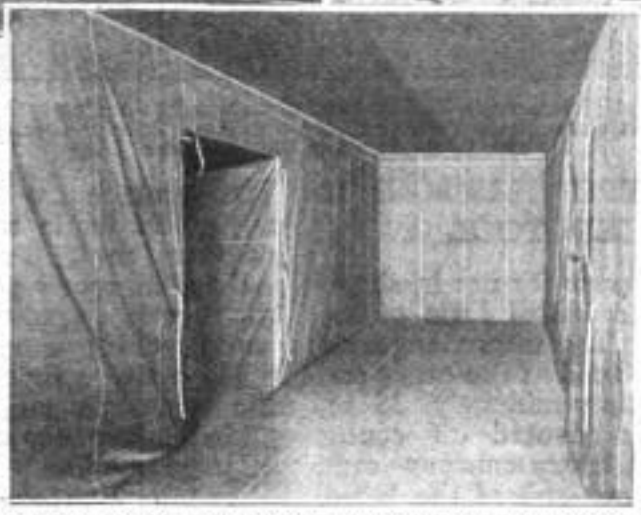
SCOWS LOADED WITH HOUSES ARE TOWED FORTY MILES

Houses are often moved by horsepower or tractor for comparatively short distances, but there are probably few parallels to the recent performance of moving eight houses 40 miles on two big scows in Puget Sound, Wash. The houses, formerly occupied by canning workers, were close to the beach onto which the scows were run at high tide, and were easily loaded on board when the tide went out. Four houses, with a total length of 150 ft., were placed on each 110-ft. scow, the load overhanging 20 ft. at each end. The next incoming tide floated the scows, and they were towed to Seattle by tugs, making the 40 miles in 12 hours.

Loading Houses from the Beach onto Stranded Scows, to be Floated on the Next Tide and Towed to Seattle, 40 Miles Away: The Four Houses Are Longer than the Scow, and Overhang at Each End

CANVAS CAR LINING PROTECTS GRAIN SHIPMENT



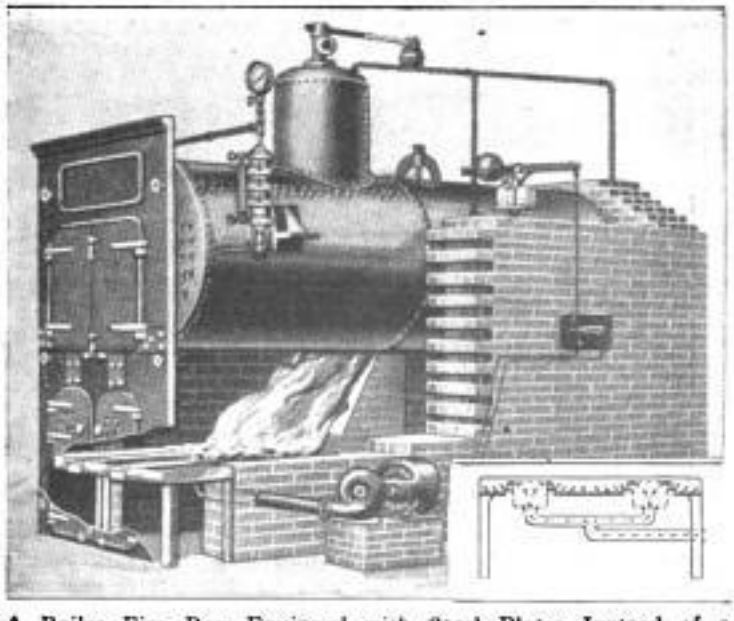


Left: A Broken Box Car in Which Wheat was Satisfactorily Shipped with the Aid of the Lining. Right: One of the Canvas Linings Suspended on a Frame for Inspection. Center: Interior View of a Box Car with the Lining in Place

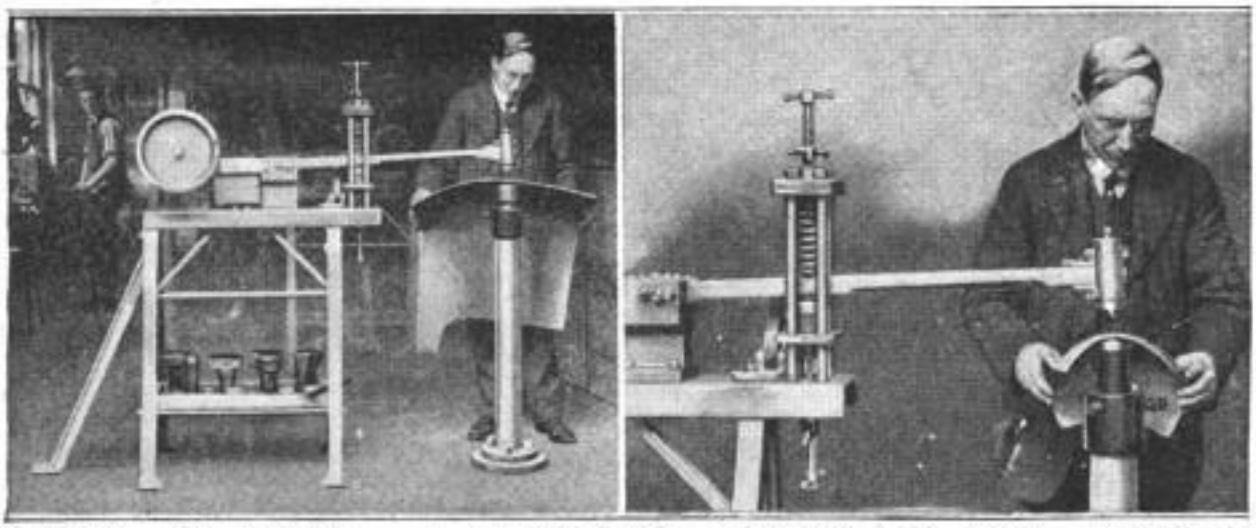
It is a matter of common observation that freight cars often take the road in such bad shape that shipping grains, sugar, or similar materials, in them without repair is a precarious undertaking. A Missouri concern has now put on the market, however, a simple attachment that makes such shipments entirely safe, even in the most battered of box cars. The device consists merely of a canvas lining, or "inner tube," which literally incloses the whole shipment in a huge, stout bag. The lining is 41 ft. long, and 9 ft. wide and high, and fits any car. In loading, rings on its upper edge are hung on nails in the car, and when loading is completed the rings are used for lacing the sides together over the top of the contents. The doors also are laced. After unloading in the usual way, all the remaining grain is easily shaken out without sweeping, saving considerable time, and the lining is packed for return by express in about 15 minutes. For larger loads, an extra canvas top may be laced onto the same rings.

BOILER HAS FLAT PLATES INSTEAD OF GRATE

Replacing the usual grate bars of a furnace with flat steel plates, and permitting no air to pass from the ash pit to the fire box, is the paradoxical method by which an eastern manufacturer gains efficiency in the consumption of coal. Air is driven by a blower into longitudinal channels in the plates, and escapes laterally under flanges on the covers of the channels, thoroughly permeating the fuel. The ash is raked out through the fire door. Fuel only 40-per-cent combustible may be used with this equipment, and steam may be brought to pressure very quickly.



A Boiler Fire Box Equipped with Steel Plates Instead of a Grate: The Small Cross Section Shows the Air Channels

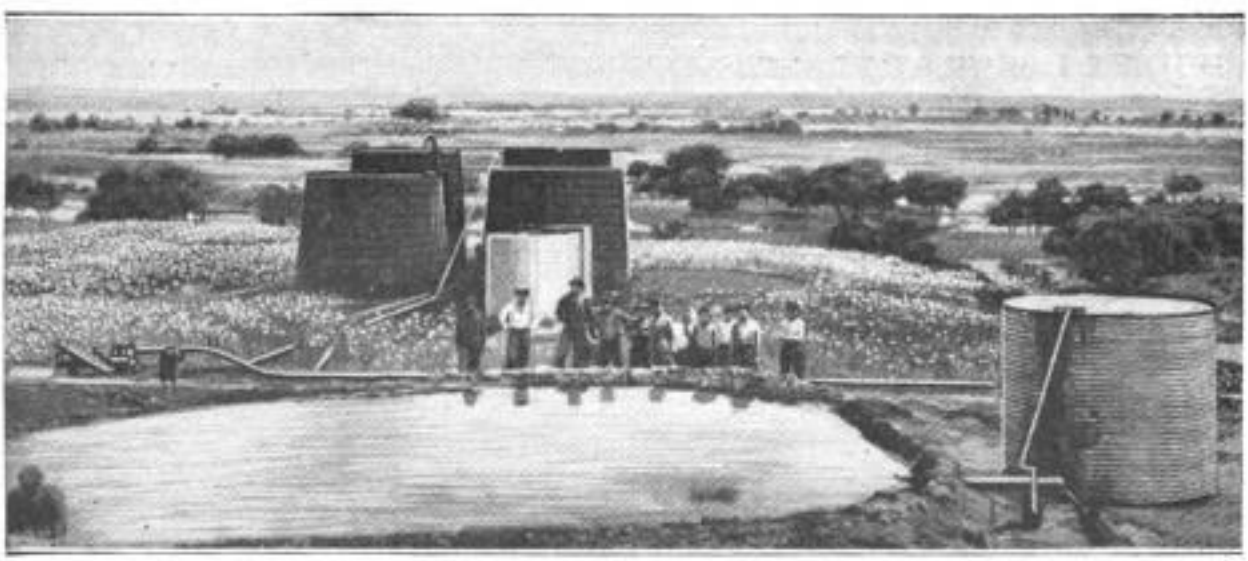


In This Power Sheet-Metal Hammer the End of the Stroke can be So Closely Regulated by a Vertically Adjustable Bottom Block That the Hammer Head Barely Touches the Metal. This Is Desirable in Working Thin Stock

SHEET-METAL TRIP HAMMER IS HIGH-SPEED TOOL

A light power hammer for use in sheet-metal working is a modified form of the trip, or beam type. The interchangeable hammer heads are placed at the outer end of a steel beam, approximately 36 in. in length, which is pivoted off center toward a six-point sharp-contour cam. This acts on the inner end of the beam, causing it to be raised and suddenly dropped six times to each revolution of the drive shaft. The force of the blow is not dependent upon the weight of the hammer, but is determined by the pressure of an adjustable-tension, spiral compression spring bearing upon the top of the beam. The hammer may be stopped instantly at any point in its travels by a hand-lever operated cam. The striking speed, from 120 to 420 blows per minute, is varied by the three-step pulley method. A columnar stand, which supports the interchangeable anvils, is independent of the rest of the apparatus and is placed 18 in. away, allowing ample space for the manipulation of large sheets.

¶By mounting in a watch a spiral made of nickel-steel alloyed with 12 per cent of chrome and a small amount of tungsten, manganese, or carbon, a Swiss scientist is reported to have solved the problem of compensation by equalizing the expansion of parts.



KING COTTON ABDICATES AND IS SUCCEEDED BY PRINCE PETROLEUM

AS those portions of the southland formerly given over to the exclusive growing of cotton are, in many cases, in the recently exploited oil fields, it is not surprising that the two sources of wealth should be found on the same farm. However, the old order is passing. As the field shown in the illustration is in the heart of one of the famous oil sections and is producing at the rate of thousands of gallons of oil daily, the owner has decided to discontinue the planting of cotton.

BOOKS FOR THE BLIND IN CONVENIENT FORM

BY HARRY A. MOUNT

A CODE similar to the Morse alphabet ticked off by a phonographlike machine may soon replace the Braille system of raised dots for reading among the blind. The code record has many advantages; chief among them is the fact that an ordinary book can be transcribed onto two records, while the same book in Braille would require five or six very bulky volumes. It is claimed, also, that the code is much easier to read than the raised dots—which require a very delicate sense of touch—and therefore can be used by a much larger number of blind persons.

This system of reading has been named "typophonia" by its inventor, Dr. Max Herz, a blind Viennese specialist. Doctor Herz recently made a visit to this country at the invitation of the New York State Commission for the Blind, the Matilda Ziegler Magazine for the Blind, and other institutions interested in the welfare of the blind, and exhibited his invention.

Because he was able to obtain only very inferior materials in Vienna during the war, and since some details of the device were not entirely perfected, no conclusion was reached. Authorities who have seen the device in operation, however, declare the possibilities of its development are very great. Doctor Herz has returned to Vienna, in the meantime, to carry his experiments further.

The Hand-Operated Phonograph, the Slowly Revolving Records of Which Carry Combinations of Four Dots Representing the Letters of the Alphabet: Blind Persons Soon Learn to Read These with Ease and Rapidity

The reproducing instrument is in reality a modified form of phonograph. It consists of a small record disk, but instead of the customary spring motor, the disk is rotated by hand by the manipulation of a larger disk mounted on the same shaft with the record disk, and directly beneath it. There is a series of gears connecting the two disks so that ten turns of the lower one, which acts as a flywheel, produce one revolution of the record disk. Thus the record disk moves very slowly, this fact accounting for the great number of words that can be recorded on it. Spoken words could not be recorded on such a slow-moving disk, and so a system of dots, following a code similar to the Morse, is used. The dash of the Morse code is eliminated and the letters of the alphabet are made up of combinations of one, two, and four dots. The four dots in these combinations are very close together, so that they produce a short buzz. The dots are low-toned, being scarcely audible. Loud or harsh sounds have been purposely avoided so that the use of the machine does not become tiresome or wearing on the nerves.

Doctor Herz did not bring with him his recording machines so they have not been seen in this country. They are described, however, as consisting of a typewriterlike machine that punches a series of dots corresponding to the code in a strip of paper, and another machine, through which this paper strip is run. The dots in the paper are made to vibrate the needle of a phonograph reproducer in such a way that the recording needle produces on the record a series of indentations. When this record is used in the reproducing machine, these indentations produce ticks corresponding to the dots of the code.

A master record is then made of the original and as many copies as desired can then be produced, using the same process as in the manufacture of phonograph records. The dots on the original record are so slight, however, that the one attempt to make these records by an American phonograph-record manufacturer has resulted in failure. It remains for Doctor Herz to demonstrate the practicability of manufacturing the present form of record or of modifying it to meet production conditions. There is little doubt, however, that this can be done.

Directors of the Matilda Ziegler Magazine, the one publication for the blind

in this country, have been especially interested in the device. The magazine is printed in New York City, in Braille, and is issued monthly. It is a bulky volume maintained as a charity.

The Braille system has been in use for more than a half century, and it has been conclusively demonstrated that it has serious drawbacks. As has been stated, it requires a very sensitive touch, and while one often hears the statement that when a person becomes blind the other senses are sharpened, this is not always borne out in experience, according to experts. Only a comparatively small number of the thousands of blind persons in this country can read Braille. A very active mind also is required, it has been shown, for a clear understanding of Braille, and even then about two years' study is required before one can read it easily. However, any person who has sufficient intelligence to master the Morse code can learn the typophonia method in a few weeks, Doctor Herz contends.

The reproducing instrument itself is a very simple apparatus. It could be sold at about $15, and undoubtedly would be placed at the disposal of every blind person free of cost, where necessary. The cost of the records, which would be manufactured without profit, would be only 10 or 15 cents each. A circulating-library system for these records would make available for the blind man or woman a large collection of the world's best literature.

The inventor also has evolved plans for a new system of producing Braille characters which he believes to be an improvement on the one now employed. In the present method of printing Braille, the dots are first impressed on a double sheet of specially annealed sheet iron. The sheets are then separated and placed on the cylinders of a printing press in exact registering position. A special grade of heavy paper is first soaked overnight, and, as these sheets are run through the press, the dots are embossed on them. The sheets are baked in a big gas oven and then assembled into books.

Doctor Herz makes use of a putty-like preparation which adheres so closely to paper that it appears to become a part of it. He first punches the Braille characters in a sheet of heavy paper or tin and lays this on the sheet to be impressed. Then he rubs in the composition material and removes the tin. This leaves on the paper little dots of the material, which when dry serve the same purpose as the embossed characters of the old process. Thin paper can be used, and Doctor Herz plans to have this work done by blind persons.

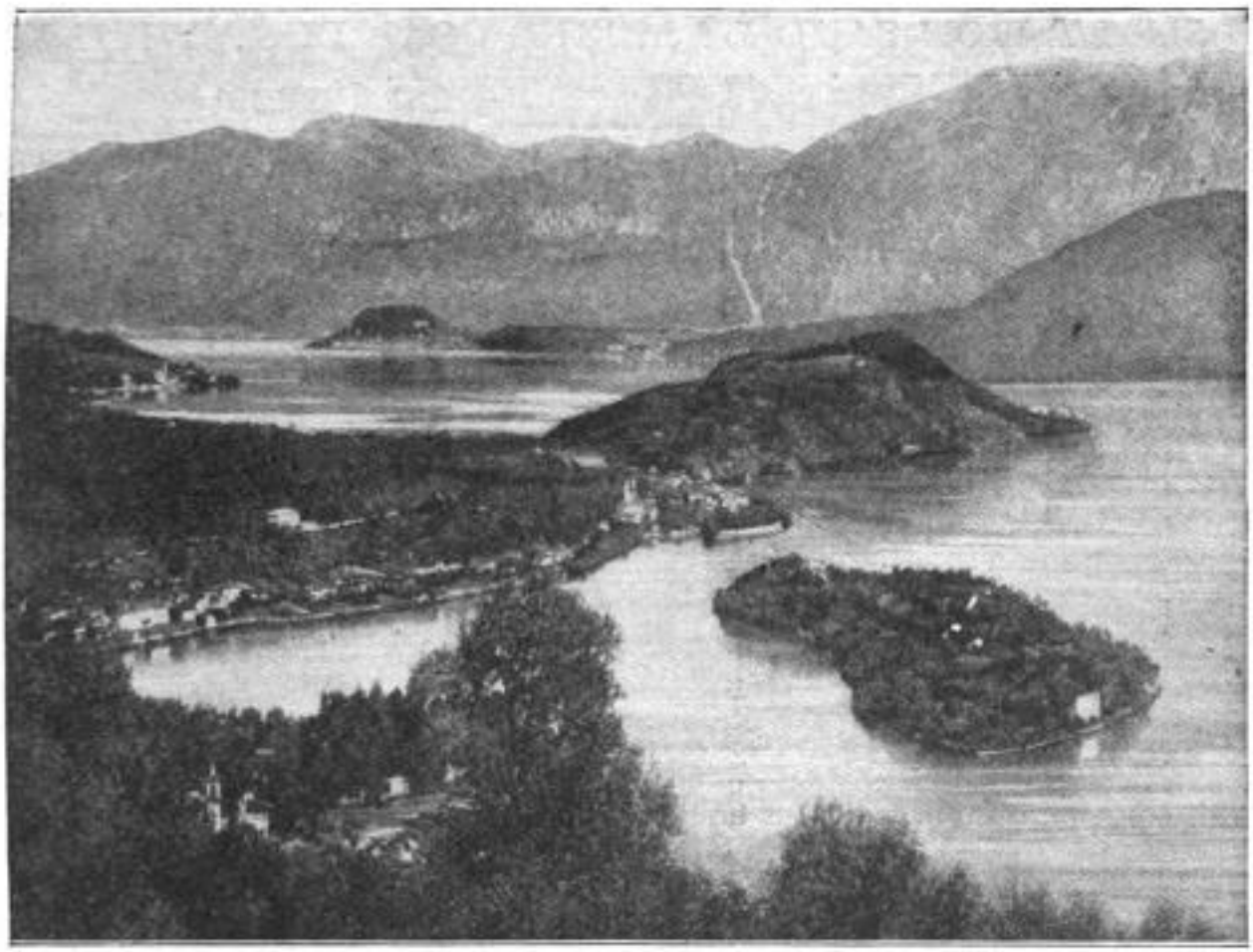
FIGHTING WOOD BORERS WITH A CEMENT GUN

BY ROBERT CAMPBELL

AN effective method has at last been found for preserving piles from the attacks of the teredo, limnoria, and other wood borers found in salt water. It consists in coating the pile with a three-to-one sand-and-cement mixture, which is driven against the wood with such force as to penetrate all crevices and render it completely impervious to water. No form of animal life can then enter. The cement-gun "battery" is transported on two flat cars, one of which is equipped with a pressure tank filled with water and an air compressor. The other carries a cement mixer and the raw materials. Two lines of hose lead to the gun. A stream of water is forced through one of them and the dry sand and cement mixture through the other. The two meet at the nozzle, where the cement is driven through a fine spray or mist, gathering moisture for sticking at the point of contact. A hand lever at the nozzle controls the amount of water, and the drier the mixture the better will be the results.

Using a Cement Gun to Place a Protective Coating of Sand and Cement on Old Wood Piling

More than 5,200 piles in a four-mile trestle across the tideflats of Puget Sound have been treated in this way with pronounced success. In cases where the borers had nearly eaten through the piles, they were built out to the original size by applying a coating of cement from 8 to 12 in. thick.



A Remarkable Aerial View of the Tiny Island of Comacina, in Lake Como, Italy, Bequeathed to the King of Belgium, and Now Returned by Him to be Converted into an Exclusive Colony of Artists

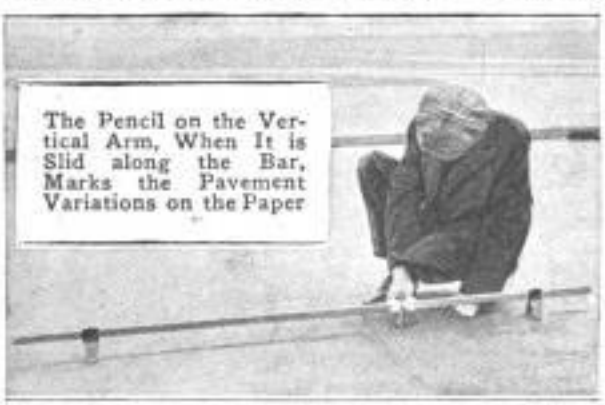
ITALY'S ISLAND ART COLONY REPEATS ITS HISTORY.

It is a curious fact, illustrative of the well-known proclivity of history to repeat itself, that the conversion of Comacina Island, in Lake Como, Italy, into an artists' colony really constitutes a reversion to the circumstance that first brought it renown. The new project, distinguished by a number of romantic episodes, was announced in this magazine last August, but the origin of its artistic fame dates back more than a thousand years. Near the close of the eighth century, certain citizens of cultured Rome, who had taken refuge on the little island during the Lombard invasion, organized an order of architects and sculptors under the name of "Magistri Comacini," whose early imprint is still discernible among the ancient works of southern Europe.

¶The Sonora River, which drops into the ground 15 miles from the Gulf of California, in Mexico, is the nucleus of a comprehensive irrigation project now being studied. Land owners will donate half their now arid and barren acreage to help defray the $5,000,000 cost.

SIMPLE GAUGE MAKES RECORD OF PAVEMENT VARIATIONS

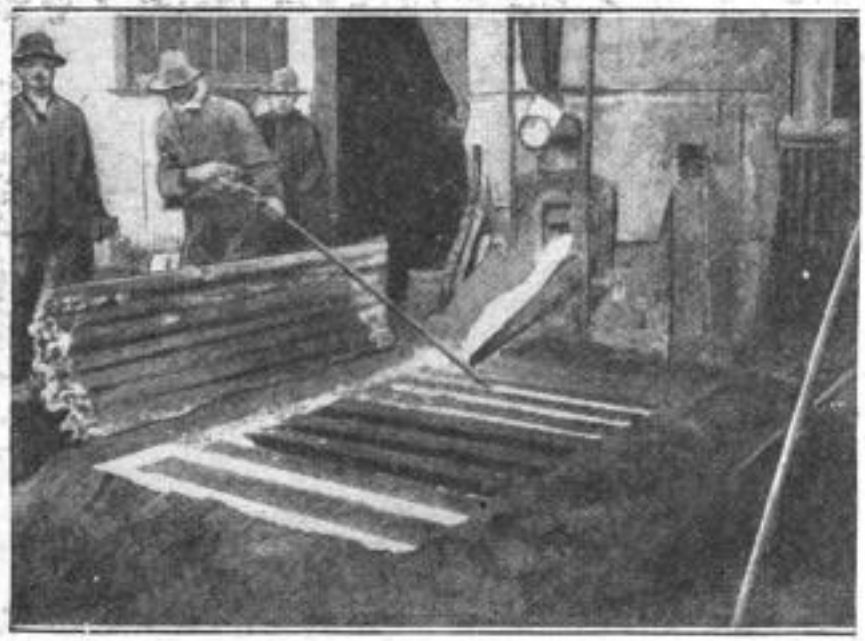
New pavements are laid as nearly level as possible, but a reasonable variation, about ⅛ in. in 8 ft., usually is allowed. A simple gauge has now been designed for checking this figure. A rigid steel bar, supported by short legs near the ends, carries a sliding bracket, in which an upright arm with a roller at the bottom is free to move vertically. A pencil



The Pencil on the Vertical Arm, When It is Slid along the Bar, Marks the Pavement Variations on the Paper

point on the arm bears against a paper held by the bracket, and when this system is slid along the bar, the resulting marks indicate the variation.

SMELT IRON SAND BY MIXING COAL DUST WITH IT



The Product of the New System: Molten Iron Flowing into Molds from the Fusion of the Iron Sand and Coke in the Blast Furnace

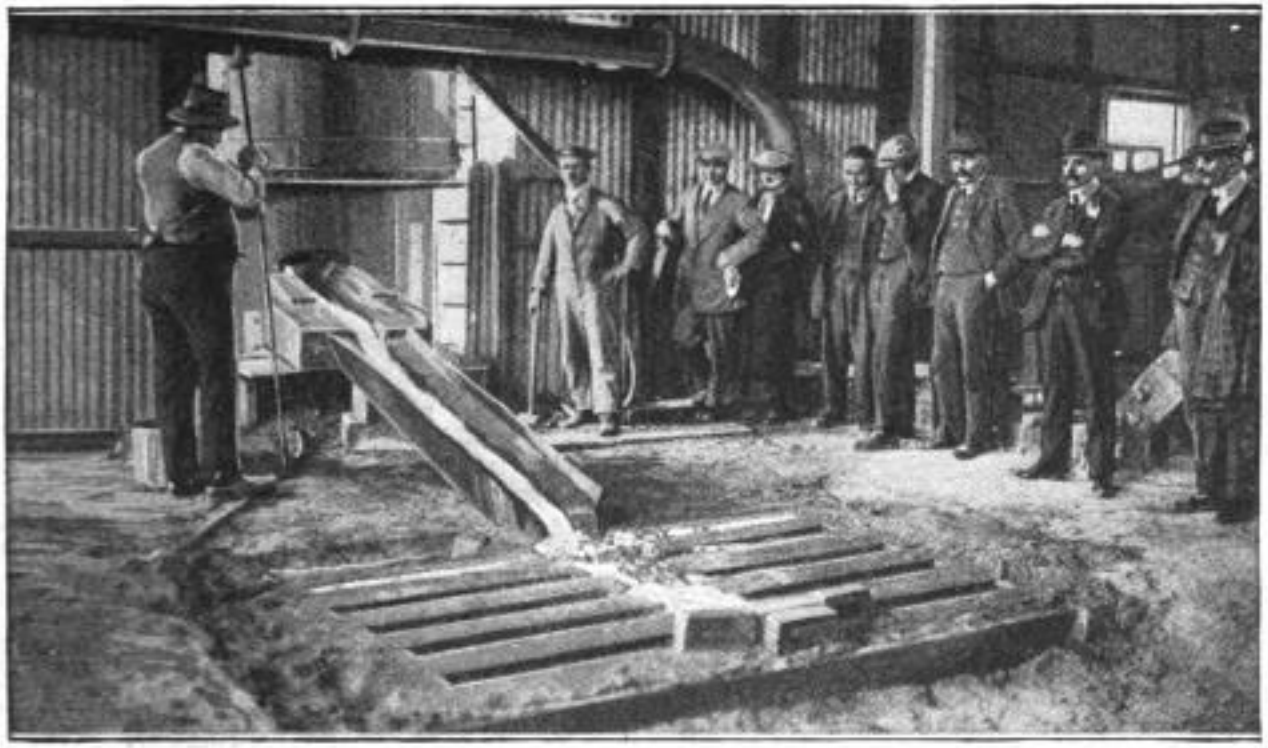
Rich as it is in metal, the form of magnetite known as "iron sand" has hitherto presented insuperable obstacles to the smelter, for the obvious reason that the finely divided ore blows out of the blast furnace. Nevertheless, enormous deposits of this material along the west coast of New Zealand's North Island have long tempted experimenters, and now, within the past few months, a process for the economical extraction of the iron has been devised that is as simple as it is successful.

Coal dust, in itself commonly regarded as waste, and therefore obtainable at low prices, is the basis of the new system. This pulverized fuel is intimately mixed with the sand that is gathered directly from the beach, and the granular compound thus obtained is placed in a baking furnace, kept at a temperature that turns the coal to coke. The result is a solid mass of "ferro-coke," a form of artificial iron ore especially suitable for the smelting operation. Placed in baskets, with a small addition of limestone flux and raw iron sand, this substance is then dumped into the blast furnace from an elevated platform, the mouth of the furnace being plugged with clay. At the proper moment, the clay is pierced, and the clean molten iron flows out into the molds. The pig iron so obtained is of such excellent quality that the finest and most intricate castings may be made from it.

The Blast Furnace, and the Elevated Platform from Which the "Ferro-Coke," Made of Baked Iron Sand and Coal Dust, is Dumped into It

Stacks of Pig Iron of the First Quality, Cast from the Combination of Iron Sand and Coal Dust Baked Together and Melted in the Furnace

The plant now using



Beginning a Pour of "Ferro-Coke" Iron: The Man at the Left has Just Pierced the Clay Stopper at the Furnace Mouth, and the Liquid Metal Flows Down into the Little Trenches, Forming Pigs

the process is so situated that gravity conveyors can be used for much of the mechanical work, including the disposal of refuse, and the by-product coal gas generated is ample for the operation of the whole installation. Production is therefore extremely economical, each ton of pig iron requiring about 2,400 lb. of coal dust. There are available at the site some 150,000 tons of sand directly usable, and an unmeasurable supply that can be made usable by a simple process of magnetic separation.

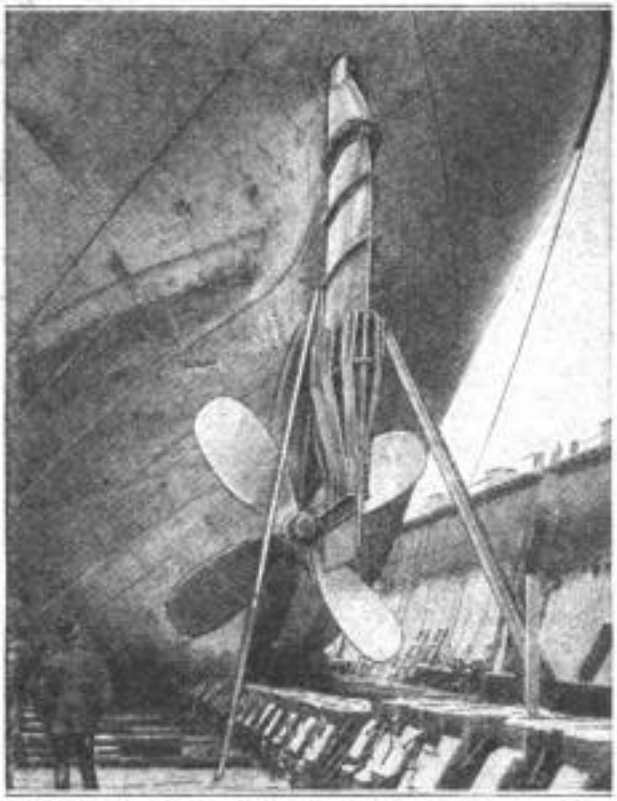
WIRE NETTING HOLDS STONES OF RIVER DIKE IN PLACE

A stretch of California highway which has been washed away each spring herctofore by the turbulent San Gabriel River was kept intact for the first time last season by means of a peculiar dike, or dam. This structure, paralleling the road and river for about 600 ft., is composed of rounded stones from the river bed, and is unusual in that, because of the scarcity of mortar and cement, none was used to bind the stones together. Instead, the bowlders are held in place by a netting of galvanized-iron wire which passes over and under each course. There are five of these, each about two feet thick. The first, or foundation, course measures 12 ft. wide; the fifth, or top, course 4 ft., giving the faces a safe angle.

Close Inspection of This River Dike Shows That the Stones are Held in Place by Netting of Heavy Wire. The Five Courses can be Distinguished

HOG ISLAND RUDDER BECOMES REGULAR REPAIR UNIT

While the great Hog Island shipyard was turning out vessels in record time for



The Fabricated Repair Rudder, Made of Plates and Angles: The Cage Arrangement at the Bottom Lightens the Structure and Relieves Bearing Strain

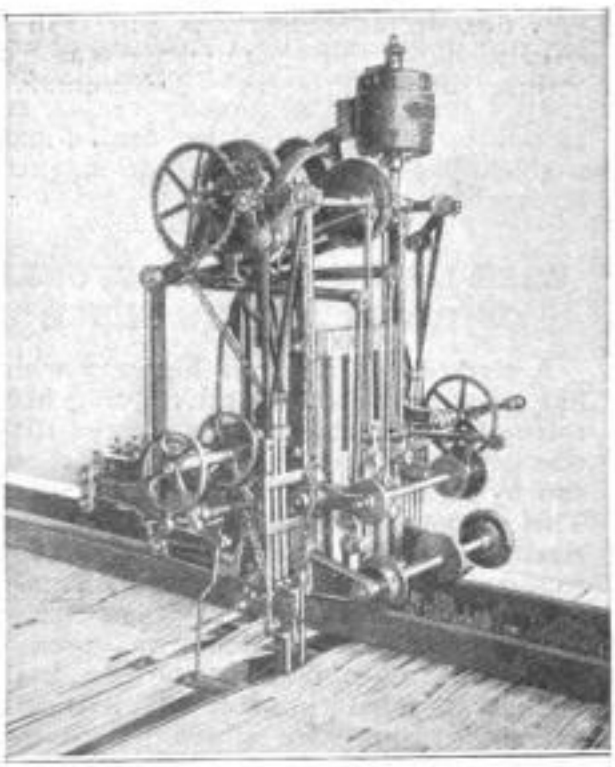
war use, a peculiar form of rudder was devised, made almost wholly of steel plates and angles, and saving much time that the production of castings and forgings demanded. The practice so inaugurated, described in this magazine, in March, 1919, has now been adopted and improved in many ship-repair yards, where the necessary parts are always available without delay. The fabricated rudder serves well until opportunity arrives for the installation of one of the conventional type.

PRINTS NINETY-SIX COLORS AT ONE OPERATION

Another laborious manual operation, seemingly impossible of machine performance, has now been made automatic in the printing of the sample color plates used in the paint, textile, and similar industries. An Illinois inventor has developed a press arrangement by which the incredible number of 96 different colors may be printed at one time. The method employed is simple, being merely a mechanical refinement of the system of dividing the ink rollers into narrow units, to suit the work in hand, and feeding each roller from an individual ink fountain. This mechanism is used with a standard two-color press, which is virtually a double press, and the inks are mixed as used to match the customer's samples.

DROPS WARP DETECTOR WIRES AUTOMATICALLY IN LOOM

Though the stop motion for looms has been in use for many years, dropping the detector wires on the warp threads has continued to be a laborious manual process. Now, however, a Massachusetts mill operative has invented a machine by which this difficult work is accomplished mechanically. The device runs on a pair of permanent or removable rails on top of the loom. Reciprocating vertical prongs pick up the warp threads, and the forked wires are dropped upon them from a series of magazines. The machine is electrically driven, and if the prongs miss a thread, or an imperfect wire is dropped, it stops immediately. The attachment weighs 39 lb., is made ready in four minutes, and drops from 200 to 500 wires a minute, according to the nature of the material being woven. Experienced man-



A Loom Attachment That Automatically Drops Detector Wires on the Warp Threads at High Speed

ual droppers average around 40 or 50 wires a minute.

Left: The Winch and Superstructure of a Heavy-Duty Automobile-Wrecking Truck. Right: The Overhang of the Superstructure Prevents Body Damage to a Car being Lifted

MOTOR-SERVICE AMBULANCE ASSURES RAPID ACTION

A 1½-ton motor-truck chassis has been equipped with a sturdy overhanging superstructure and a powerful winch by a progressive Ohio garage owner. The overhang of the structure permits the hoisting of cars from front or rear without damage to radiators, fenders, gasoline tanks, or limousine bodies. Although the truck is classified in the lightweight division, it is claimed that one man can easily hoist and manipulate cars and trucks weighing up to 10,000 pounds.

METHOD OF FUSING FELDSPAR GIVES NEW POTASH SUPPLY

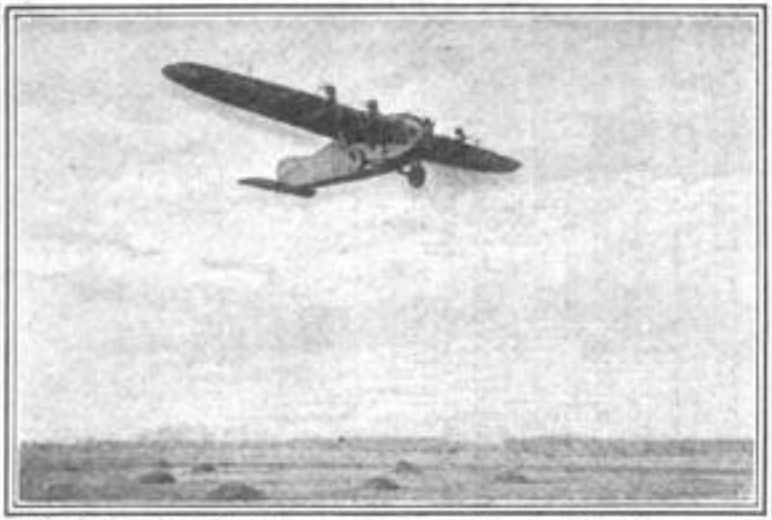
Recent discovery of a method of lowering the melting point of common feldspar to 1,560° F. opens to commercial exploitation a new source of cheap fertilizer of enormous extent and value. The feldspar, as it exists in vast deposits in North Carolina, is prepared by mixing it with phosphate rock, the addition of a soda flux causing both to fuse at a relatively low temperature, and resulting in the production of potassium phosphate. This compound, containing 16 per cent phosphoric acid and six per cent potash, has an alkaline reaction which makes it an especially desirable fertilizer for continuous use. A plant for the manufacture of the new product already has been established, with some 10,000,000 tons of feldspar and 900,000 tons of phosphate rock immediately available, and a practically unlimited supply within reach, assuring economical handling.

TREE OVER WOMAN'S GRAVE ENVELOPS HEADSTONE

Seventy-five years ago Virginia Kirk was buried in the Winchester cemetery at Memphis, Tenn. An acorn sprouted on the mound, and as nothing interfered with its growth, it has grown so large that the headstone is almost enveloped, leaving but part of the inscription visible. Otherwise the headstone is in an excellent state of preservation, while all trace

An Acorn Sprouting on the Grave of a Woman Who was Buried 75 Years Ago has Developed into a Tree Large Enough Partially to Envelop the Headstone Erected to Mark Her Grave

of the grave has been obliterated by the tree, which has formed itself into one of the oddest and most interesting monuments on record.



The Views in Their Sequence from Left to Right Show: A Passenger Disembarking through the Front End of the Coach of the Mammoth Plane; the Enormous All-Metal Plane in Full Flight—the Last Word in Aerial Navigation; a Near View of the Passenger Coach, Showing Landing Gear and Details of the Streamlined Engine Mountings in the Wings. An Idea of the Depth through the Wing Section can be Gained by Comparing the Wing Edge with the Height of the Cabin

Just What a Wing Span of 174 Feet Means is Conveyed by This Illustration. A Fair-Sized Company is Easily Sheltered by the Great Wings. The Wheels of the Landing Gear Differ Only in Size from Those Used on Smaller Machines. The Arrangement and Spacing of the Engines Are Noteworthy

WIDE WORLD PHOTOS

A TEN-TON ALUMINUM AIRPLANE

BY WM. H. HUNT

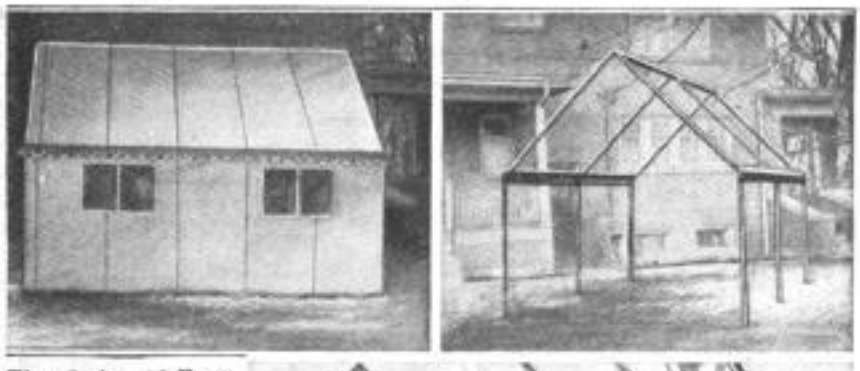
FOREIGN development of aerial engineering and navigation is advancing with giant strides. Daily rumors are heard of new achievements in design and construction, and increase in capacity or radius of European-built machines. The latest authentic report is of the completion and successful trials of a new all-metal German monoplane with seating accommodations for 18 persons exclusive of the crew. The hollow planes of the gigantic craft, tunneled to permit access to the engines while in flight, have a spread of 174 ft., while the over-all length of the machine is 59 feet.

The power plant, consisting of four independent engines rated at 260 hp. each, is built into the front edge of the wing. This arrangement of the engines removes them to a considerable distance from the combination passenger and baggage cabin, thus almost totally eliminating the fire hazard. With a further view to minimizing the fire risk and also saving weight, all wood, except that in the floor of the cabin, has been dispensed with and a new, very strong aluminum alloy, used exclusively in the wings, body, and for bracing. Despite all efforts to hold the weight down to as low a point as is commensurate with safety, the great machine tips the scales at 8,500 kg., or a trifle under 10 tons, with a full load. Any two of the engines will sustain flight and all four will drive the loaded machine at a speed of about 130 miles an hour.

The two pilots and the mechanic, constituting the crew, occupy a compartment on the roof of the main cabin, to which they have access through a trapdoor. Entrance to the cabin is through the front end, in which the pantry is also located. Headroom is a trifle restricted, as the cabin is only 5 ft. high inside, at the front end, and rapidly tapers to a height of 3 ft. at the rear. The only departure from conventional design noted is a cushioned, telescoping landing gear. The assertion is that this is so efficient and the control of the great ship so delicate that there is only a very slight shock when landing at the terrific speed of 80 miles per hour. It is estimated that the fuel supply will suffice for straight-away, nonstop flights of about 600 miles with 12 passengers, or 300 with the full complement. As no over-water flights are contemplated, the big ship is equipped with wheels only. This precludes the possibility of a transatlantic flight until such time as the great plane shall have proved its airworthiness conclusively.

STEEL-FRAMED TENT AS STURDY AS A HOUSE

That it is possible to make a canvas tent as sturdy as a house, and still preserve its portability and ease of erection, is proved by a Wisconsin inventor. The secret lies in the use of a framework of 1¾-in. steel tubing, ⅛-in. gauge, of which four pieces are assembled to follow the walls and gable roof of an ordinary wall tent. For a 9 by 12-ft. tent, three of these assembled forms are used, one at each end and one in the center. The tubular legs slip over wooden ground stakes, which are located by first assembling the gable, and using it as a marker. Light castings are used at the junction points, connected longitudinally by No. 16 gauge steel strips, held by wingnuts. The whole frame weighs about 90 lb. packed, and may be erected very quickly by one man, or just as expeditiously dismantled.

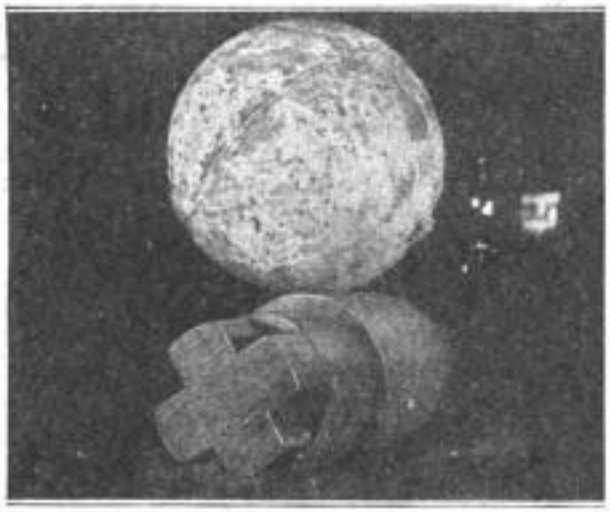


The 9 by 12-Foot Wall Tent as It Appears Assembled on Its Light but Sturdy Steel Frame

Top: The Frame Erected, Ready for Its Canvas Cover. Left: The Four Steel Tubes and Connecting Lugs of a Single Form. Right: A Detail of the Completed Structure, Showing the Sheet-Metal Connector

ROUND BALL MAINTAINS NICE BALANCE ON A ROUND SHAFT

A strange freak of equilibrium occurred recently at one of the large eastern steel mills when a 30-in. crusher ball,



This Huge Round Ball would, Possibly, have Balanced on the Round Roller Indefinitely If It had Not been Removed

weighing 9,000 lb., fell 30 ft. and struck the exact center of a perfectly round sheet-metal roll, 20 in. in diameter, with such a nicety of precision that it came to a perfect balance and did not roll off. Examination showed that, both ball and roller being hard, the latter was only slightly dented, and not sufficiently to account for the ball remaining in balance. The ball remained in position until workmen removed it 24 hours later.

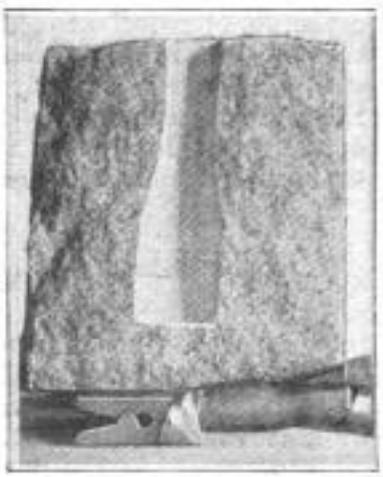
PORTABLE SCALE BEAM TESTS CUSTOMHOUSE WEIGHTS

The custom officials are very particular when it comes to weighing sugar imported into this country, on which duties are collected. In the photograph is shown a portable scale beam and equipment used at the New York customhouse to test 50-lb. weights, and smaller counterpoise weights employed on steelyards. An equal-arm beam, in a suitable mounting, is suspended from one of the frames, or horses, which are ordinarily employed when steelyards are used for weighing. A standard weight, from the inspector's set, is then suspended from one arm of the beam and balanced by means of a weight applied to the other arm. The standard weight is then removed, and the weight to be tested is substituted and its error determined by adding small weights to one side or the other, as required. With this arrangement accurate work can be expeditiously carried out. Winds and drafts must be prevented from striking this device, which is therefore ordinarily used indoors.

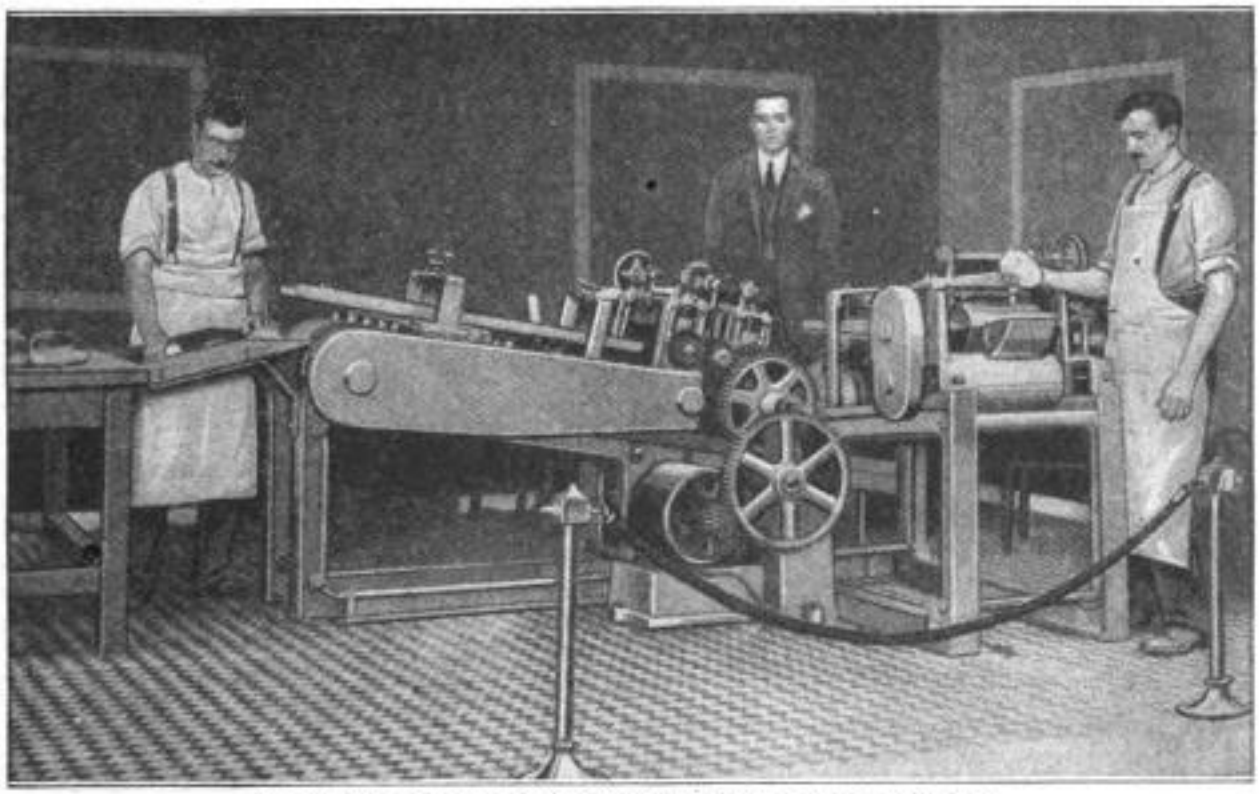
Testing the Accuracy of Customhouse Weights by Means of a Portable Scale Beam and Standard Weights

EXPANDING ROCK DRILL BORES TAPER HOLES

A departure in the construction of hard-rock drills is shown by one recently produced by an ingenious blacksmith, resident of Arizona. Two half-round, beveled-edge cutters, each with an elongated shank at the top, bear on each other through a cross pivot. This assembly by a pin in a special drill stock, the beveled ends of which transmit the blow to the beveled tops of the cutter blades, has the effect of forcing the blades outward, toward the sides of the hole, at every blow. The resulting hole is somewhat bottle-shaped with the neck, which is drilled for a short distance by the common type of tool, at the top. A blast taking place in a hole of this shape exerts a much more powerful sidewise rending shock than one set off in the straight drilling heretofore used.



¶Plans have been made in China for a complete system of highways radiating from Peking, rated as national, provincial, and district highways, and country roads. Another proposed improvement is to make each of the 10,000 post offices a telegraph office.



ENGLISH BREAD MACHINE MOLDS A LOAF A SECOND

THE ancient art of breadmaking affords an excellent example of gradual transition from a wholly manual process to one that promises to become, before long, entirely automatic. Already electrically operated mixing machines and dough molders pass long rows of loaves into electrically heated ovens, that turn them over and decide automatically when they are properly done, and in hotels and restaurants even the slices of bread are cut by electric knives. Some of the ingenious equipment of the modern bakery formed an interesting display at a recent exhibition in England, and not the least impressive of the demonstrations was that of a dough-molding machine that cut the prepared dough into loaves of the desired size without the aid of human hand. The endless procession of loaves prepared by this machine passes into the oven at the rate of 60 every minute. The picture shows the machine in operation, the mass of dough being fed to the cutting and molding mechanism by the mixing machine at the right, and carried ovenward by the conveyor at the left.

POLICE MOTORCYCLES HAVE RED HEADLIGHTS

In order that motorcycle police may be given the right of way, and to avoid their being involved in serious accidents, the authorities of a large western city have equipped the motorcycles of the police force with powerful headlights having a bright-red lens. The ordinance authorizing the equipment is worded in such a way that other motorcyclists are prohibited from using red headlights. Thus all chance of confusion is avoided. All motorists have been requested to give way to the marked machines as an act of co-operation in the enforcement of the laws.

A Brilliant, Dazzling Red Headlight Is Part of the Equipment of These Police Motorcycles. Motorists Give Way When These Lights are Seen

SQUARE SOCKET IMPROVES RAILROAD TRACK JACK

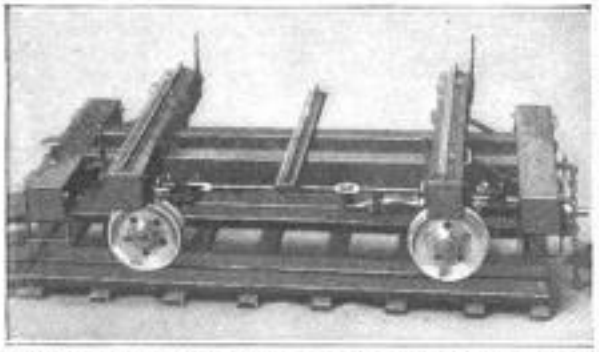
An improvement of extreme simplicity, recently incorporated in the construction of a certain railroad track jack, has resulted in a marked reduction of first cost and breakage, and an increase in power. The change consists merely

Using a Standard Steel Lining Bar as a Handle for a Square-Socket Railroad Track Jack

in substituting a square-handle socket, of 1½-in. opening, for the customary round socket. This permits the use of a standard 5½-ft. steel lining bar as a handle, instead of the wooden handle formerly furnished. With this arrangement the jack, which has been strengthened by using a 1-in. trunnion in place of the former ½-in. fulcrum pin, lifts 104 lb. for every pound of pressure on the end of the handle.

AIR-PRESSURE CAR UNLOADER SETS A LOGGING RECORD

In order to accomplish a saving in time, the master mechanic of a large Arizona lumber concern has equipped the cars of the logging trains with a compressed-air device, something on the order of the air



The Working Model of a Logging Car Equipped with a Compressed-Air Stake-Releasing System: All Stakes Drop Simultaneously

brake, which releases the side stakes automatically and simultaneously on every car of the train. An air cylinder on each car actuates a series of rods and levers which trip the stake-locking devices. The air is supplied from the locomotive, and the releasing valve is under the control of the engineer. The records show that, by the new system, a train of 18 cars, each containing 4,000 ft. of logs, can be unloaded in from six to eight minutes.

CEMENT YACHT IN TINY POND IS ODD ADVERTISING SIGN

Travelers along a certain western highway are startled when a seemingly serviceable sailboat, all in white, suddenly comes into view where nothing but a tiny pond breaks the monotony of the terrestrial landscape. Closer inspection discloses that the boat's hull is made of cement, and its sail of sheet metal, painted white, and bearing the advertising slogan of a local cement dealer. To make the

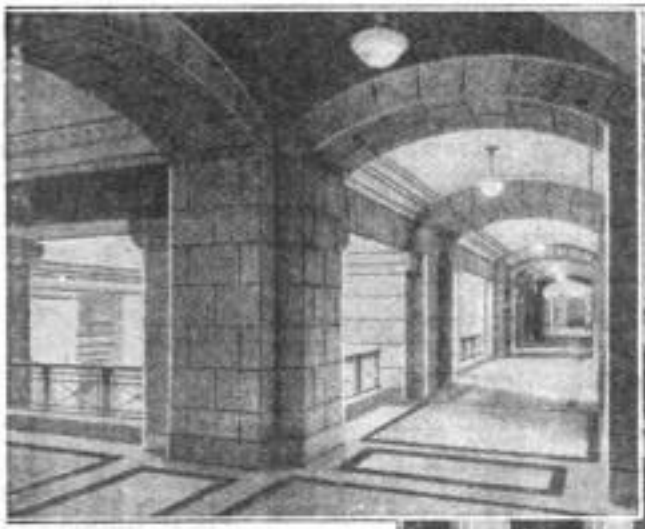
The Advertising "Sailboat" of Cement and Sheet Metal, in a Pond Not Much Larger than Itself

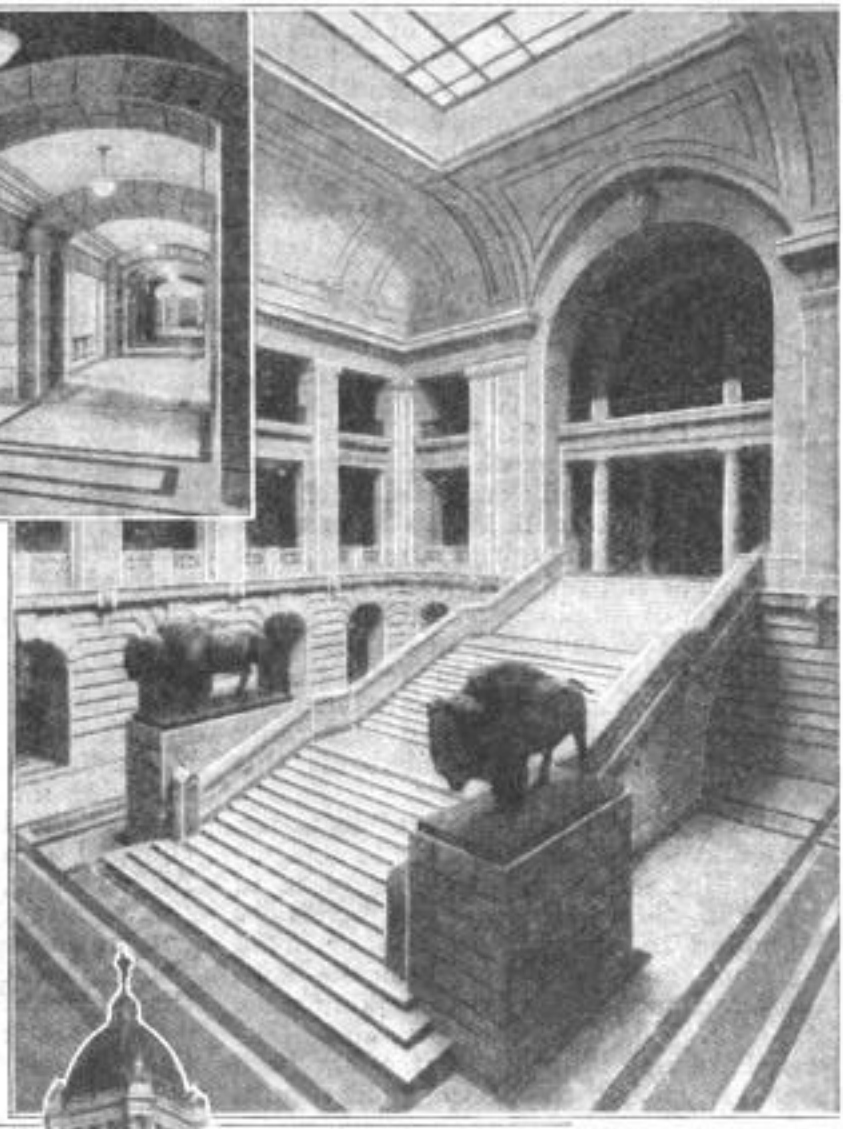
ingenious announcement doubly effective an electric light illuminates it after dark.

PERFORMANCE SCORE CARD IS AUTO BUYER'S GUIDE

Convinced that the asserted superiority of its product will stand a more substantial test than the mere impressions of the "prospect," a large automobile house is now supplying score cards for each demonstration. The copyrighted card bears 12 pertinent questions to be decided during the trial runs, and space for recording the performance of three other cars as well as the one responsible for this new sales method. Ease of riding, acceleration, deceleration, slow and high-speed performance, ease of steering, control convenience, economy, weight, smoothness of engine operation, rigidity of frame and body, and "roadability" are the points on which the prepared record makes direct comparison between the cars tested.

MANITOBA DEDICATES ITS NEW CAPITOL





To the Right Is a View of the Grand Staircase, Guarded by Bronze Bison. These are Said to Be, Probably, the Most Splendid Reproductions of This Distinctively American Animal Extant. Upper View: Only the Slight Shading Afforded by a Few Neutral Tints Relieves the Severity of Some of the Long Corridors

On the fiftieth anniversary of its entering into the confederation of Canadian provinces, Manitoba saw its archives and legislative chambers housed in a magnificent new capitol, which is a masterpiece of engineering and decoration. The cost of the elegant

The New Capitol of Manitoba: The Frontage Is toward Broad Street. Assiniboine Avenue, One of the Principal Thoroughfares, was Diverted to Form the Gracefully Sweeping Driveway Up to the Front Entrance. The Massive, Fluted Columns Are of a Native Stone Closely Resembling Marble

structure approximated $9,000,000. Most of the stone used in the construction is native, being quarried within 30 miles of Winnipeg, the capital of the province. In form, the building follows the outline of the capital letter "H," assuring good light and ventilation in all parts of the structure. The decorations are of an allegorical nature, most of them depicting the progress and historical high lights of the province, and prophesying and pointing the way to greater things to be achieved.

That Manitobans within range of vision

may be assured that their building is safe during the night watches, large searchlights play upon the cupola of burnished copper, transforming it into a ball of seemingly living flame. Surmounting the cupola is an 18-ft. bronze statue of a youth bearing aloft a flaming torch. Gazing into the great unexploited Northwest, he symbolizes Manitoba's progress and recognition of the source of her abundant wealth. Two other fine decorative pieces are the bronze bisons which guard the grand staircase. In order that the structure may be served by a fitting approach, one of the city's leading thoroughfares was diverted to form a sweeping driveway leading up to the main entrance. The Manitobans exhibit a proper pride in what is conceded to be a triumph in architectural artistry.

DRY BUTTERMILK—A NEW COMMODITY

BY HJALMER LINDQUIST

A COMPANY at St. Paul, Minn., now operates a plant where thousands of gallons of buttermilk daily are dried and powdered. Buttermilk in this form keeps indefinitely without refrigeration, and can therefore be shipped to any distance without danger of spoiling. Shipping costs are less because of its lightness, and its keeping qualities permit it to reach a far wider trade than was formerly possible. In the winter months, when buttermilk is scarce because less butter is made, this product finds a ready market.

Buttermilk powder, dissolved in water, is used as a general substitute for buttermilk. Not much change takes place in drying it. Some of the large bakeries are beginning to use this product in bread making, and soap, drug, pancake-flour, and other manufactories are making some use of it. The dry, though unmilled buttermilk, which is rather coarse, has been used for chicken feed, with good results.

The drying machinery consists essentially of a slowly rotating steam-heated cylinder upon which the buttermilk is forcibly sprayed, and then scraped off when dry. In operation, the buttermilk is sprinkled from a perforated pipe onto the hollow metal cylinder, and permitted to bake while the cylinder makes nearly a complete revolution, which requires about one minute. It is then scraped off by a snugly fitted blade set at an angle against the cylinder's side. The milk is dried to nearly a crisp by the time it reaches the knife and hardens still further in cooling. Milk from the sprinkler that fails to cling to the cylinder drips into a pan underneath and is pumped back into the sprinkler pipe again. The drip pan is kept filled with milk to a certain level by a float control on the supply pipe. The buttermilk gravitates from tanks above, and is warmed and partly condensed before it reaches the drying machines.

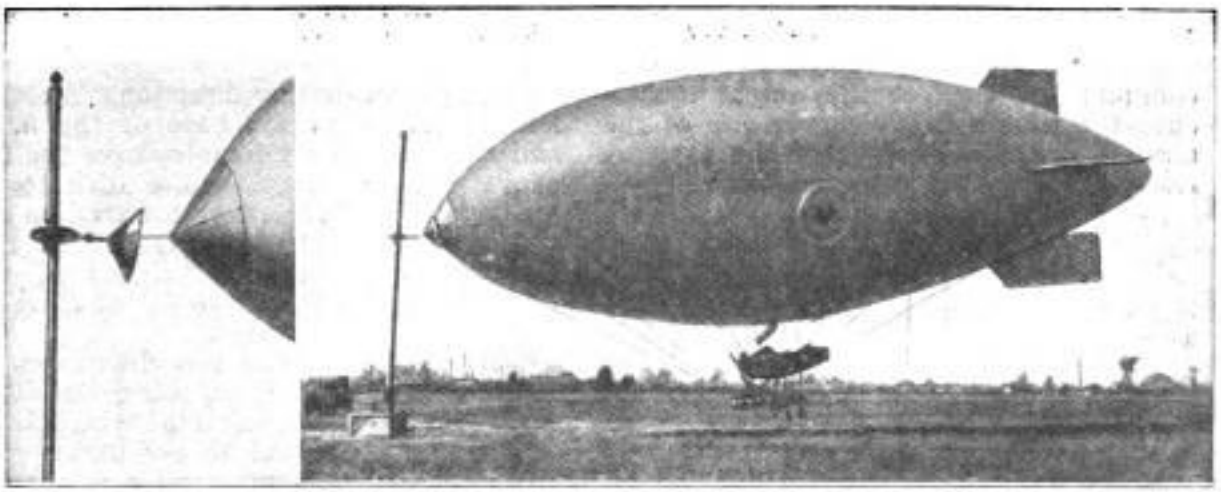
Vapor given off from the baking milk on the hot cylinders is carried off by a system of hoods placed over each machine for the purpose. These hoods connect with a 2-ft.-square wooden vent running along the ceiling over all the machines, and from it the vapor is drawn out of doors through a stack in the roof.

The dry milk is scraped off the cylinder in a thin crumbling sheet that folds and breaks as it passes the knife's edge and slides down the blade side to fall into the receiving box below. By the time it reaches the box it looks something like chopped straw, bright yellow in color. After milling, the color is white.

A rotating screw, in the receiving box, cuts up the now cool and baked milk particles to some extent and gradually works them to one end of the box, where they drop through a hole into another box of like character which continues the process, working the material in an opposite direction. At the end of this latter box the meal drops into a metal basket. A man with a low box-topped truck gathers the dry buttermilk from 14 such machines. He empties the baskets into his truck and shovels it into an elevator spout that carries it to the floor above, where it is run through a milling process to powder it.

The buttermilk is gathered from the creameries of the twin cities, Minneapolis and St. Paul, by two trucks carrying tanks that hold 700 gal. of buttermilk each, and usually each truck draws a trailer carrying the same amount. The tank trucks are filled through a pipe, extended to them on the drive outside, from the storage tanks in the creameries. This milk is later pumped from the trucks by motor power at the drying plant.

¶The average size of all tank ships is 4,775.8 tons, American tankers averaging 5,632.6, and British 4,426.1 tons each.



Left: A Close-Up View of the Steel Nose Disk and the Cable That Passes through It for Mooring the Balloon to the Mast. Right: An Airship Anchored to the Mast, Which Holds It against the Strongest Wind

MOORING MAST HOLDS AIRSHIPS IN HIGH WINDS

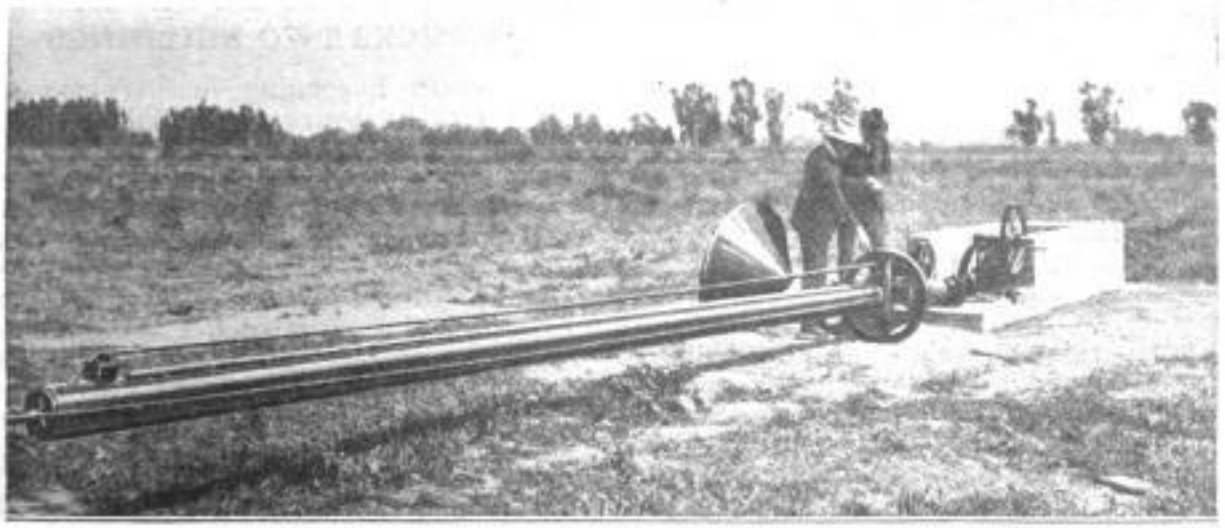
BY JOHN EDWIN HOGG

THE lack of means of holding a dirigible in a high wind when no hangar for the airship is available, heretofore one of the greatest obstacles to the extensive use of lighter-than-air air craft, has been filled efficiently and economically by the development of a folding steel mooring mast, the invention of a Los Angeles man.

Until very recently the cruising radius of airships has necessarily been limited, due to the scarcity of suitable hangars, and the utter inability to anchor an airship firmly on the average aviation field. Even though the airship is fitted with motors powerful enough to enable it to fly in a gale, its range of passenger and cargo-carrying activity has heretofore been seriously hampered because, once the air craft is on the ground in a strong wind, it becomes unmanageable the moment its motors are shut down. In consequence, most of our dirigible flying has had to be done in calm weather, and then only between points where hangar and ground-crew facilities have been available. The newly developed mooring mast changes all this by providing the means whereby any aviation field may, for a nominal sum, equip itself for receiving this type of air craft regardless of wind conditions.

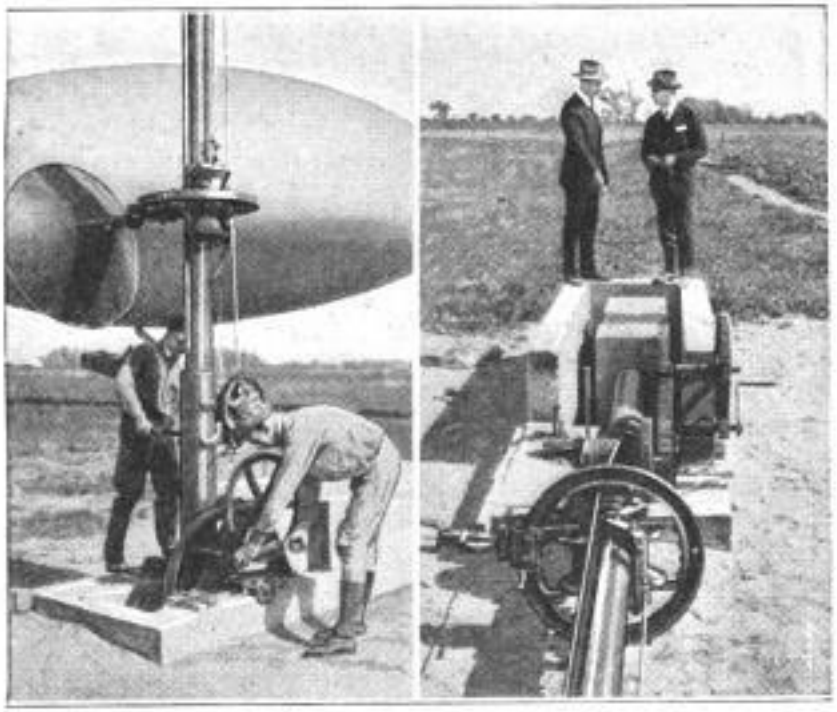
The mooring mast is made entirely of steel with the exception of the concrete base by which it is anchored in the earth, and with practically no alteration whatever, can accommodate any airship from a pony blimp to the largest Zeppelin. The concrete base which anchors the mast to the ground is built in the form of a box-shaped pit.

The steel mast is pivoted over the top of the concrete-box structure, and on its lower end, within the box, there is a



The Steel Mast is Folded in a Horizontal Position by Turning the Hand Winch Mounted on the Concrete Base, and a Counterweight within the Base Makes It Just as Easy to Raise It to the Vertical

concrete and steel counterweight to balance the weight of the lower end of the mast against the weight of the top. A few revolutions of the crank on a hand-operated geared windlass lower the mast horizontally on the ground, or a few turns in the opposite direction raise the mast in position for use. After the mast has been raised into the vertical position, it is latched into place, and cannot again be lowered until the latch is released. On the perpendicular body of the mast there is a sheet-steel "nose disk" into which the nose of the airship fits. To get the airship's nose into this disk, there is a steel cable which operates over a pulley and through a hole in the center of the disk, and thence down the body of the mast to a geared hand windlass.



Left: Raising the Steel Nose Disk and Swivel Ring to the Proper Height to Accommodate an Incoming Airship That has Asked for a Mooring. Right: A Detail View of the Concrete Base, Showing the Counterweight and the Winch for Raising the Mast

When an airship lands on the field and is to be moored to the mast, the steel cable is pulled out and attached to the dirigible's nose line. A few turns of the windlass then pull the airship's nose into the disk, where the big gas bag is held securely. Once moored to the mast, the airship rides above the ground, ballasted by sandbags hooked under its gondola. Its nose is held into the wind, and its rudders and elevators act as wind vanes, which aid in maintaining it in a stable position at all times.

To compensate for possible changes in the direction of the wind, the nose disk may be turned in any direction. Another hand windlass at the base of the mast, and a system of steel cables over the top of it, also permit the nose disk to be raised or lowered to accommodate it to the varying heights of the gas envelopes of different airships.

The mooring mast, in addition, is a great aid to the airship when it is about to get under way. It practically eliminates the necessity of a ground crew, for when the pilot wishes to leave, he has but to cast off the craft's nose line, drop his ballast bags, and "free-balloon" off the field. The services of a ground crew are no longer necessary while tuning or warming up the motors preparatory to a flight. All necessary work about the dirigible may also be done at the mast, by the pilot, without any assistance.

The cost of building the first experimental mast was about $1,500, but this cost probably can be reduced to $1,000, or even $500. It is believed that eventually the mooring mast will be a feature of every flying field, since the installation of one is all that is needed to convert a field, that can be used by airplanes only, into one which can be used by airplanes and dirigibles alike.

RUNAWAY ENGINE PARTIALLY WRECKS TWO BUILDINGS

A recent happening in a cotton gin illustrates the destructive power of a large steam engine and the centrifugal force stored in a flywheel when they become ungoverned. The engine, of 14-in. bore and 36-in. stroke, "ran wild" when the governor belt broke. Before the steam could be turned off, the 10-ft. wheel, used as a pulley, reached such a speed that it could no longer stand the strain and burst. The heavy rim tore away from the spokes and crashed through the roof and walls of the engine room. A fragment, after flying over 400 ft., practically demolished the porch of a dwelling. It is estimated that the heavy rim section reached a height of 500 ft. in its flight.

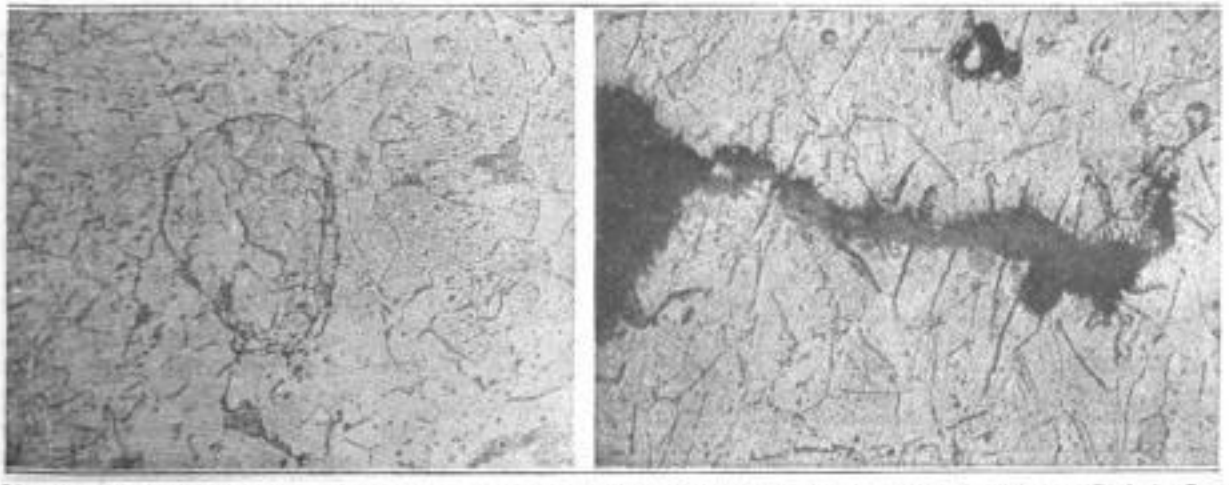
Wreckage Caused by the Bursting of a Large Flywheel. Left to Right: The Wrecked Engine; the Roof of the Engine Room; the Demolished Porch of a Dwelling, and a Section of the Wheel Found 500 Feet Away

A man and two children, who had been inspecting the engine a few moments previously, and a woman, who had just left the porch, escaped injury or death by very narrow margins.

WORKMANSHIP IS IMPORTANT FACTOR IN ELECTRIC WELDS

A study of the material formed in electric or arc welding, which gives interesting information, was recently made by the Bureau of Standards. Blocks of iron were built up by welding successive layers on a plate. From this, specimens were cut which were tested for physical and chemical properties and examined carefully under the microscope. It is stated that the metal formed by arc welding is practically a casting, and that it will serve for many useful applications. Owing to the conditions under which this is formed, the character and quality are not quite equal to that of good steel castings. The skill, care, and patience of the operator have an important influence on the results.

Pieces Cut from Blocks Built Up by the Welding Process, to be Used for Tests of Tensile Strength



Microphotographs of Steel Formed by Electric Welding: At the Left, a Specimen Containing a Globule Surrounded by a Film of Oxide, Represented by the Irregular Outline. At the Right, a Specimen Containing a Rupture

SPEED OF ANIMALS AND BIRDS IN FLIGHT

BY LLOYD D. LEWIS

THE reader should bear in mind that the experiments described in the following article all took place in a single locality—the Uintah Desert of Utah. Although there is no authentic publication covering the subject of the speed of wild animals and fowls in flight, there is reason to believe that it may vary with locality and the thousand and one influences that affect life everywhere, and, in fact, gradually modify the species.—Editor.

SPEEDOMETERS have been found to have a value other than that of aid to motorcycle "cops" in establishing the speed of luckless motorists. Experimental scientists of Denver, by using motor cars and airplanes, have made stop-watch and speedometer records of the speed of antelopes, coyotes, mule deer, elk, and greyhounds, the fastest running animals known, and of eagles and wild ducks, the speediest feathered coursers of the air. On the Uintah Desert, much of which is flat tableland in Utah, these tests of running animals were made. The party, seated in a high-powered automobile, drove across the desert following such animals as leaped from cover before them. By holding the car close to the fleeing animal the exact speed of the fugitive could be told.

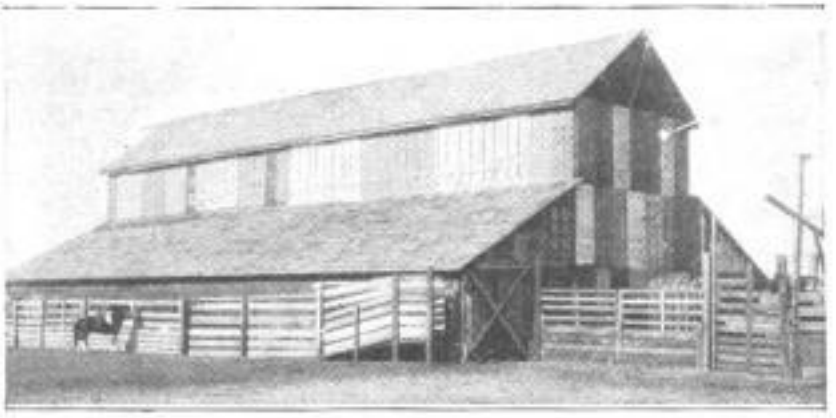
For instance, when a coyote sped like a gray ghost ahead of the car, the speedometer registered at 45 miles an hour for the first two and a half miles, then it went down to 30 miles, where it stayed. The tireless legs of the coyote find their "distance gait" at 30 miles. A wolf can do little better than 38 miles an hour at its best, the speedometer told, holding it, however, for three miles before finding its distance gait at around 33 miles. A mule deer averages 47 miles an hour for the first mile and a quarter, then settles to 29. An elk can do 52 miles an hour for three miles, but its distance gait is as low as 27. The antelope is the swiftest of all animals whose gait has been discoverable so far, its windlike pace taxing even the powerful car. For the first two and one-half miles the deer went over the plain at the unbelievable pace of 62 miles an hour. Faster than a mile a minute! Not even the greyhound can touch this speed, its best being a snaillike 49 miles per hour. The antelope wearies only after four miles, when it finds a 48-mile pace preferable. Its distance gait is 31 miles.

By following birds through the air with an airplane it was found that the eagle can make 46 miles an hour for 10 miles, then 32 miles an hour indefinitely, while a wild duck can scud with the wind at a 50-mile gait for four miles, slowing down to a 25-mile pace.

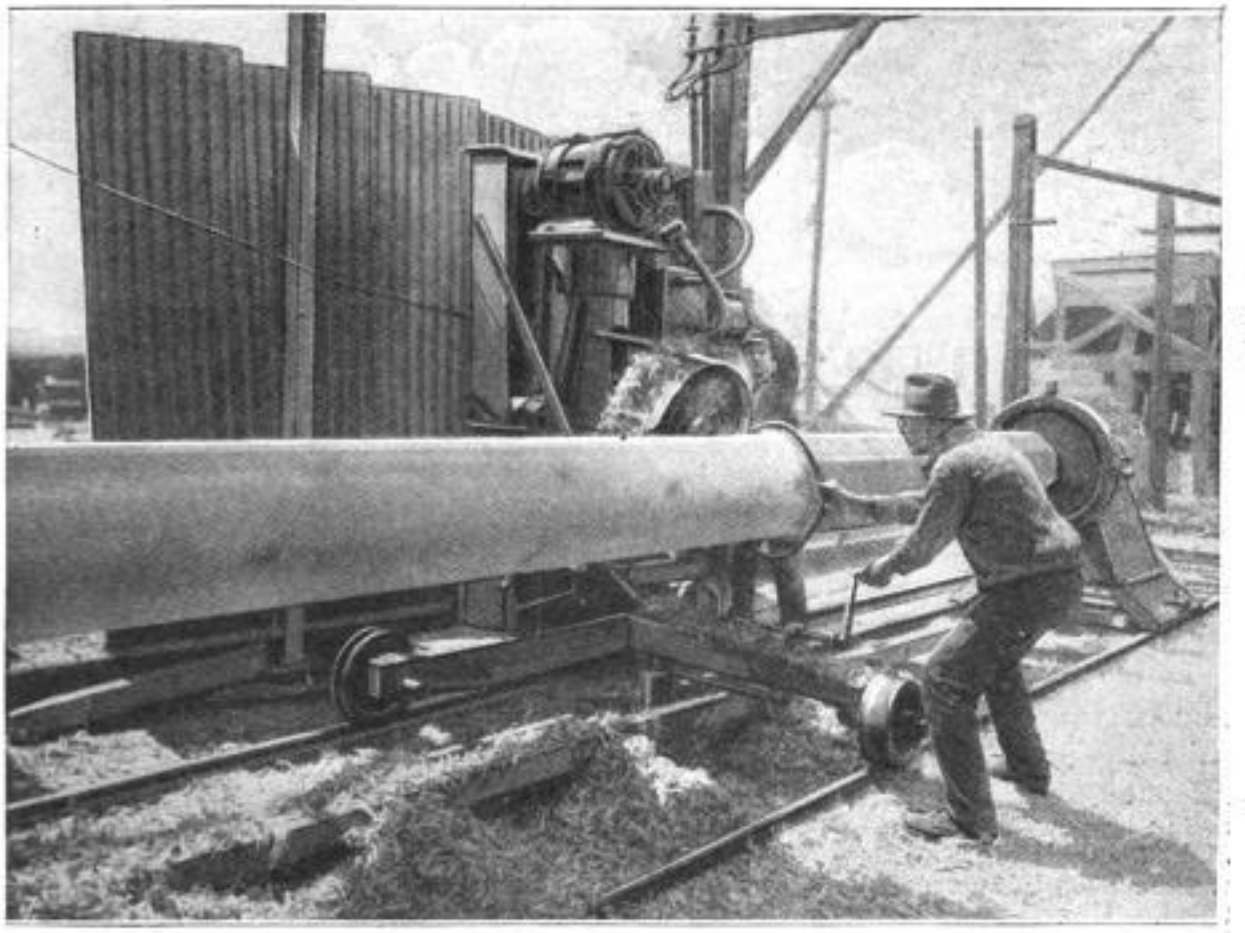
Wild horses have not been timed as yet, owing to their rarity on the plains, but it is agreed by wild-horse "wranglers," as their hunters are called, that most of them can outstrip the best thoroughbreds for distance speed. The immense difference between wild creatures, such as those already tested, and horses ridden on race tracks, can be appreciated when it is remembered that the time of 1:30 on the fastest tracks with a small jockey riding is phenomenal. This is at the rate of 40 miles an hour for one mile.

EXPOSITION DOORS BECOME WALLS OF BIG BARN

The walls of a large barn near Butte City, Calif., have felt the hands of hundreds of thousands of people, representing probably every civilized nation of the world. This strange statement can be hazarded because the framework of the big structure is covered with scores of doors salvaged during the dismantling of the old exposition buildings at San Francisco. Though Butte City is many miles from the metropolis, transportation of the doors was easy. The ranch fronts on the Sacramento River, and one of the proprietors is also the owner of a steamboat which frequently travels to the coast, and readily handled the odd cargo.



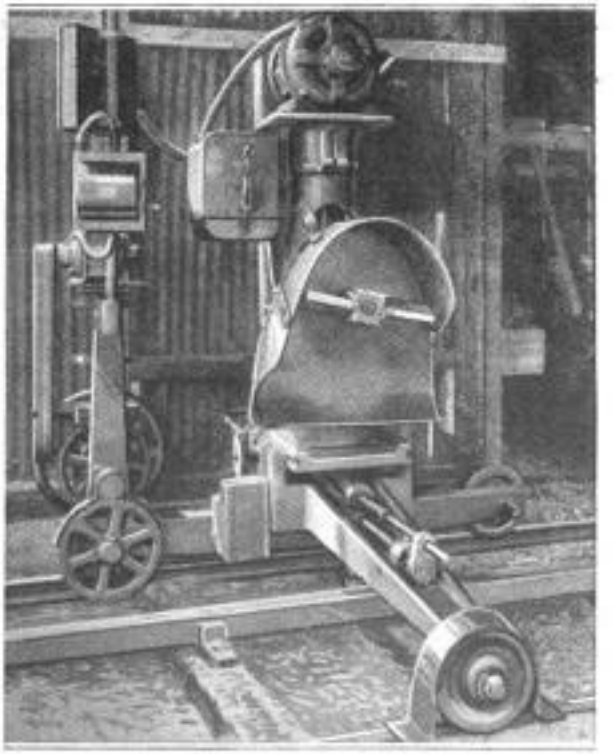
Close Inspection of the Walls of This Big Barn near Butte City, California, Shows That the Walls are Formed of Doors. These Are Relics of the San Francisco Exposition



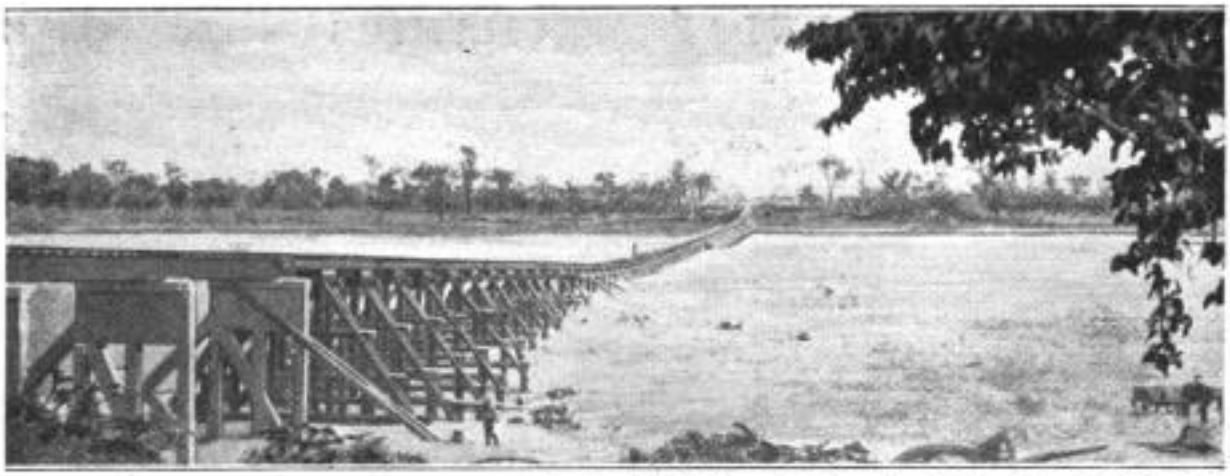
One End of the Big Combination Lathe and Planer, Turning a Stick of Timber, 100 Feet Long, into a Ship's Mast While the Operator Applies the Calipers: The Electrically Driven Blades are Seen in Action Both Planing and Turning the Giant Timber, While the Carriage upon Which They are Mounted Travels Slowly on Its Track along the Line of Its Work

GIGANTIC LATHE TURNS MASTS FOR SHIPS

What is virtually a combination lathe and planer of gigantic size, taking work upward of 100 ft. in length, is the interesting shipyard tool, invented in Georgia, that is making new records in the manufacture of masts and spars. The big stick of timber to be turned into a mast is centered between two tailstocks, one at each end, and supported at the center by an internal-gear chuck, which, driven by a 25-hp. motor, revolves it at 18 r.p.m. The two cutting-head carriages, electrically propelled, travel on rails between the center and ends of the timber, moving at the rate of 3, 6, or 12 ft. a minute. These carriages support revolving cutters that have blades 8 in. long, with 3-in. cutting edges. The machine will complete a 100-ft. mast of 22-in. butt, with all gains cut for fittings, in less than three hours, as compared with about 160 hours of labor for the same task, manually performed. Smaller work is readily handled with equal celerity, the tailstocks simply moving along the rails for adjustment.



A Close-Up of the Cutting-Head Carriage on Its Track, Showing the Shape of the Revolving Blades and Their Protecting Shield: The Electric Driving Motor is Mounted at the Top



A View across a Three-Quarter-Mile Stretch of the Burdekin River, in Queensland, Australia: The Need for Wells is Explained by the Fact That What Looks like Water Is Really Only Wet Sand

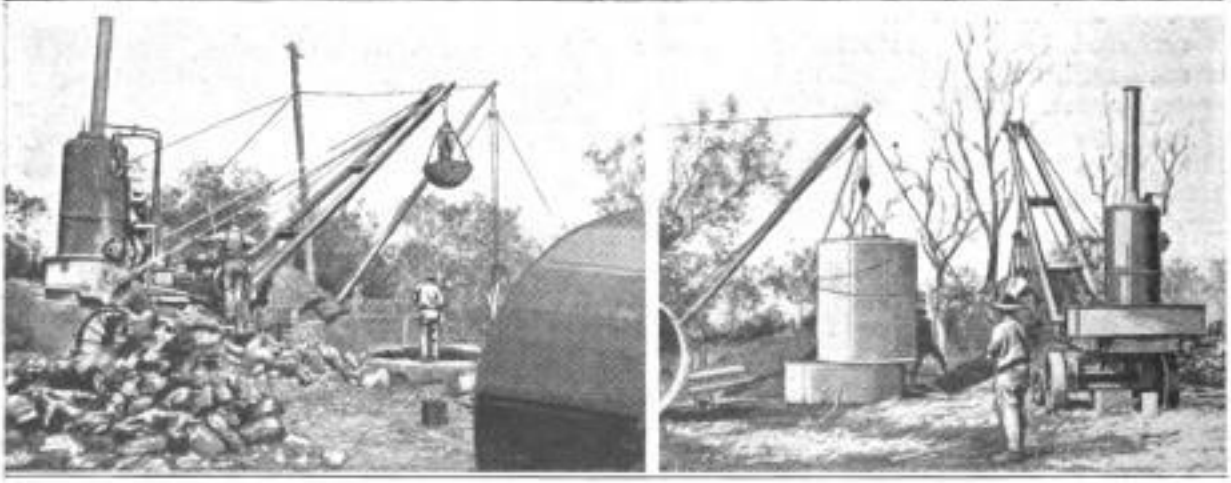
ELECTRIC OPERATION FOR IRRIGATION PROJECT

Wholesale generation and distribution of electric current for the special purpose of irrigation, as it is generated and distributed elsewhere for light and power, is an unusual and interesting project recently undertaken in Queensland, Australia. The method employed is to sink a large well on each holding of land, and install an electrically driven pump. There are in excess of 160 of these well pumps, and some 73 miles of transmission lines radiate from the central station to supply them. Three-phase current of 50 cycles is distributed at 6,600 volts to field transformers, and there stepped down to 415 volts for the motors. Each transformer operates three wells in rotation, each well having its own period of working.

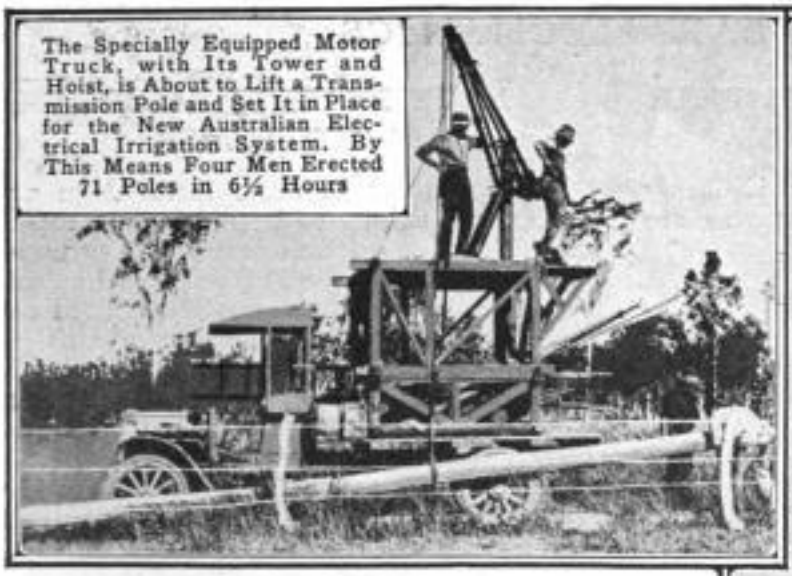
For the wells, precast reinforced-concrete cylinders, 5 to 7 ft. in diameter, 8 ft. long, and weighing 2½ to 3 tons, are lowered from 16 to 40 ft. to the water-bearing stratum. A crane with an orange-peel grab bucket is used for digging the wells, and motor trucks equipped with winches handle the heavy well cylinders and plant the poles and transformer supports. It was found that three men could load a 3-ton cylinder on a truck in three minutes, while four men erected 71 poles in 6½ hours.

TEST THIN CONCRETE SLABS POURED EDGEWISE

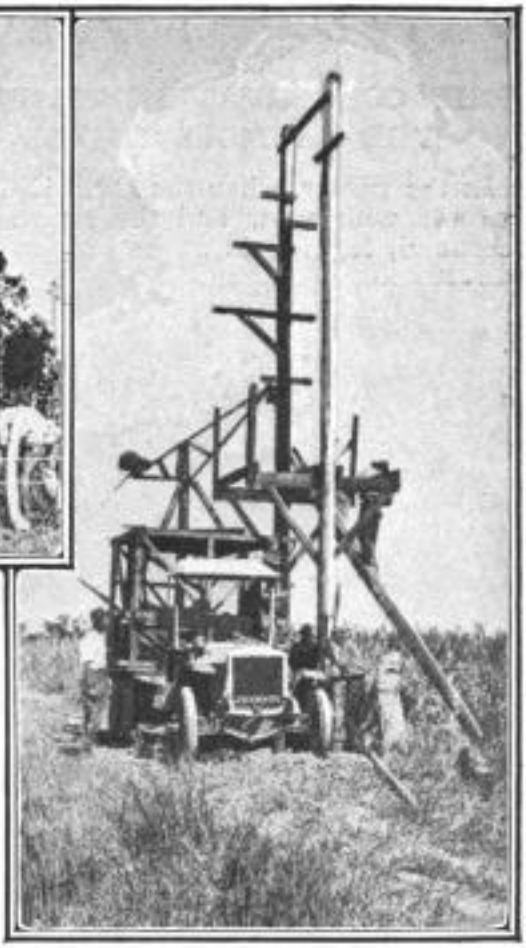
That concrete in the shape of thin slabs, as in the sides of ships, can be poured edgewise with satisfactory results, even though the form space is largely obstructed by reinforcing, is demonstrated by recent Bureau of Standards' tests. The experimental slabs were 6 ft. square and 4 in. thick, poured through windows at various heights in the sides of the form. Subsequently broken into 1-ft. strips for testing, these slabs showed a consistently high-grade composition. Maximum pressure, equal to that of a liquid weighing 124 lb. per cubic foot, developed 40 minutes after pouring.



Left: A Steam-Operated Grab Bucket at Work, Boring One of the 160 or More Large Wells of the New Irrigation District. Right: Simple Hoist System Used for Lowering the Heavy Concrete Linings into the Wells



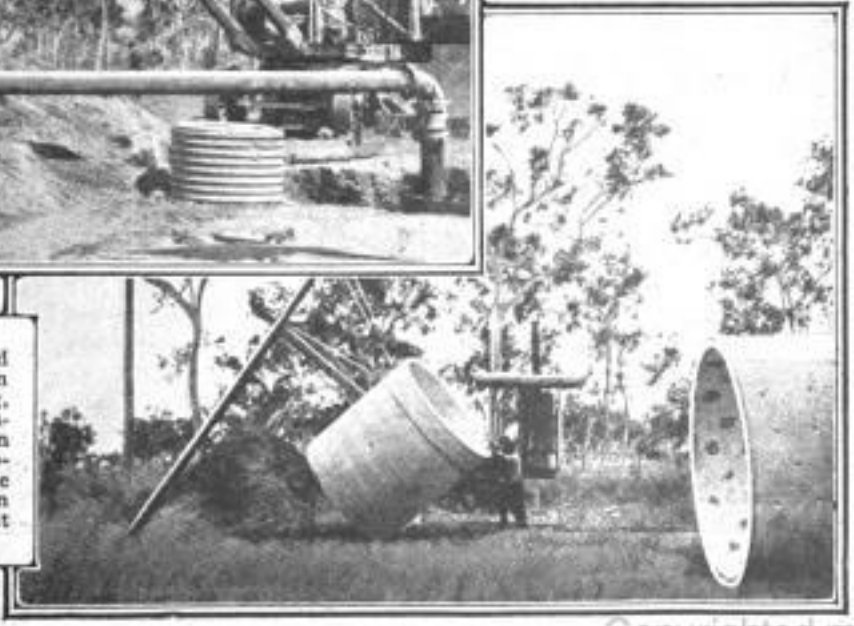
The Specially Equipped Motor Truck, with Its Tower and Hoist, is About to Lift a Transmission Pole and Set It in Place for the New Australian Electrical Irrigation System. By This Means Four Men Erected 71 Poles in 6½ Hours



The Pole-Planting Truck has Just Completed a Transformer Station and Platform on the Distributing Line. Each Transformer Feeds Three Well Pumps

The Big Concrete Well Cylinders, Weighing Three Tons, were Loaded on Trucks in Three Minutes Each by Means of a Hoist and a Cable

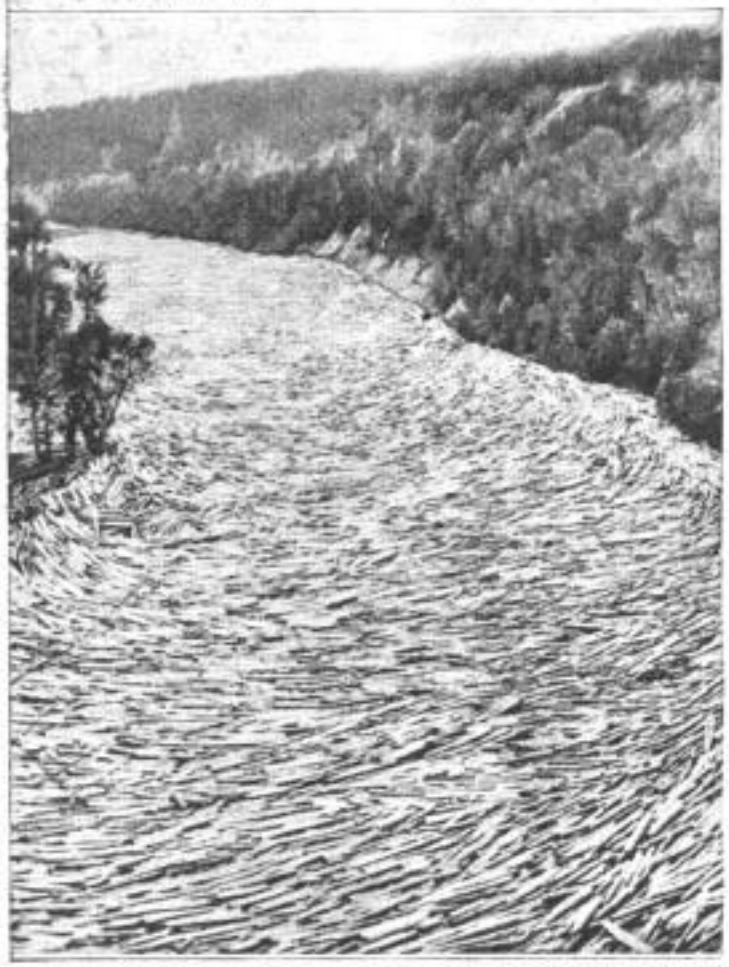
The Orange-Peel Type of Grab Bucket was Used in Excavating for the Well Cylinders, as at the Left. The Large Output of the Wells is Indicated by the Stream of Water Drawn by a Test Pump from a Five-Foot Bore in the Right Foreground



The Cylinders, of Reinforced Concrete, Five to Seven Feet in Diameter and Eight Feet Long, were Handled Easily by the Simple Hoisting Apparatus, Often Showing Its Strength by Supporting the Whole Weight of the Cylinder, Some 6,000 Pounds, on One Edge, as Seen on the Right

WHY CONSERVATIONISTS FEAR FOR NATION'S TIMBER

In the winter, when the earth is deeply covered with snow and the streams are icebound, logging is at its height. The



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Perhaps the Very Familiarity of Sights like This in the Timber Country, When the Spring Thaws Carry Millions of Logs to the Mills, have Dulled the Perceptions of the Lumbermen to the Inevitable Exhaustion of the Nation's Forests Unless Conservation Intervenes

logs are dragged to the river and dumped onto the ice by the thousands to await the spring thaws which carry the timber downstream to the mill, where it is either converted into lumber or into pulp for paper making. Should the logs jam, as they frequently do, they can only be dislodged by heroic effort and plenty of dynamite. Some of them sink and remain on the river bottom.

That the arctic lands of northern Canada, where the thermometer goes down to 91° below zero, offer unusual opportunities for growing sheep, cattle, Siberian alfalfa, and even fruit, is the announced belief of an American agricultural expert. He recommends the cross-breeding of Canadian and Siberian sheep to gain the hardy qualities required.

NAVY REPORTS RADIO DEVELOPMENTS

Improvements in radio installation on airplanes continue to be made at a rapid rate. In fact, so numerous and complicated are the different mechanical instruments now being placed on modern airplanes that the ships of the air are beginning to resemble much more closely their sister ships of the sea in elaborateness of machinery.

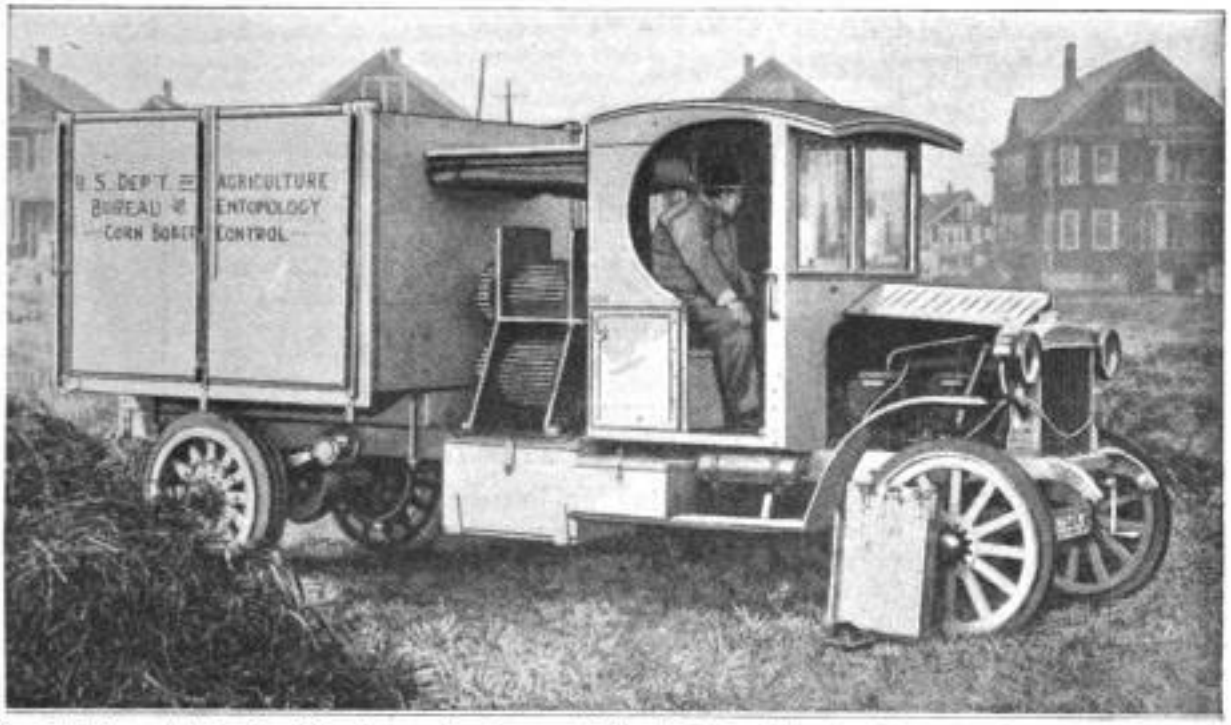
The commander of the air detachment, U. S. Atlantic Fleet, reports that the installation of distant control for the ignition system on airplanes has practically eliminated all ignition noises both on the trailing antenna for receiving and on the radiocompass coil. He states that the elimination of these noises permits communication between planes using the skid antenna for distances up to 10 miles. With the ordinary installation, using skid antenna, such communication is practically prohibited, except when planes are flying in close formation.

He also reports that the transmitting equipment which was recently modified to operate on the new standard fleet wave length, 975 meters, is giving satisfactory results.

The Martin bomber, which has been operating from the Naval Air Station, Anacostia, D. C., has been equipped with standard radio apparatus and the ignition leads shielded with flexible aluminum tubing. Tests are being made to see if this method of shielding is satisfactory for radiocompass work.

TRUCK HAS HEAVY IRON ROLLS TO CRUSH CORN-BORER PEST

Fire and steam are the agencies adopted as most reliable for the destruction of the recently imported European corn-borer pest, as related in this magazine in October, 1919, but there are places where these effective methods cannot safely be used. For carrying the war against the corn-killing worm into the small gardens and plots of cities and villages, for example, the Department of Agriculture now has a large motor truck, with a box at the back for collecting material from infected fields. Between



Special Motor Truck Used for Destroying Corn and Weeds Infected by the European Corn Borer, Recently Imported: The Heavy Rolls Back of the Driver's Seat Crush Stalks, Ears, Borers, and All

the box and the driver's compartment are a pair of heavy corrugated-iron rolls, driven by the truck engine. Weeds, cornstalks, and even ears of corn, in which the borers lie concealed, are readily crushed by these powerful rolls and their dangerous tenants destroyed.

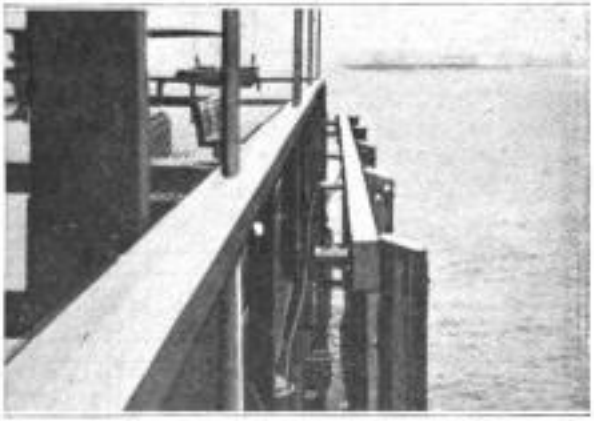
CHUTE CONDUCTS BUILDING DÉBRIS TO PAVEMENT

Because local ordinances prohibited dumping the débris from the upper stories of a building that was being remodeled, the contractor used a chute for the purpose. A quantity of tin pipe of large diameter, which was taken from the building, was connected to make a chute through which the mortar and other refuse were conducted to the ground.

A Quantity of Large-Diameter Tin Pipe, Connected to Make a Chute from the Upper Floors of a Remodeled Building, Enabled the Contractor to Remove the Débris Conveniently

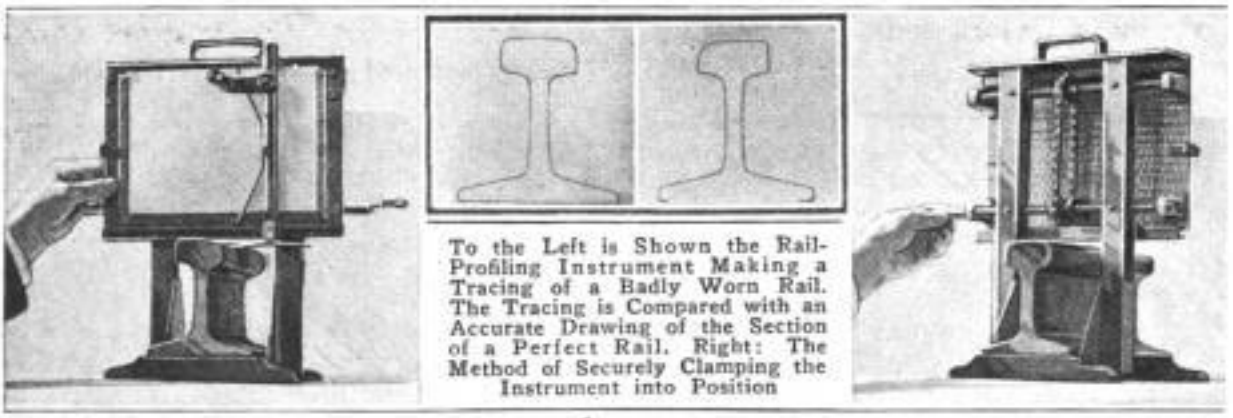
NOVEL SHOCK ABSORBER TO PROTECT A PIER

To protect a large pier, at Venice, Calif., from the full force of the waves, a shock absorber has been constructed



An Effective Pier Shock Absorber: The Auxiliary Piling Breaks the Force of the Waves. The Partially Absorbed Impact is Further Dissipated by Large Spiral Springs Which Also Have the Effect of Distributing It over a Wide Area

a few feet away from it. This is a row of five piles interconnected by heavy timbers. Although large open spaces are left, it is said that the retarding effect is almost the same as though it were a solid wall. Between the tops of the piles and the pier heavy compression springs are interposed. These serve as top braces for the piles, but do not transmit the impact of the waves as would rigid material.



To the Left is Shown the Rail-Profiling Instrument Making a Tracing of a Badly Worn Rail. The Tracing is Compared with an Accurate Drawing of the Section of a Perfect Rail. Right: The Method of Securely Clamping the Instrument into Position

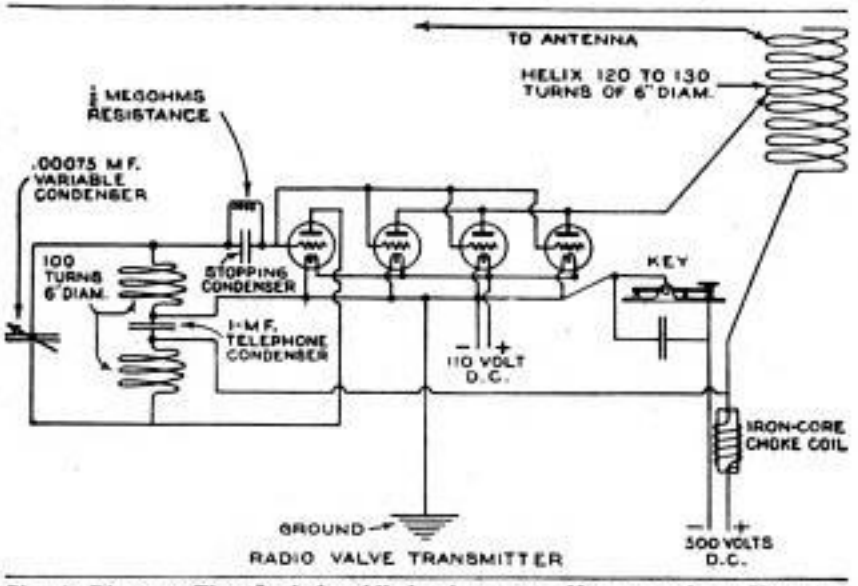
RAIL PROFILES MEASURED BY NEW INSTRUMENT

A new profiling instrument, used in measuring the degree of wear in railway rails, consists of a vertical rod, free to move horizontally and vertically, having a stylus at its bottom end and a pencil at the top, the complete assembly being attached to a drawing board, upon which a piece of paper may be fixed. Two legs hold the entire instrument free of the rail when placed crosswise of it. With the legs resting upon the crosstie, the stylus is drawn over the rail from top to bottom and across the top. As every movement of the stylus is duplicated by the pencil, a perfect tracing of the rail profile is made. When the tracing is placed over a drawing of a perfect rail section and the two are viewed against a strong light, points of difference, wear, etc., may be easily seen and measured. This method of determining wear is said to be more rapid and accurate than the older one wherein a plaster cast of the rail was taken.

RADIO "VALVE" TRANSMISSION A NEW DEVELOPMENT

BY SAMUEL W. BEACH

Only yesterday, as time goes, we were laboring to communicate through space without wires by means of the old spark coil. Even yet, lonely, rusty tramp steamers may be heard grunting and spitting out this style of signals, the meanest sort to copy.



Circuit Diagram That Includes All the Apparatus Necessary for a Vacuum-Bulb Radio-Sending Station, except the 500-Volt Generator, for Which a 500-Volt Fan Motor, Run as a Dynamo, may be Used

Then came the high-power transformer along with fancy spark gaps, much easier to read, and in universal use right now for ordinary transmission. Next appeared the arc, unexcelled for tremendous distances.

Now, a new type of radio-transmitting apparatus is appearing, which bids fair to run the "spark" out of business. This is the bulb, or valve system.

All that is required in this new transmitter are a 500-volt current supply, two or more vacuum audion bulbs, and a few other knickknacks, the whole of which, even for a professional station, might occupy less space than a soap box.

This new transmitter is quite common in Europe at present. The British navy is being rapidly equipped with it, and the United States maintains a string of bulb stations from Antwerp, Belgium, to Paris,

via the American zone of occupation in Germany.

The signals sent out by this type of transmitter are particularly clear, like high-pitched whistles, and are so sharply "tuned" to a desired wave length that outside interference is reduced to a minimum. The Antwerp station may be distinctly read by a ship two days off the entrance to the English Channel.

The accompanying diagram is easy to understand, and needs no further elucidation, other than a word to amateurs to the effect that should they not possess such a thing as a 500-volt current supply, the same may be secured by hooking up an old-style 500-volt fan as a dynamo, connected mechanically to a 110-volt fan motor.

ADDING-MACHINE ATTACHMENT FOR BLIND OPERATORS

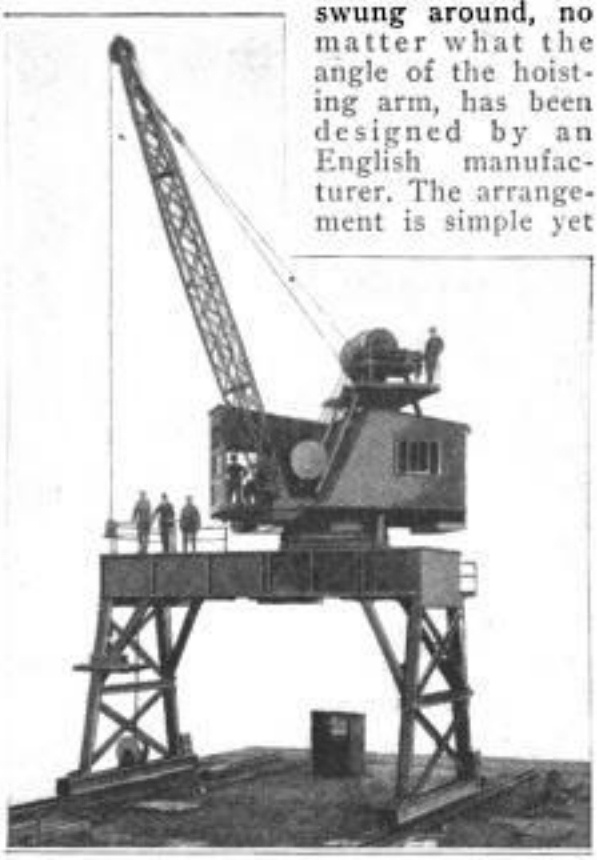
Since an adding-machine operator seldom looks at the keys after he has become familiar with them, it is evident that blindness need be no insuperable bar to the use of such an instrument. To remove what obstacles there are, a blind inventor of California has devised an attachment with which he is able to operate an adding machine, and read his totals, without trouble. An auxiliary keyboard is mounted on two parallel rods above the regular keys, and the cover glass is removed from the totaling dial.

An Adding Machine with an Auxiliary Keyboard and Braille Totaling Figures, for a Blind Operator

With the figures of the totaling register in Braille characters, a blind operator is ready to compete with any other.

LUFFING CRANE SWINGS LOAD IN PATH ALWAYS LEVEL

A crane of the luffing type which keeps its load level with the ground as it is swung around, no matter what the angle of the hoisting arm, has been designed by an English manufacturer. The arrangement is simple yet ingenious. The hoisting rope, on its way from the arm to the drum, passes around a fixed pulley at the base of the arm, then around a movable pulley which slides up and down a portion of the crane frame, then back around another pulley at the base of the arm, and finally to the winding drum. As the hoisting arm rises, the movable pulley slides down an equivalent distance, paying out rope and keeping the load horizontal, without changing the length of rope between the load and the base of the arm. The pulley counterpoises the arm, which balances in any position. By adjustment of a fusee drum the load may be gradually raised or lowered, if desired.



By Reason of the Sliding Pulley on the Face of the Crane Frame, the Load Remains at the Same Height, Regardless of the Boom's Position

¶Mineral deposits are no respecters of man's convenience. One of the richest oil fields yet discovered has just been reported near Fort Norman, Canada, almost on the edge of the Arctic Circle. It is 1,200 miles from the nearest railroad, 900 miles even from a river loading point, and a pipe line to it would cost $50,000,000.

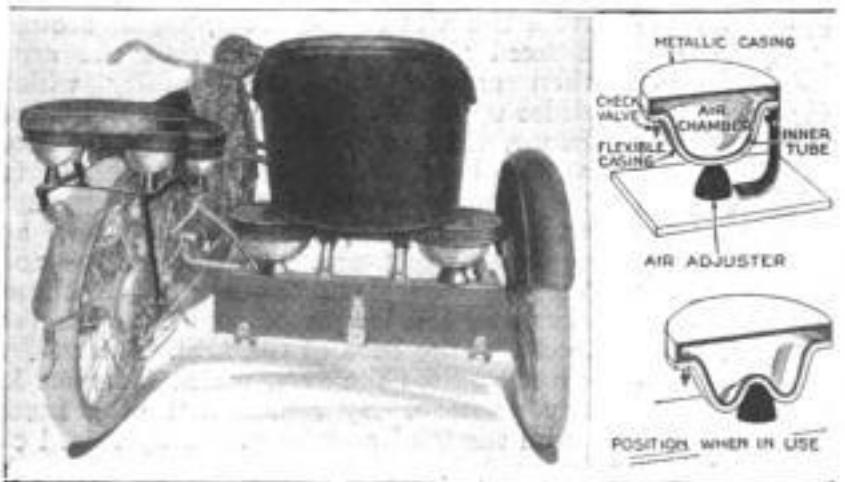
COSTA RICAN RAILROAD BURIED BY LANDSLIDE

A Landslide of Considerable Magnitude Covered the Tracks of a Costa Rican Railway, Just Missing the Passenger Train Shown in the Background. The Tracks are Buried under the Débris Shown in the Foreground

The passengers on a railroad in Costa Rica had a thrilling experience when a landslide occurred a few moments before the train upon which they were riding had reached the spot. A steam shovel required all day to clear the tracks. This part of the line is particularly hazardous, as it winds across a mile-long stretch of mountain-side with a steep slope and a river on the down-hill side. These landslides constitute a constant problem for the right-of-way engineers of the line, as they are quite frequent and, of course, dangerous.

VEHICLE SEATS MADE EASIER BY PNEUMATIC SPRINGS

Taking a lesson from the satisfactory performance of the pneumatic tire, a western inventor is bringing out a seat spring working on the same principle, and declared to add greatly to the easy-riding qualities of any vehicle. Whether applied to auto, tractor, truck, or cycle, each spring is made in the shape of a hemispherical bowl, consisting of a heavy outer casing of rubber, and a thin inner "tube." This is inflated, through a standard valve, to from 10 to 20-lb. pressure. The bottom of the bowl rests upon a conical support of wood, which indents a socket for itself in the rubber, and the vehicle seat is fixed to the metal case at the top of the bowl.



Left: A Motorcycle and Sidecar with Both Seats Equipped with Pneumatic Cushions. Right: Sectional Diagrams Showing the Cushion's Action

CARRYING POWER OF TONES FROM BELLS

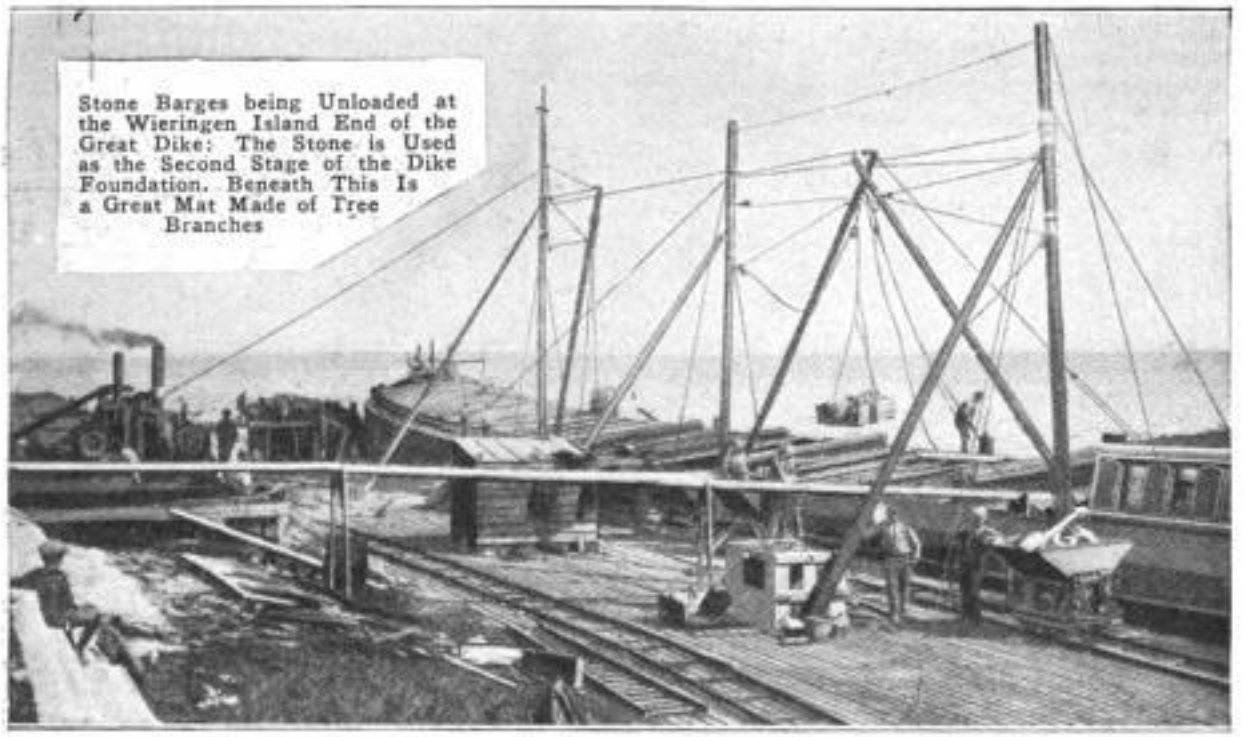
The sounds given off by bells have recently received attention at the hands of the scientist. The striking note is the note which is best heard when tunes are played upon the bells. Strangely enough, this striking note of a bell cannot be picked up by a resonator, and does not beat with a tuning fork of nearly the same pitch. Other tones of the bell can be picked up by a resonator or caused to beat with a tuning fork. It is also difficult to determine the octave of the striking note, and an error of an octave may be easily made. In reviewing the observations of an earlier worker on this subject, it appears that English bell tuners always gave the nominal note of a bell an octave lower than it really was. The sounds given out by bells are complex, and more work is required to understand the subject.

The Hollanders Have Serious Times When the Dikes Give Way. Under Normal Conditions the City Pictured Above Is Quite a Distance Inland, Surrounded by Fertile Fields. Weeks or Months will be Required to Drain This Locality

DRYING UP THE ZUYDER ZEE TO CREATE FARMS

After many years' deliberation the people of Holland have decided that they need more land and, having reached that decision, they have gone about the acquisition of it with characteristic Dutch energy and determination. The program contemplates the building of a 30-mile dike across the outlet of the Zuyder Zee and gradual reclamation of parts of that body by means of smaller dikes and a filling-in and pumping process. The damming of the north end of the Zuyder Zee presents difficulties, not only on account of the length of the dam, but also due to

Enormous Mats are Prepared by Tying Branches of Trees into Bundles and These into Larger and Still Larger Bundles. The Mats are Used as the First Stage of the Foundation of the Dike Damming the Zuyder Zee



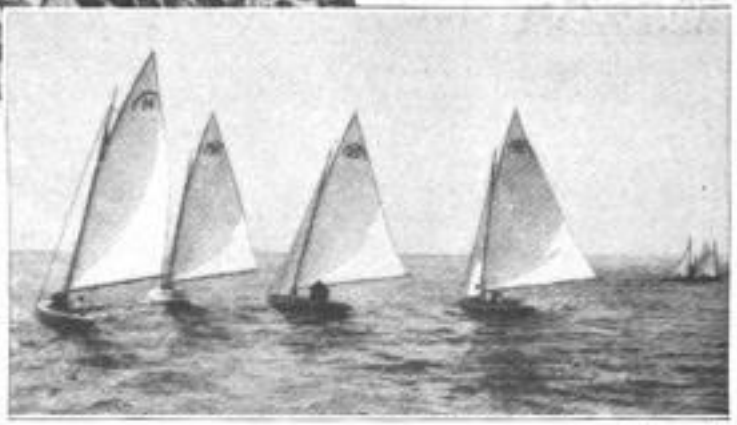
Stone Barges being Unloaded at the Wieringen Island End of the Great Dike: The Stone is Used as the Second Stage of the Dike Foundation. Beneath This Is a Great Mat Made of Tree Branches

the fact that, at the Friesland shore end, the water depth varies from 11 to 33 feet.

The foundation of the great dam will be, literally, billions of all sizes of tree branches, lashed together into great bundles. These will be sunk, forming a supporting mat of enormous area. Upon this will be placed a thick layer of coarse, crushed stone, and on this powerful foundation will be reared the masonry of the dike. The structure will have a height, above water level, of from 16 to 17 ft., and will be wide enough across the top to accommodate a double-track railway line. It is expected that the completion of the entire project will require 35 years.

The expense, based on pre-war figures, would have been about $88,000,000. However, later estimates place the figure nearer to $125,000,000. As it is expected that productive land to an extent of, approximately, 500,000 acres will be reclaimed, it will be seen that the cost will be about $250 per acre. Besides reclamation, an effect of the undertaking will be to convert the present salt-water Zuyder Zee into a fresh-water lake of an area of 600,000 square miles. Although of such great size, it will really be a controlled reservoir, impounding the flood

Dumping Rocks, Ashes, and Other Refuse down the Seaward Side of a Dike: The Water is being Steadily Pumped Out So That the Two Processes Constitute a Laborious Method of Making Land

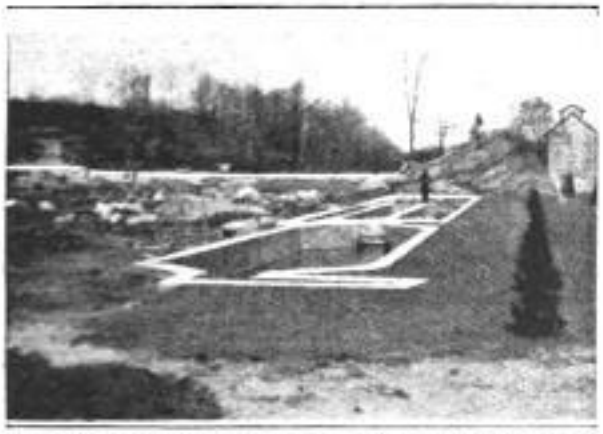


Dutch Fishing Fleets Now Sail and Cast Their Nets Where, in a Few Years, Cattle will be Grazing

waters of the River Yssel and connecting canals during the periods of the northwest storms, when they do not flow into the North Sea but overflow their banks, and releasing them through sluiceways in the great dike during calm weather.

TO REVIVE SALMON FISHING IN EXHAUSTED STREAMS

Completion of a modern $40,000 salmon hatchery at Madison, Conn., for restocking eastern streams with the valuable food fish that disappeared from that region practically a century ago, is awakening renewed interest in the cause of that early depletion. Not only has the salmon, once extraordinarily abundant, vanished wholly from many eastern waters, but even the great Pacific-coast supply is beginning to dwindle. The too common construction of dams without proper fish ladders, blocking the seasonal ascent of the salmon from the sea, explains the impending loss of this great natural resource, a condition often technically difficult of correction because many



New Concrete Salmon-Hatching Tanks in Connecticut, Independently Aerated and Drained

of the streams are not listed as navigable waters. An interesting detail of the new Connecticut hatcheries is the use of concrete tanks with independent aeration and drainage, saving the fry in the end tank from the troubles caused by series drainage.

INGENIOUS SWITCH IMPROVES MOVIE LIGHTING EFFECTS

Lighting arrangements in a modern movie studio are necessarily quite complex, and as many as 15 electricians are sometimes needed to handle a single scene. This condition has been entirely changed by one prominent manufacturer, however, through the design of a new and ingenious set of remote-control switches, with which one attendant can operate

Movie Cameraman Operating the Remote-Control Switch Box, to Coördinate the Lighting with the Action of the Player, Who is Holding a Lighted Match

any lamp or combination of lamps from a convenient point. Even the cameraman is able to handle the switches without interruption of his main task, when accurate coördination is demanded between the lights and the action.

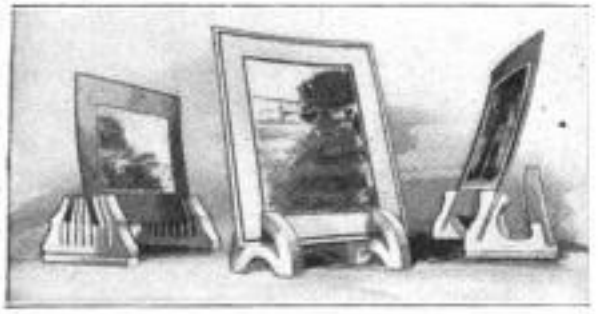
MOTOR TRUCK IS UPENDED BY SHIFTING LOAD

The sudden shifting, from front to rear, of a load of metal tubing had the effect of overbalancing the weight of the front of a truck, with the result that the forward wheels were lifted quite a distance from the roadway. The accident occurred when the driver made a sudden turn to avoid striking a child. Strangely, child, driver, truck, and load escaped injury.

A Sudden Shift of the Load Upset the Balance of a Motor Truck and Raised the Front Wheels Clear of the Roadway

NOVELTY PHOTOGRAPH HOLDER MADE IN VARIOUS DESIGNS

A nicety for the home is an artistic photograph or display-card holder, the



These Neat Photograph Stands may be Had in Conventional Finishes or in Special Schemes to Match Other Furnishings

use of which eliminates the necessity of framing prints, and protects the edges of mounts from being scarred. The new holders, made of wood and in a variety of designs and finishes, from the most simple to the ornate, are quite flexible, allowing the slots to expand sufficiently to accommodate any thickness of photograph mount or display card. The ease of making changes encourages frequent alterations in the display.

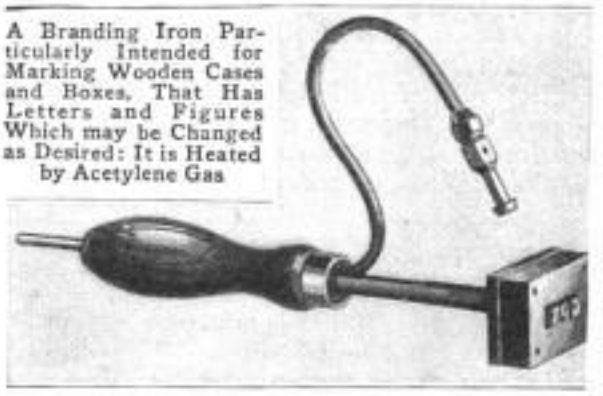
MOTORCYCLE LUMBER TRUCK SERVES ECONOMICALLY

The construction of a flume, located in the West, has been greatly hastened by utilizing a motorcycle as a light truck. A third wheel and a light framework were added to a stock model to form the support for the front end of a two-wheeled trailer. The outfit hauls a load of 200 ft. of lumber two and one-half miles three times per day. The superintendent in charge of the undertaking states that, by releasing four men for other work, the novel truck paid for itself in one month of service.

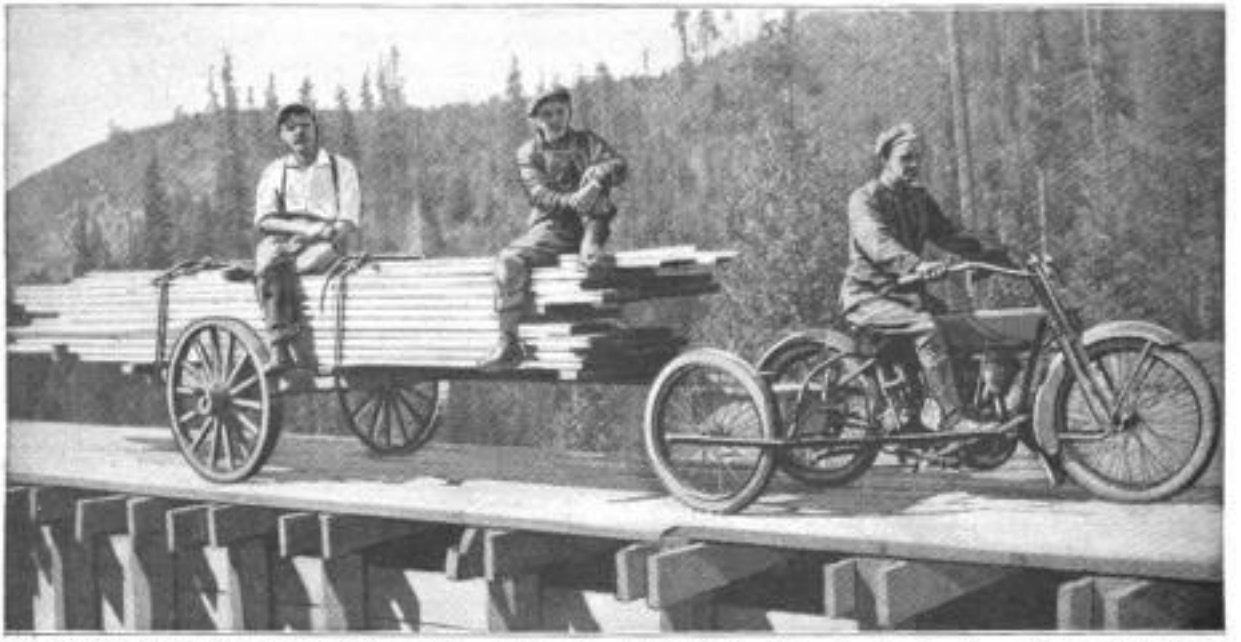
CHANGEABLE BRANDING IRON HEATED BY ACETYLENE GAS

A new branding iron has letters and figures which may be changed and combined as desired, and is heated by compressed-acetylene gas from a portable cylinder containing 40 cu. ft. Such a branding iron is particularly adapted for marking wooden cases and boxes, as the

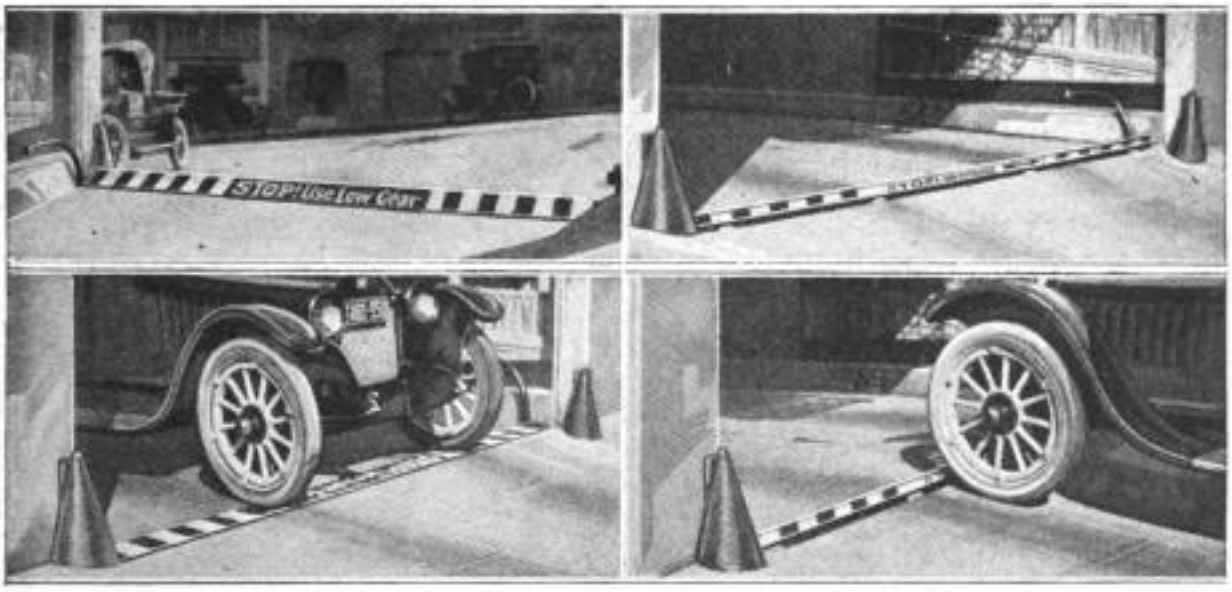
A Branding Iron Particularly Intended for Marking Wooden Cases and Boxes, That Has Letters and Figures Which may be Changed as Desired: It is Heated by Acetylene Gas



mark is permanent and there is no possibility of its becoming blurred or defaced, as with the painted or stenciled markings that are so commonly used.



A Standard Stock Motorcycle Fitted with an Extra Rear Wheel Furnishes the Motive Power for a High-Speed Lumber-Carting Outfit. The Roadway Is the Top of a Flume in Which the Lumber is Used



Four Views of the Automatic, One-Way Doorsill. Top, Left: How It Looks to the Exiting Driver. Top, Right: Appearance from the Street. Bottom, Left: Folding Down into a Recess, It Permits Egress. Bottom, Right: A Positive Barrier to Any Driver Attempting to Enter. A Conspicuous Decorative Scheme and a Printed Warning Add to Its Effectiveness

CONSPICUOUS AUTOMATIC DOORSILL PERMITS EXIT ONLY

To enforce the one-way traffic rule through the establishment, the management of a large garage has installed an automatic doorsill across the exit. The device is made of heavy steel and is hinged and counterweighted in such a way that, normally, the edge toward the street is held several inches above the drive level. This presents an obstruction which cannot fail to challenge the attention of an approaching driver. To a car advancing from the street side, the obstruction is very real. Immediately the wheels of an outgoing car bear upon the sill, the apparently formidable bump becomes a smooth, level path, the heavy threshold sinking into a recess in the driveway. A conspicuous decorative scheme and the admonitions to use the entrance and also to cross the sill in low gear have the desired effects of preventing movement against the direction of traffic and of making cars leave the building at a safe rate of speed.

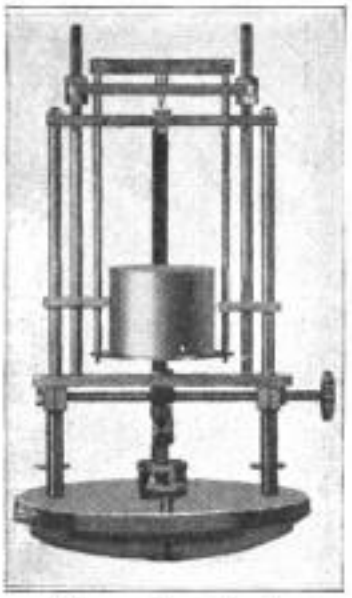
USE SIMPLE DRILLING OUTFIT IN SHALLOW OIL FIELDS

That even the process of drilling for oil may be greatly simplified when the requirements are less severe than usual, is exemplified in the shallow fields of southeastern Kansas. Here, where the wells go down only from 500 to 1,200 ft., a boom consisting of a single upright timber, supported by guy wires, takes the place of the customary substantial and expensive rig. The cable from the drill tools passes over a pulley at the top end of the boom, and down to a winding drum at the bottom. A clutch allows this engine-driven drum to be run first forward and then reverse, working the drill point effectively up and down. When, as a result of this primitive machine's operation, a well yielding 3 to 10 bbl. of oil a day is opened—which is about the average output for the fields so worked—the whole drilling outfit is readily and quickly packed up for transfer to another site, and just as expeditiously set up again.

A Boom of Timber and a Winding Drum That can be Reversed with a Clutch, Make Up This Simple Drilling Outfit for Shallow Oil Fields. It is Easily Dismantled for Moving

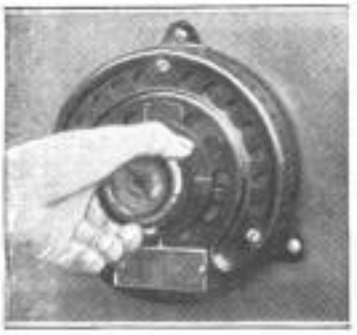
MICRO-TESTER INDICATES HARDNESS OF METALS

A recent advance in the field of the measurement of the qualities of metals is the introduction of the micro-hardness-tester. This device is used to determine the degree of the hardness of the individual crystals of which a metal is composed. A sample of the metal to be tested is placed upon a crossbar, called an anvil, at the top of the device, and a 1/16-in. hard-steel ball is then caused to press upon the sample with a force of 15 kg. (33 lb.). As the area of contact is microscopic, the depth of the resulting dent indicates the degree of hardness of the crystal, but not necessarily of all the crystals in the sample. The device is of especial value in determining the uniformity, or lack of it, in the crystalline structure of steels and alloy metals, and also of sheets of metal too thin to be accurately tested by the standard apparatus, in which a 1/2-in. ball under heavy pressure is used to make the impression.



FARM LIGHT-PLANT RHEOSTAT CHARGES AUTO BATTERIES

In order that automobile batteries may be charged from the standard 32-volt isolated power-plant circuits, a new low-voltage rheostat has been developed. Numerals, spaced around the face of the device, indicate the proper position of the control knob when a battery of a certain number of cells is to be charged. For a six-volt battery, the indicator should be set to point to the figure "3"; for a 12-volt, to figure "6," etc. It is asserted by the manufacturers that, as the resistances are accurate for their work, no voltmeter or ammeter is needed. The device may be used in cellars and other damp places.

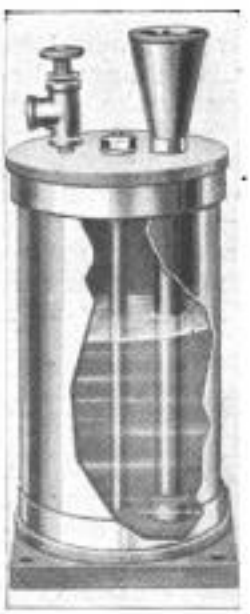


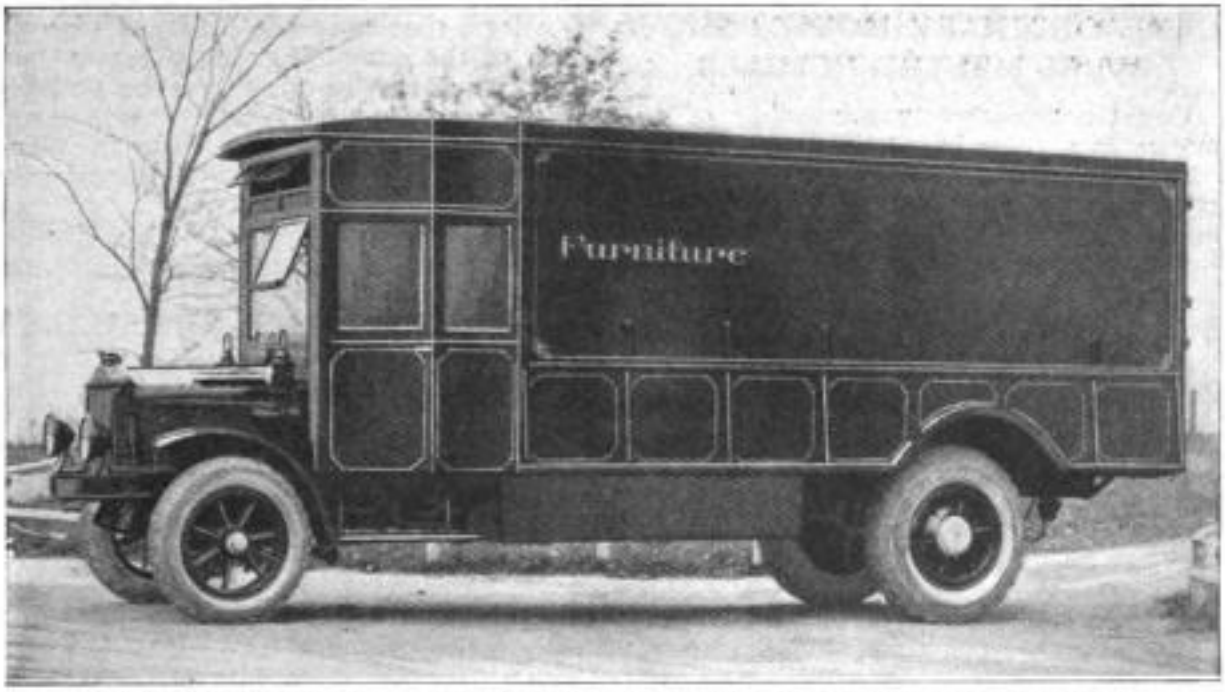
SAFETY-FIRST RULES IN THE UPKEEP OF MINE CABLES

The safe practice in the installation and maintenance of wire ropes in mines forms the subject matter of a technical paper recently issued by the Bureau of Mines. It is recommended that the large pulleys, over which the cables pass, be of a diameter of from 66 to 100 times that of the cable. Ropes used in the operation of passenger cages must not be spliced, but of the endless type of manufacture. Inspection should be made daily, broken, badly worn, or stretched strands being noted. Six broken wires in any one strand should warrant condemnation of the whole cable. Lubrication should be frequent, the lubricant being one that will penetrate to all parts of the cable and have viscosity enough to adhere, in a thick coating, to the outside. Tar does not fulfill these conditions, and its use is not favored.

ENGLISH WATER CARBURETOR MIXES WET AIR WITH GAS

For mixing water vapor with the explosive charge injected into a gasoline-engine cylinder, an English device of extreme simplicity has recently appeared. A small glass cylinder, closed by brass caps at top and bottom, is inclosed in a thin brass shell, with a vertical slot that serves as a water gauge. This chamber is filled through a tube extending nearly to the bottom, with a cork float, fastened to a wire, acting as a valve to close the lower end. An adjustable outlet valve at the top is connected by flexible piping to the engine intake manifold. The chamber is kept about three-fourths filled with water, and the air then drawn through it contains the most effective percentage of water vapor.





THIS MOVING VAN DE LUXE GIVES REAL TWENTY-FOUR-HOUR SERVICE

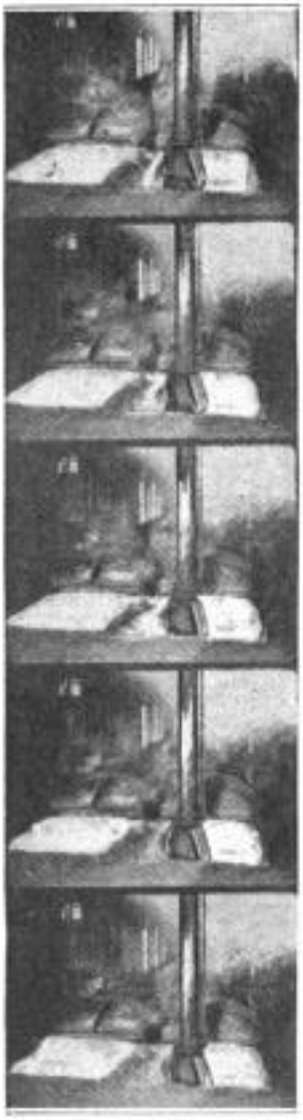
INTERCITY hauling of furniture and household goods having developed as a large portion of its business, an eastern furniture-packing and transfer concern recently ordered the enormous van pictured above. The huge body, of 1,000-cu.-ft. cargo capacity, is mounted on a 3½-ton truck chassis and will accommodate the furnishings of a six-room house. Interior padding has been supplanted by an individual compartment system, and the various articles are securely lashed into position to prevent bumping, rubbing, etc. The van is equipped with pneumatic tires in order that high speed may be maintained, and the speed idea is further carried out by having comfortable berths for the crew, so that one pilot may always be at the wheel while the others sleep. This keeps the machine in active service 24 hours per day, the only stops being for loading, unloading, taking on fuel, and the making of minor repairs. This strenuous program is necessitated by the length of the intercity runs, one of these being from Boston, Mass., to Baltimore, Md. The vehicle is electric-lighted throughout.

HUMAN BONES STREW COURTYARD OF GERMAN PRISON

THE photograph reproduced above was obtained recently from a veteran of the fighting in France. He was the source, too, of the information that the picture was taken some months ago in an inner courtyard of an abandoned but notorious German prison. Though the antecedents of the skulls and bones are not given, common sense denies that the commander of the prison would have disposed in this way of the bodies of his own men. Bullet scars on the walls at the left suggest, in fact, that this was the place of execution. If this be the explanation, the grewsome evidence seems to indicate a very orgy of indulgence of vindictive brutality.

EXTRAORDINARY MOVIES SHOW STEEL MELTED IN MILLS

Conspicuous among a number of remarkable scenes, in a three-reel motion-picture film recently taken of an Ohio steel mill in operation, is one that actually shows the boiling of molten metal in an open-hearth furnace, heated to 3,000° F. The photographic feat of successfully registering this action in detail on the film is particularly interesting, because the subject is one that the human eye cannot gaze upon unprotected. Furthermore, the extreme heat of the furnace cast some doubt on the safety of the camera, with its charge of celluloid ribbon, and while the exposure was made, two men stood ready to hurl the operator to a cooler place if anything happened. The finished films, of high educational value, are to be used in technical schools, and, with portable projectors, for sales and conventions, the set constituting a complete reproduction of steel-mill work.



AMERICAN FISHING SCHOONER WINS GREAT SAILING RACE

Sea races between yachts cleverly built and finely tuned for that sole purpose are interesting enough, but to many there is a greater appeal in the simple virility of the recent international trial, off the coast of Halifax, N. S., between two plain fishing schooners. The two-masted "Esperanto," representing the United States, and the "Delawana," of the same class from the Canadian banks, fought bitterly over a 40-mile course, laid out in five legs, that tried the practical seamanship of the competing crews beyond any experience in the circles of the polished racing machines. The final victory of the boat from Gloucester, bringing the Stars and Stripes through sun, wind, and rain, was won hardly enough, with only 8 minutes 8 seconds to spare, its time for the course being four hours 33 minutes.

START NEW YORK-NEW JERSEY TUNNEL FOR VEHICLES

Emancipation of New York City from the difficulties of ferry connection with the New Jersey side is actually in sight now, since ground has been broken for the new vehicle tunnel under the Hudson River. It is expected to take 3½ years to complete the big double bore, which will be about 1⅓ miles long. Each tube is to be 29 ft. in outside diameter. The traffic passages will be 20 ft. wide and 13½ ft. high, the spaces below and above being used as incoming and outgoing ventilation ducts, respectively. Four ventilation shafts, the inner two 3,800 ft. apart, and 65 electric fans, will serve to change the air 32 times an hour. The tunnel's cost is estimated at $28,669,000, and it is calculated that in 20 years it will be handling 15,800,000 vehicles a year.

NAILS INSIDE SHOES REMOVED BY ILLUMINATED PINCERS

Discovering nails in a shoe with one's foot as the detector is a distressing experience that one eastern footwear factory is determined to abolish. In the inspection of this concern's output of shoes, a curious instrument is brought into play, consisting of a pair of slim cutting pliers with long handles and short jaws, and a tiny electric light mounted at the hinge. With 4 ft. of flexible cord connected to a flashlight battery, the interior of the shoe is so illumined that any protruding nail or tack is instantly spotted and deftly removed.

PILING SUBMERGED FOR 28 YEARS TO BE USED AGAIN

The Long Pier from Which the 28-Year-Old Piling was Removed and Found to Be Still in Good Condition

The Improvised Plant on the Beach, Where the Old Piles are Cleaned and Coated with Preservative

A Stack of the Old Piles Just Removed from the Water: In Spite of Their 28 Years of Submarine Service, They Are as Good as New, and Ready for Use in Building the New Pier

After the city docks of one of the transcontinental railroads had been moved to the new harbor of a west-coast city, the old pier was abandoned to the fishermen who have used it exclusively for almost a decade. The wharf has been declared unsafe and the work of dismantling it is under way, but though submerged for more than a quarter of a century, the original piles have been found in such excellent condition that they are to be sent 10 miles down the coast and used to support a new pier. Whether it was an extra-good coat of tar or a thick layer of barnacles that saved them from the ravages of marine borers, the fact remains that the piles are practically as good as new. The old piles, as they are removed, are scraped and cleaned, and treated with wood preservative, and a temporary but effective plant for handling this part of the work has been set up on the beach.

GROTESQUE GERMAN MOTORBOAT IS IMITATION WHALE

WITH the grotesquery that frequently distinguishes design in that country, a new type of motorboat, which has recently appeared on the River Spree, in Germany, has the shape and general aspect of a whale. To avoid too realistic an emulation of the famous Jonah, however, the passengers enter through a cockpit opening midway of the back, and not by way of the monster's esophagus. Three round portholes, glass-windowed, on each side forward, give a sheltered outlook over the water. An engine of 50 hp. drives the counterfeit leviathan at a high rate of speed.

QUADRUPLEX ELECTRIC CLOCK SHOWS TIME IN FOUR CITIES

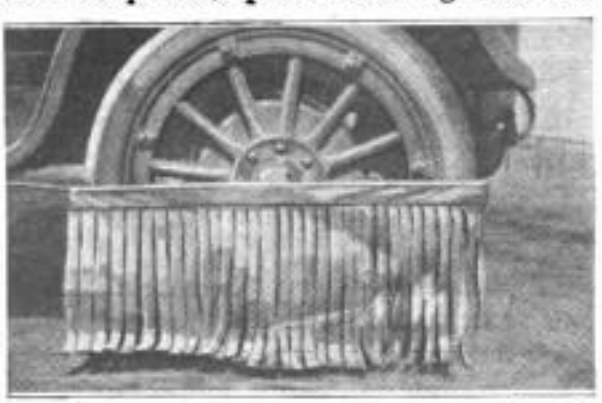
The time in New York, San Francisco, London, and Paris is shown by an unusual clock recently installed on a new

The Large View Shows the Master Dial and the Mechanism of the Four-Locality Clock. At the Top Are the Main Dial, Showing Local Time, and the Small Dials Showing the Time in Three Important Cities

building in the first-named city. The motive power is electricity, and accuracy is assured as the timing impulses are governed by a master clock, which, in its turn, is governed by impulses originating at Washington, D. C. The large dial of the local-time clock contains the small dials showing the time at the distant points.

JAP CITIES REQUIRE SPLASH FENDERS ON RAINY DAYS

Unfortunately, this country has no ordinance to prevent a motorist from running his car through a puddle and spattering everyone within range. However, most Japanese cities require the use of guards on the wheels of automobiles to protect pedestrians against this sort of mud slinging. The guard is attached to the axle end, and consists of cloth or paper strips fastened to a horizontal board.



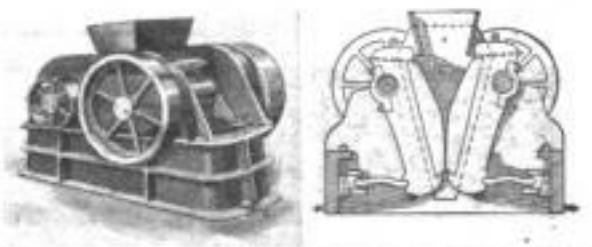
Local Ordinances in Most Japanese Cities Require That Automobile Drivers Use Splash Fenders on Their Cars on Rainy Days

INVISIBLE RAYS FROM ARC WELDER INJURE THE EYE

The extent to which the eye is susceptible to injury by the invisible ultraviolet ray emitted by the flame of an electric-arc welder, or any other open-flame arc, was most decidedly illustrated recently when 17 out of 30 of the spectators of the demonstration of a new-type arc-welding apparatus developed marked cases of a serious eye inflammation, similar to that caused by injuries such as blows, dust, or other foreign bodies in the eye, which, unless treated promptly, may result in blindness. Although many of the spectators were acquainted with the risks attendant upon the operation of the apparatus, the invisible rays are so far beyond the comprehension of the sense of sight that the injuries had been sustained before the danger was realized. Workers with the arc protect their eyes with thick-lensed colored glasses.

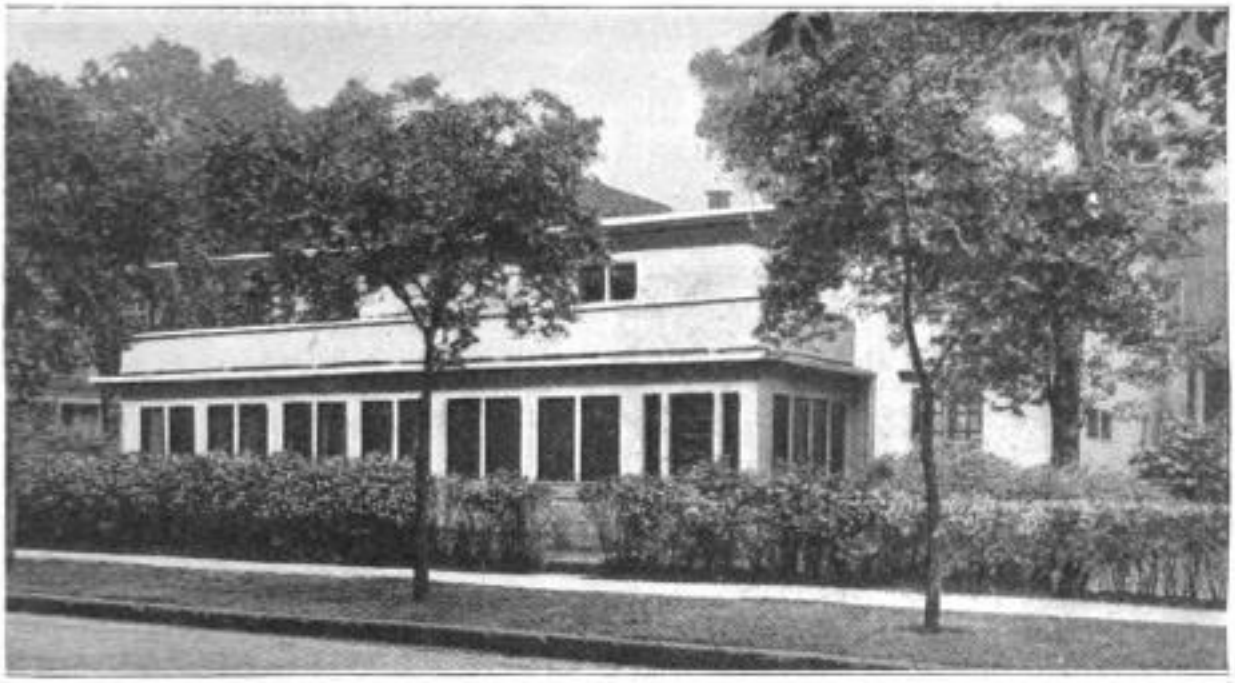
COMBINATION ORE REDUCER CRUSHES AND GRANULATES

A new ore crusher combining two successful principles has been developed



A Lightweight Ore Crusher and Pulverizer Which Is Small Enough for Use by Prospectors: At the Right is Shown How the Jaws First Crush, Then Rub the Ore into Powder

by an Arizona inventor. The ore is first crushed by the upper portion of the jaws, after which it falls to the lower parts and is subjected to a rolling and grinding movement. This difference in motion is accomplished by designing the jaw linings in such a way that they are never parallel. The travel of the jaws is adjustable, and the linings and other wearing parts are easily replaceable. High speed, low upkeep charges, and economical operation are claimed. It is said that the machine, being small, is adaptable to the requirements of prospectors and small mines.



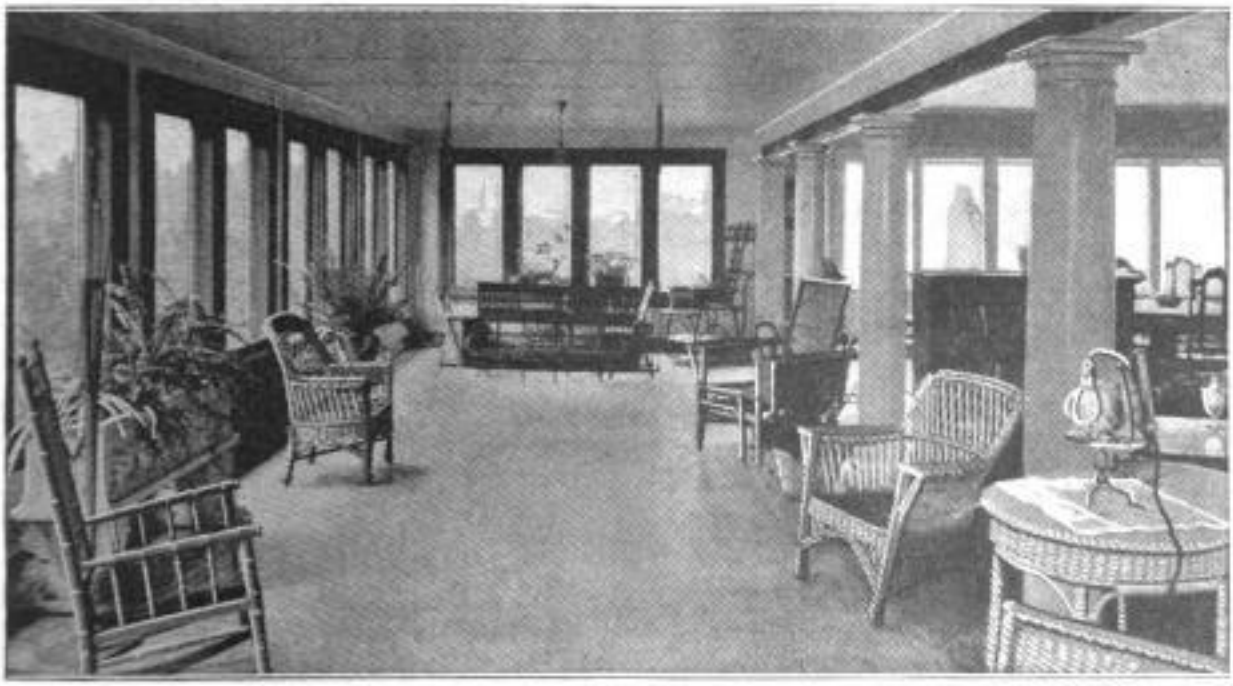
View Approaching the House from the Center of Its Block: The Long Glassed Porch Is Very Much in Evidence, and the Height of the Wall around Its Roof Makes the Latter a Safe Balcony-Playground. Behind the Porch Roof, the Gallerylike Second Story Is Visible

SAVING OF WORK IS MOTIVE OF UNUSUAL HOUSE

BY PAUL H. WOODRUFF

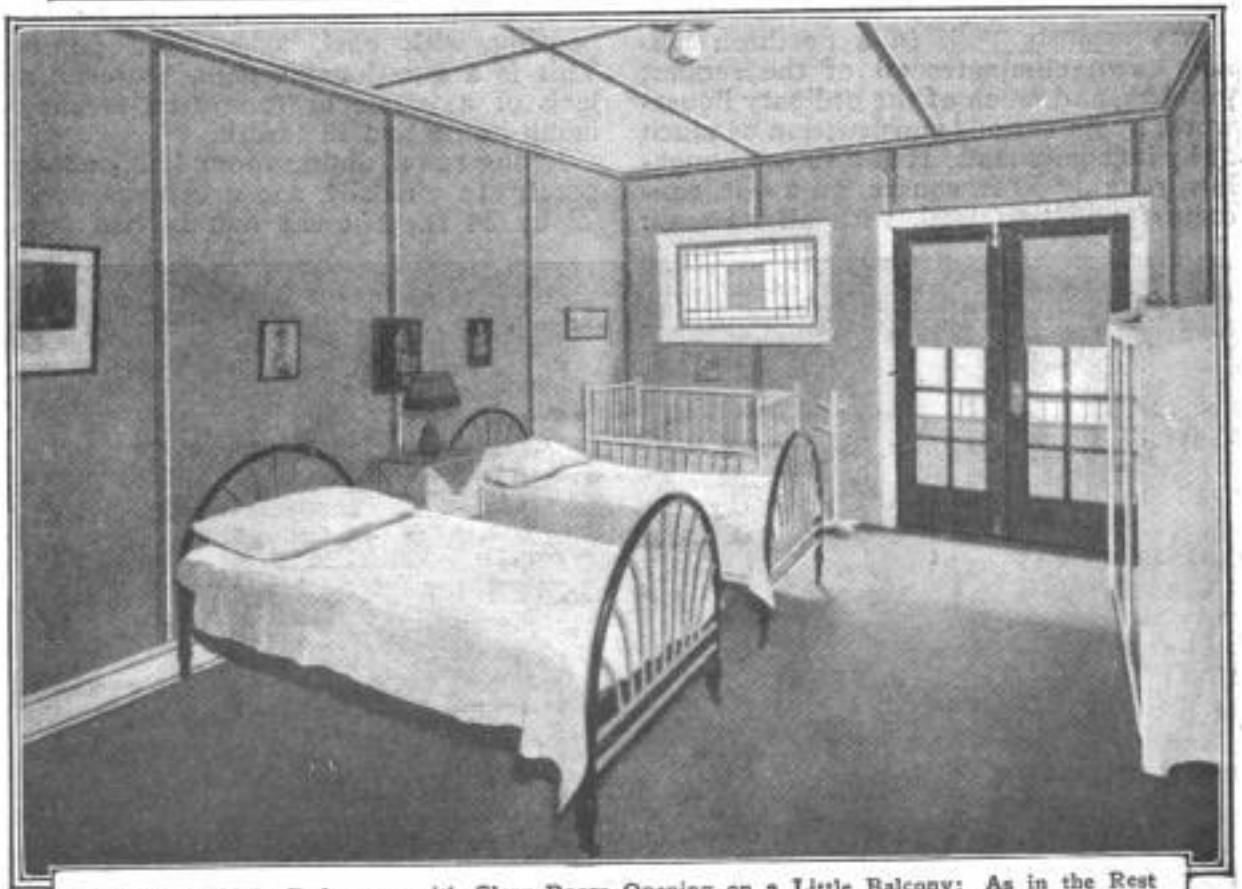
TO a housekeeper, a home that saves labor is primarily one that is easily kept clean. Designed by a woman, a house recently built in a northern Illinois town eliminates all of the servant problem, and much of the ordinary housework, by its curious construction as much as by its equipment. It is a stucco bungalow, roughly 58 ft. square, on a 4-ft. concrete foundation wall, with all its main rooms on one floor. There is no basement, except a 5 by 8-ft. pit, in which is installed an automatic gas boiler, dispensing with coal, ashes, and janitor. This is a questionable gain, however, as lack of a basement too often means a damp house and ill health.

Living room, dining room, hall, and sun porch are virtually one enormous room, 42 by 34 ft., but the hall is two steps

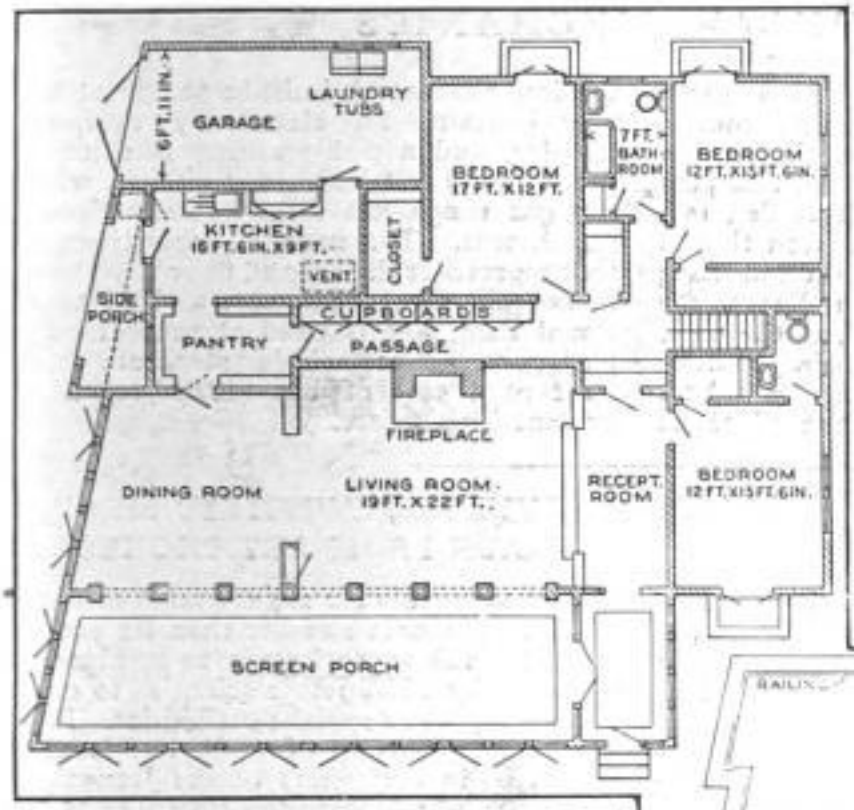


The Long Vista of the Porch Interior, Looking from the Hallway: Only the Row of Pillars at the Right Separates the Porch from the Huge Living Room, and the Whole Stretch is Floored with Italian Terrazzo

One End of the Big Playroom on the Second Floor, Where Toys may, on Reasonable Occasion, be Left Scattered About over Night without Serious Consequences: The Doors at One Side Open upon a Charming Little Pergola, and at the Other Side the Big, Walled Balcony above the Front Porch Offers a Safe Outdoor Retreat

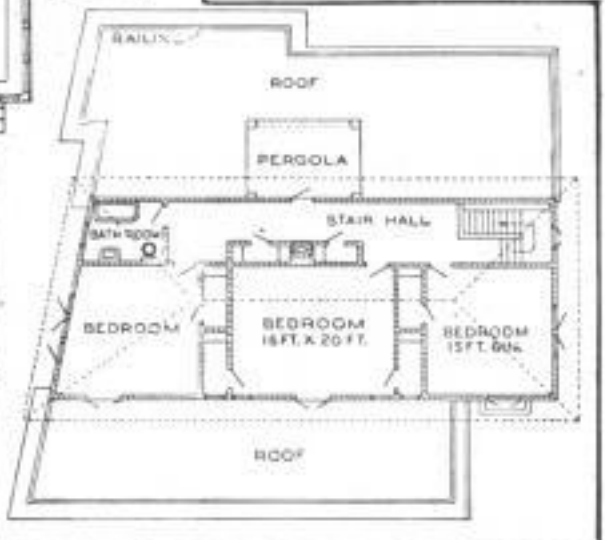


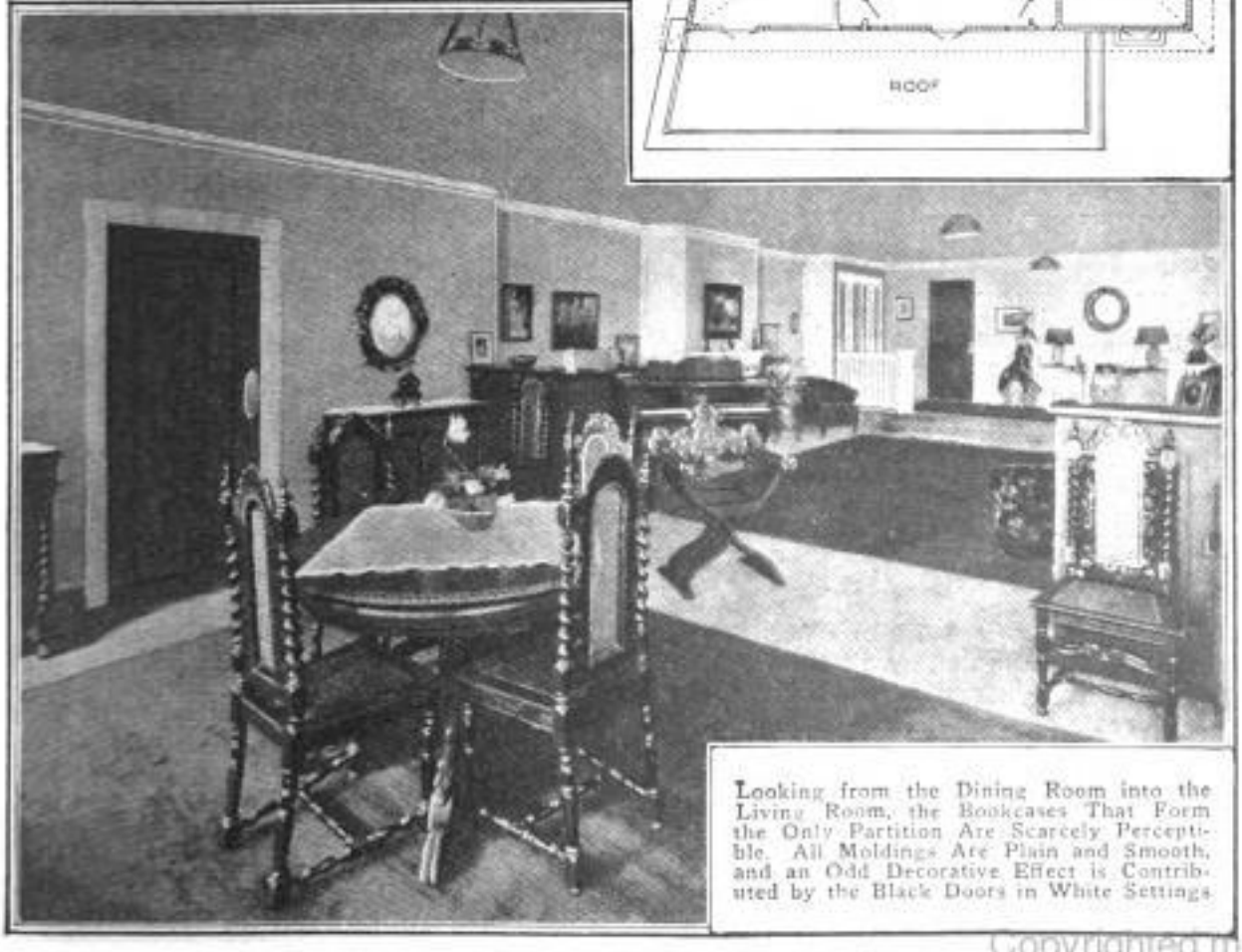
One of the Main Bedrooms, with Glass Doors Opening on a Little Balcony: As in the Rest of the House, No Plaster is Used, Paneled Wallboard Effectively Taking Its Place, While Plain Linoleum Makes an Eminently Satisfactory Floor Covering. The Small, High Casement at the Left of the Balcony Doors Is an Interesting Detail



Noteworthy Points in the First-Floor Plan, Above, Are the Reception Hall's Position, Two Steps Higher than the Living Room, and the Laundry in the Back of the Built-In Garage. The Second-Floor Plan, at the Right, Indicates Three Bedrooms, but at Present It is Used as One Large Playroom

Interesting Features of the Bathroom Are the Sanitary and Dustproof Baseboard Arrangement, and the Curious Casement Curtains





Looking from the Dining Room into the Living Room, the Bookcases That Form the Only Partition Are Scarcely Perceptible. All Moldings Are Plain and Smooth, and an Odd Decorative Effect is Contributed by the Black Doors in White Settings

higher than the rest, a pair of bookcases separates the living and dining rooms, and a row of eight pillars marks off the porch, with its 16 windows. All this part of the house is floored with Italian terrazzo, an economical composition that is more durable and easier to clean than wood. The three bedroom floors are linoleum. No plaster is used, all the walls and even the cabinet panels being of wallboard. Fancy moldings are also taboo, and casement cloths take the place of window shades. A built-in garage at the rear contains an electrically equipped laundry, and a dish-washing machine is permanently installed in the kitchen, while the gas range has an automatic timing attachment. The narrow superstructure that represents the second floor is planned to contain three bedrooms and an additional bath, but is used at present as a playroom. The whole structure was built at a cost of but $12,000, even at present high prices.

IMPROVED RAIL-BOND TESTER INSURES PERFECT CONTACT

A new instrument to test the conductivity of the bonds between rail joints has, as contact points, four small drills which quickly cut through rust or other insulating matter. The drills, a buzzer, one dry cell, and a switch, all contained within the device, and a separate telephone-receiver head set, comprise the component parts. In use, the apparatus is forcibly applied to the rail joint, causing the drills to cut their way to clean metal, and the switch is closed. If the bond is perfect there will be no indication. An imperfect bond causes a buzzing in the receiver. Varying degrees of sound indicate various degrees of bond imperfection.

VENTURESOME AIRMEN EFFECT LANDING IN SNOWDRIFTS

Unexpectedly encountering a terrific blizzard, accompanied by a blinding snowstorm, while flying at a great height, two amateur airmen, residents of a northern city, were forced to fly with the wind in the direction of the nearest town, 180 miles away. One of them states that this distance was covered in 80 minutes. A forced landing was made, without serious damage, in drifts so deep that the machine was completely buried.

LEVULOSE, SWEETEST SIRUP, MADE FROM ARTICHOKES

As a substitute for sugar that is actually 30 to 50 per cent sweeter than its prototype, the substance known as levulose is declared, by a Minnesota scientist, to offer interesting commercial possibilities. It is the sweet principle of fruit, but is also abundant in the tubers of the Jerusalem artichoke, of which, in the starchlike form of inulin, it constitutes 12 to 14 per cent. The inulin is converted to levulose by treatment with boiling water or dilute acids, but its recovery and conversion have not yet been attempted on a large scale, though few technical difficulties are apparent. In round numbers, 40,000 lb. of artichokes to the acre would yield 4,000 lb. of the fruit sugar, comparing well with any other method of sugar production. Its use as a sirup would release large quantities of dry cane and beet sugar for other purposes. The levulose itself is difficult to crystallize.

AUTO ACCELERATOR PEDAL AND FOOTREST IN ONE

A combination footrest and auxiliary accelerator pedal, for motor cars, which relieves ankle strain, keeps the foot cool, and allows a more steady throttle control, consists of a short lever, hinged immediately back of the center, to permit a rocking motion. The forward end of the appliance rests upon the stock accelerator pedal, or button, found on most makes of

cars. The toe rest is fitted with a block of heat-insulating material, which prevents the engine heat from being conveyed to the foot. Another effect of the device is the preventing of the wear of an unsightly hole in the floorboard covering directly beneath the driver's right heel, a common occurrence when the covering is of soft material.

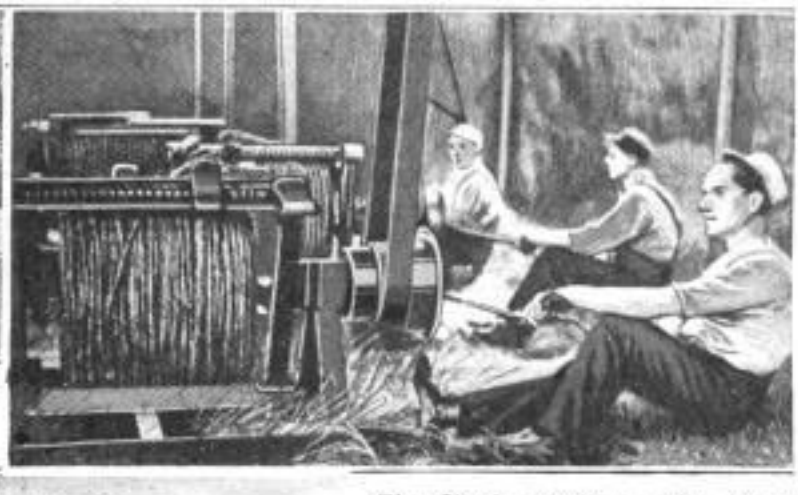
CONCRETE VESSEL SHATTERED AND SUNK IN COLLISION

Sacrificed, apparently, to a misunderstanding of signals, the American concrete steamer "Cape Fear" sank in three minutes, in about 750 ft. of water, when it was rammed in Narragansett Bay, a short time ago, by the liner "City of Atlanta." In spite of a clear sky, a calm sea, and an exchange of signals, the concrete ship is reported to have swung directly across the course of the liner, which reversed its engines in vain. The stone hull was completely shattered at the point of impact, while the bows of the liner were smashed, and a 7-ft. hole opened above the main deck. Of the "Cape Fear's" crew, 15 were saved, but 19 went down with the ship.

HAY FROM SALT MARSHES VALUABLE EASTERN CROP

Salt marshes along the bays of the Atlantic coast produce, in addition to mosquitoes and muskrats, a luxuriant crop of hay that is most profitable to the owners of these lowlands, in that it is much in demand for industrial purposes as well as for the feeding or bedding of farm stock. Along Delaware Bay thousands of tons of salt hay are gathered each year. The bay farmers ordinarily have to wait for favorable tides before they can harvest their hay, but they have developed a system of drainage ditches and movable bridges that has greatly facilitated the work.

Coils of Rope Made from Salt-Marsh Hay, Used as a Core for Molds in Making Large Iron Pipe



The Simple Machines, with Which Small Inland Factories are Equipped, That Twist the Hay from the Salt Marshes into a Coarse Rope: This Work is Customarily Done during the Winter Months, After All the Hay has been Harvested

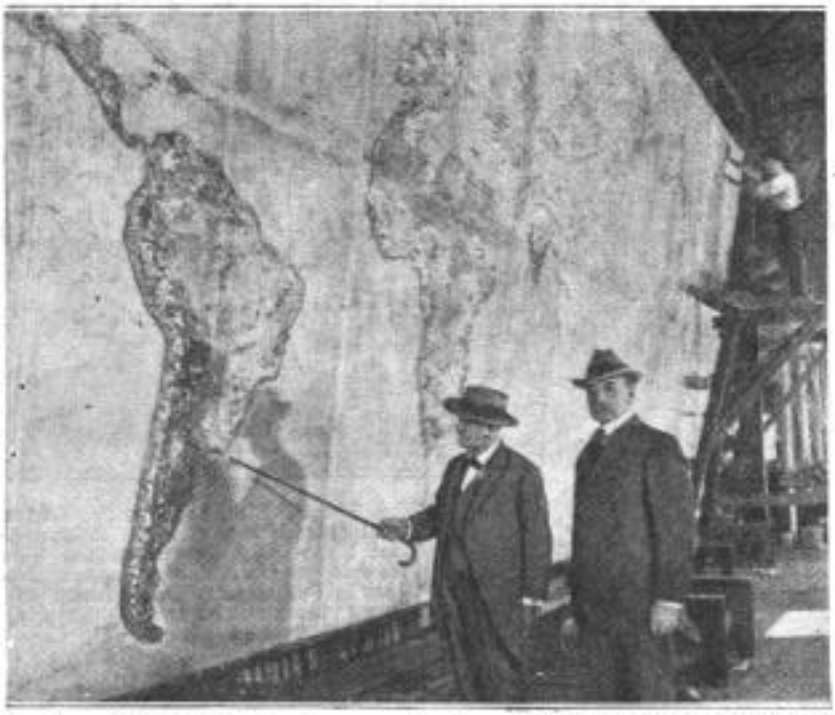
Stacking the Hay Cut from the Salt Marshes along the Atlantic Coast: There Is a Large Demand for the Crop for Feeding and Bedding Farm Stock, as Well as for Industrial Purposes

Bay schooners transport great loads of the hay up the river to the industrial plants, or it is carted inland to small factories where it is twisted into a coarse rope during the winter months. This salt-hay rope is used as a core for molds in the making of iron pipe of large dimensions, and also for the casting of other metals.

¶Experiments in the quantitative analysis of mint gold by spectroscope, using the spark method, have shown that impurities ranging from zero to one or more per cent can be detected and estimated with only a few hundredths of one per cent error. In the tests, the U. S. Bureau of Standards used nine standard samples, alloyed with silver, copper, and iron.

WORLD'S LARGEST RELIEF MAP IS OVER FORTY FEET LONG

Made entirely of aluminum alloy enameled in colors, with a length of 43 ft. and a width of 15 ft., a new relief map of the world now being exhibited about the country by the U. S. Shipping Board lays claim to the title of the largest ever built. The big map, which is mounted in a frame of heavy angle iron, is constructed in 26 sections, 7½ ft. high and 38 in. wide. The cast metal of each section is 5/16 in. thick, and the flanged edges are machined to an accuracy of .01 in., making smooth joints in the finished assembly. The Mercator projection is used, with the eastern hemisphere occupying the center and the western continents appearing at both ends, so that trade routes can be laid out in either direction. The sections are easily taken apart by unscrewing the flange bolts, and, for shipment, each section has its own packing case. Moving pictures were taken of the building of the huge map.



Putting the Finishing Touches on the Huge Aluminum-Alloy Relief Map of the World, 43 Feet Long and 15 Feet Wide, Made in 26 Sections

WOOD CROP PROFITABLE AT $64 A CORD

The people who flock to southern parts of California have done the growers of eucalyptus wood a good business turn. The eucalyptus trees are planted in rows along line fences, along roadways, and sometimes in veritable orchards. The tree reaches a stage fit for firewood in from 14 to 16 years, when the trunks are felled, and a small gasoline outfit saws the sticks into foot lengths.

The demand for these short lengths, to burn in the little fireplaces of the bungalows, has increased so much that wood which formerly sold for a dollar a foot-length cord, now sells for $16 a cord, or at the rate of $64 a cord

Eucalyptus Stumps That have Yielded Their Share of Cordwood, and Now Are Ready to Sprout and Grow Another Crop

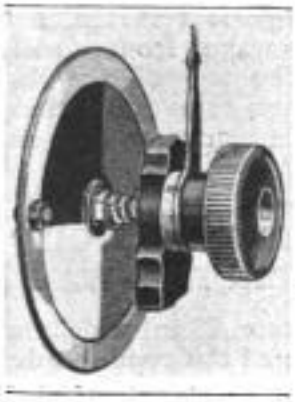
The Foot-Length Sticks of Eucalyptus Wood, as They are Sold at $16 a Cord for Fireplace Fuel in California Bungalows

for the 128-cu.-ft. cord of the schoolbooks. As a row of eucalyptus trees along the sides of a quarter section yields 660 or so cords of foot-long wood, in a period of 15 years, the high price adds to the income of the land at the rate of $400 net annually, or thereabouts, for the land owner. The average bungalow burns from one to five cords in a winter, if fireplaces are used for heat.

No sooner are the trees cut down than the stumps begin to sprout by coppice growth, and there is no difficulty in planting or encouraging the new sprouting and building up of firewoods. The fact is, when there is a wish to kill off the stumps, the great trouble is to stop their growing. They must be dug out, or hoed out and grubbed—and even then, there is only one sure way of stopping the growth, and that is to keep hoeing down the sprouts.

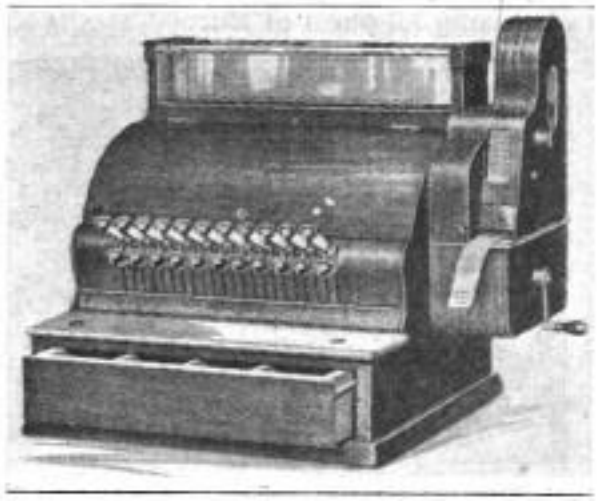
RADIO VARIABLE CONDENSER HAS A MERCURY ELEMENT

A new variable condenser of a capacity of .001 microfarad is but 3 in. in diameter and ⅛ in. thick. One element is a semicircular sheet of tinfoil, the other a semicircular film of mercury hermetically sealed between a fiber plate, which forms one side of the case of the instrument, and a ruby mica disk, which forms the insulating plate between the elements. When mounted on an instrument panel the mercury always sinks to the bottom. Moving the semicircular tinfoil sheet into register with the mercury film gives the desired condenser effects in capacities determined by the extent to which the elements overlap. This latter is indicated by a pointer which moves over a scale calibrated in microfarad values.



CASH REGISTER ITEMIZES AND TOTALS PURCHASE

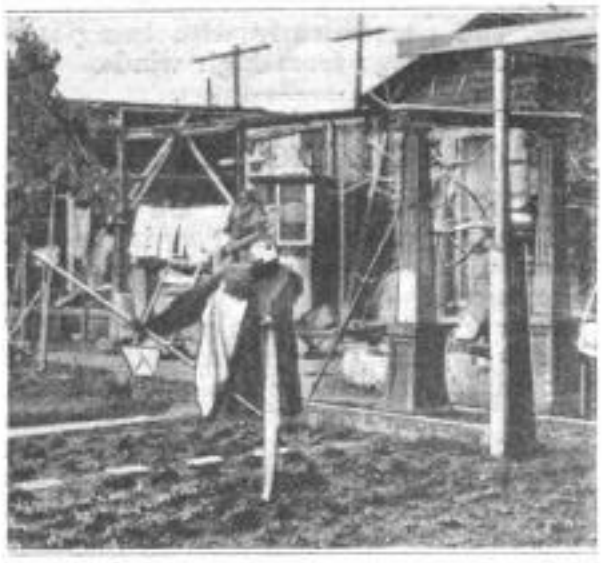
A new development in sales registers is one which not only supplies a receipt showing the gross amount of the purchase, but which also lists the cost of each item purchased. This affords a double check against incorrect charges, as both the customer and the sales person have an opportunity to scrutinize the items instead of relying on mental addition. Besides the special itemizing feature, the new register has the various fitments with which all are acquainted.



The New Cash Register That Records Not Only the Gross Amount of the Sale, but the Price of Each Item on the List as Well

NOVEL SCARECROW MADE OF CONCRETE

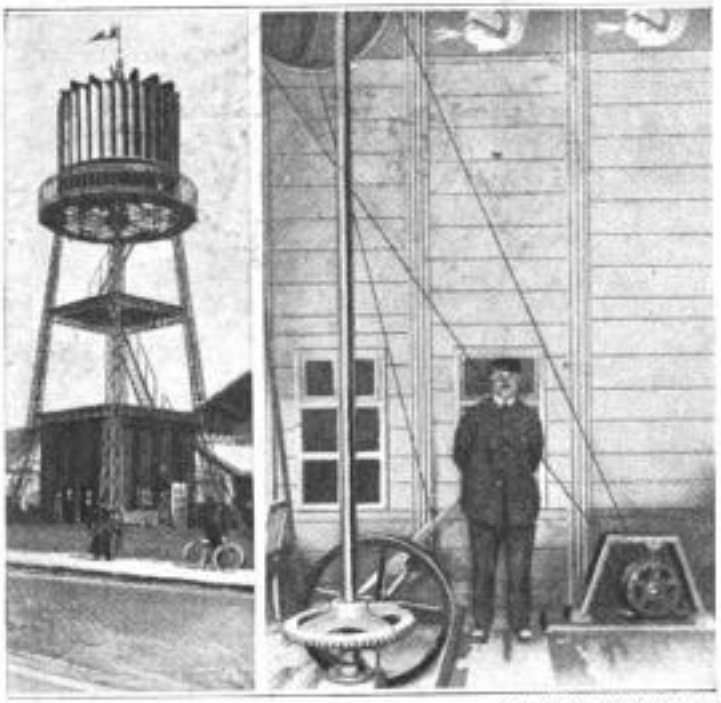
A manufacturer of concrete novelties, with a factory in a western city, has recently added to his line a concrete scarecrow. These are little more than busts, cast from a mold, and mounted on posts for implantation in the ground. A crosspiece serves as arms and supports the old coat or shirt which is placed on the shoulders to give the figure added resemblance to a human guardian of the fields.



The Concrete Scarecrow: A Molded Bust of a Human Figure Mounted on a Post, and Draped as Usual

WINDMILLS TO RELIEVE FUEL SHORTAGE OF EUROPE

As a result of the fuel shortage that is threatening all parts of Europe, inventors



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Left: By Mounting the Vanes of a Windmill Vertically, a French Inventor Hopes to Utilize Wind Energy for Relieving His Country's Shortage of Fuel. Right: The Electric Generator at the Base, Which Stores the Current in Accumulators

are concentrating upon the development, for power purposes, of the solar and wind energy, with interesting results. One development of the situation is a windmill having vertical vanes. A windmill of this type will operate regardless of the direction of the wind, without the customary vane, and consequently with less possibility of damage from high winds.

PROGRESSIVE TURKS ARE ABANDONING THE FEZ

Among the reforms that are following one another rapidly in Turkey is the substitution of conventional European head coverings in place of the picturesque fez. It is expected that this garment, used for so many years that it has come to be recognized as being as typically Turkish as the Star and Crescent, is falling into disuse among all but the most orthodox Mohammedans. The origin of the fez is interesting. One of the Mohammedan laws requires that the head be covered while at prayer, and that at one point in the devotions the devotee touch the earth with the nose and forehead simultaneously. This cannot be done while wearing any sort of brim hat; hence, the fez.

DAM USES WINDING STAIRWAY TO KILL FORCE OF WATER

Water escaping uncontrolled from the outlet works below a dam contains enough unexpended energy to work considerable harm to the river channel, especially in flood time. An interesting method of disposing of this surplus force, worked out mathematically and experimentally, has been applied to the Miami dams, in Ohio. The system, called a "hydraulic jump," consists of a winding concrete stairway, down which the outlet water flows in a sheet that grows wider and thinner until it plunges into a concrete chamber. The discharge wall of the chamber is only 1 ft. lower than the floor of the outlet conduits, but the water surface, forced down by the impact of the descending flow, actually slopes back toward the stairs, setting up a reverse current. The whole mass of water in the chamber is set into violent commotion, in which its pent-up energy is released, and the smooth wave front finally flows over the top of the discharge wall in a calm and orderly stream, incapable of damaging the unprotected banks below.

CONCRETE EDGES AID AUTOIST AND STRENGTHEN HIGHWAY

Two strips of concrete, 28 in. wide, and flush with the surface of the road, border a 17-mile stretch of asphalt highway built

The Concrete Strips Keep the Surface from Spreading, and Help the Motorist to Keep to the Road at Night

recently near San Juan Capistrano by the California State Highway Commission. The engineer approves of these because

they prevent spreading of the surface under heavy loads during hot weather. The motorist commends the innovation even more strongly, however, because it makes it easy for him to keep to the road after sundown. Under the glare of his headlights, in fact, the white edges of the road loom up warningly at curves and upgrades. Because of the satisfaction given by this experimental mileage, it has been decided to employ the same method in further road construction.

HOW LOBSTERS ARE CAPTURED IN SIMPLE TRAPS

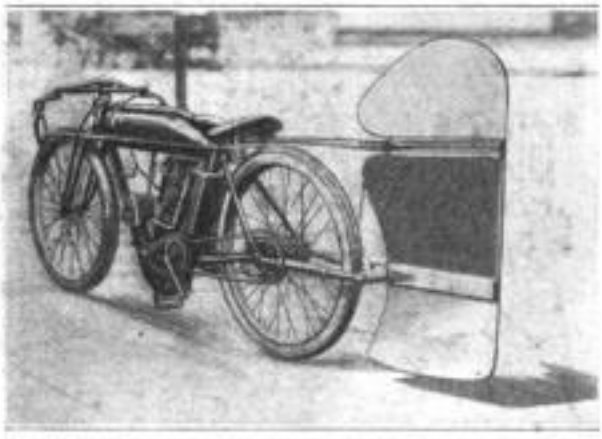
The toothsome lobster is caught in very simple homemade traps by the Nova Scotia fishermen during the season, which lasts from December to June. The traps are constructed of lathing. The door is partly barred by a piece of strong netting, stretched toward, and nearly reaching, the inside wall. The center of the netting is held open by a ring. It will be seen that this forms a cone with the apex within the trap. As the lobster crawls through the ring, tempted by the

In the Lobster Traps Used by the Nova Scotia Fishermen the Entrapping Element Is a Funnel-Shaped Section of Strong Netting Held Open by a Ring

bait, he falls to the bottom of the trap. Finding his egress barred by the netting, he remains where he is until removed by the fisherman. The traps are weighted with rocks and sunk on the ledges of the fishing grounds. Their location is marked by buoys.

AERO RUDDER PREVENTS CYCLE FROM SKIDDING ON CURVES

To prevent, as much as possible, the dangerous skidding of the rear wheel of a motorcycle while rounding curves at high speed, a Carolina race rider has fitted his mount with a light vertical rudder on the order of those used on aeroplanes. Light cables connect the rudder to the motorcycle steering fork in such a way that turning the front wheel to the left swings the rudder to the right and vice versa. Upon first consideration it would appear that increased wind resistance

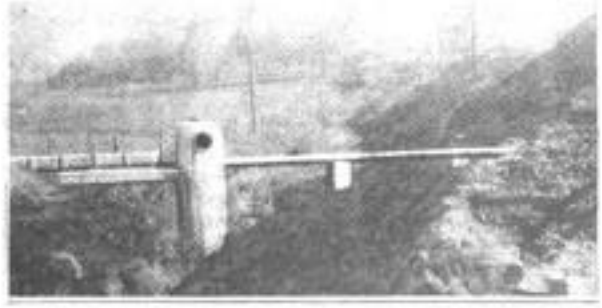


The Antiskid Rudder Fitted to the Rear of a Motorcycle: It is Operated by a Light Cable, Attached to the Steering Fork

would have a retarding effect. However, the inventor claims that this is more than offset by the fact that the prevention of the skid improves the tractive force of the rear wheel. He further asserts that since using the device he has bettered his speed records.

EXPOSED SEWER-PIPE LINE REDUCES DIGGING COSTS

The building of a sewer-pipe line above ground, exposed to the gaze of the public, would cause the taxpayer to feel considerable apprehension over the results of such a plan. The large pipe leading to the manhole, is supported on a concrete slab, while concrete piers at the joints carry the load of the small pipe. An overflow arrangement within the manhole diverts all storm water in excess of



Exposed Sewer-Pipe System, the Large Pipe Supported by a Concrete Slab, the Small One by Piling

the carrying capacity of the small pipe. This method of construction was necessitated by the desire to avoid additional trench digging.

BUOY-LAYING IN THE ST. LAWRENCE

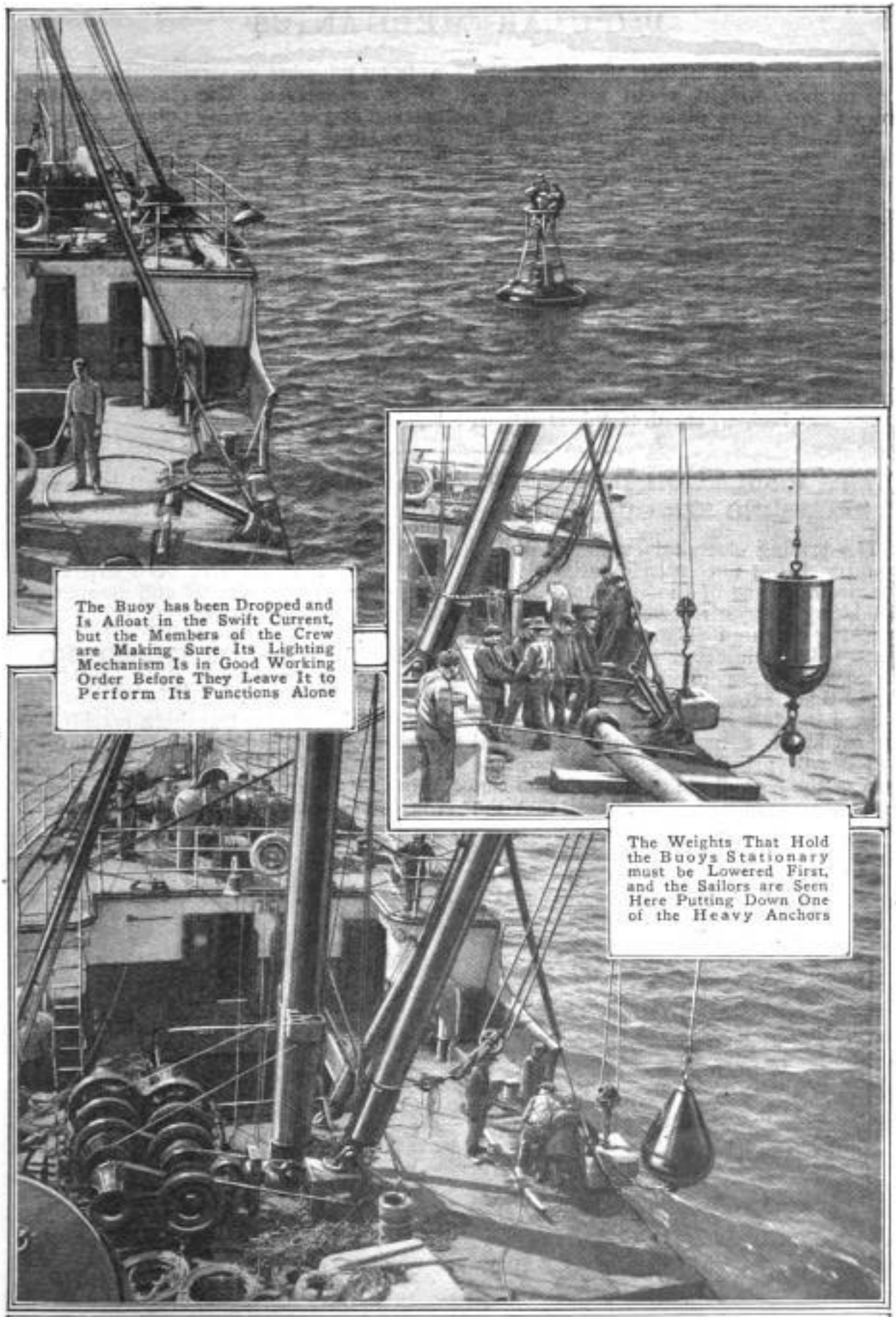
By J. G. MacPhail

One of the Special Steamers Operated by the Canadian Government, Running at High Speed against the Heavy Current, and About to Drop a Big Gas Buoy

A Close-Up View of the Huge Modern Gas Buoy, in Process of being Lowered over the Side of the Steamer, with the River Current Running 10 Miles an Hour

LAYING gas buoys along a course of 340 miles, a great part of the way in a current running at a speed of over 10 miles an hour, is the difficult task performed each spring by Canadian government steamers in the St. Lawrence River between Montreal and Father Point, the latter the point where the "Empress of Ireland" sank in the summer of 1914 after collision with the collier "Storstad."

Throughout the winter months the entire length of the St. Lawrence is icebound. All marine traffic is suspended. Prior to the breaking up of the ice, in April, all equipment is made ready. The buoys are charged with several months' supply of gas; the lanterns, including the flashing mechanisms and burners, are adjusted, and mooring cables are cut to lengths and conveniently placed. Derrick steamers are standing by. Immediately the ice has ceased running, the buoy-laying steamers proceed, each to its allotted section, carrying its complement of equipment, and, in addition to the master of the vessel, a civil engineer whose duty it is to establish exact positions.



The Buoy has been Dropped and Is Afloat in the Swift Current, but the Members of the Crew are Making Sure Its Lighting Mechanism Is in Good Working Order Before They Leave It to Perform Its Functions Alone

The Weights That Hold the Buoys Stationary must be Lowered First, and the Sailors are Seen Here Putting Down One of the Heavy Anchors

A General Deck View of One of the Canadian Government's Buoy-Laying Steamers in the St. Lawrence River: One of the Gas Buoys is About to Go Overboard, as Soon as Its Anchor has been Placed. At the Left Is the Hoisting Apparatus Used for Handling the Heavy Buoys and Weights, Which are Dropped with the Steamer Running Full Speed

PHOTOS FROM THE BRITISH AND COLONIAL PRESS

Each buoy, with lantern, mooring cable, and anchor, weighs about four tons, is from 5 to 8 ft. in diameter, and from 10 to 30 ft. in length over all, according to type. The distance from Montreal to Father Point is 340 miles. One hundred and fifty gas buoys are placed to mark this route. Some idea of the dispatch with which the work is performed is conveyed by the fact that it is usually completed in three days. This is one of the enterprises in which the eight-hour day is never mentioned. Considerable rivalry exists among the crews of the various steamers engaged in the work; and it is the competent who are the most honored.

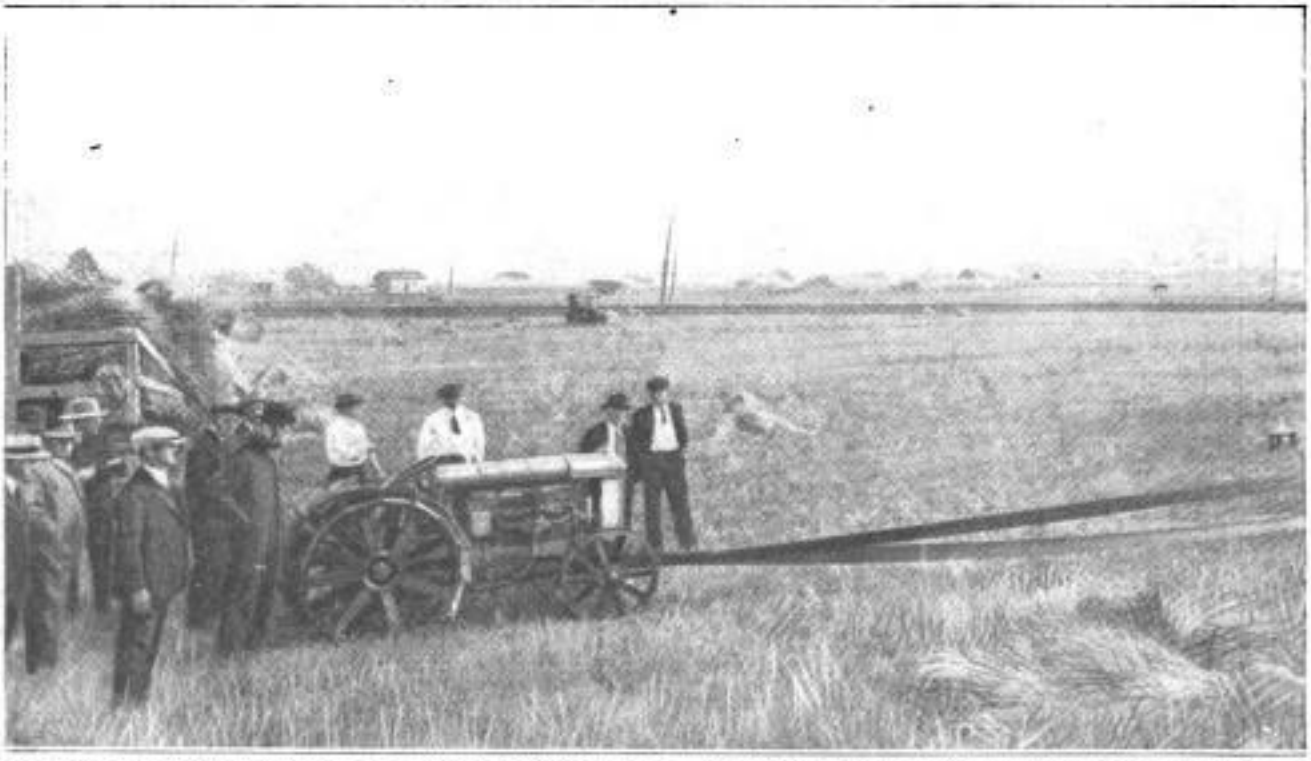
The channel, where dredged, is 300 ft. wide on tangents or straight reaches, and 800 ft. on curves. The starboard side is marked at every turning point and around every curve by buoys, each exhibiting a flashing red light, and the port side by flashing white lights. Where desirable, each tangent is marked by a pair of range lights at each end, and between the gas buoys on each side is maintained a large number of unlighted buoys, called spars, cans, and conicals; the conical buoys marking the starboard side and the cans the port. To such a degree of perfection has the marking of the St. Lawrence waterway been brought that masters of 15,000-ton ships navigate the river as confidently by night as by day.

WHY INSULATION INSULATES RECEIVING SERIOUS STUDY

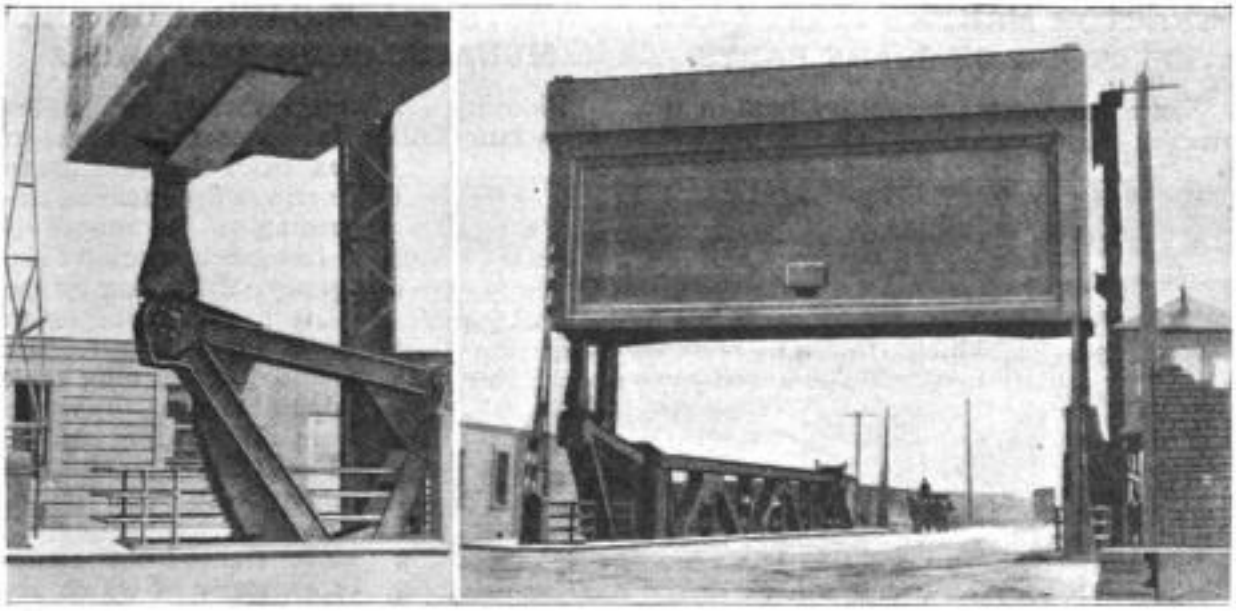
The leading electrical engineers of the country, being not entirely satisfied with the performance of the various electrical insulating materials, have instituted a far-reaching research program with the object of determining, if possible, the principles underlying insulation. It is believed that, if these can be discovered, the present insulating materials can be greatly improved or a new material developed which will prove more efficient. Some idea of the magnitude of the problem can be gathered when it is realized that the terms conductivity and insulation are relative, there being no known perfect conductor nor perfect insulator. The method of research will be an intensive study of everything that has ever been written on the subject of insulation and also extensive experimental work.

MOTORIZING OF THRESHING IS COMPLETE AT LAST

The driving of a threshing machine by tractor or gasoline engine is no novelty, but a recent threshing job in North Dakota is thought to be an advance toward the complete motorizing of the farm. A



For Anything So Commonplace as a Threshing Operation to Stimulate Sufficient Community Interest to Attract a
out the Aid of Horses. All Power and Transportation Re



The Great Slab of Reinforced Concrete Serves as Counterpoise for the Leaf of the Bascule Bridge. A Front View is Shown at the Right. The Detail View, at the Left, Shows How the Block is Carried; a Part of the Quadrant Gear is Seen Also

tractor drove the separator, and another hauled in the bundle wagons, while two trucks were kept busy carrying the grain to the elevators. Although it is not so stated, it requires no great stretch of imagination to picture the thresher hands and the farm owner riding to and from the field in motor cars. At any rate there were no horses used in the actual work, the machines being hauled into and out of the field by tractor.

MONSTER SLAB OF CONCRETE IS BRIDGE COUNTERPOISE

A huge slab of reinforced concrete is the unusual counterpoise carried by a large bascule bridge in San Francisco, Calif. The monolith is 20 ft. high, 10 ft. thick, and as long as the street is wide. It balances the bridge so exactly that a small electric motor is able to raise the big span.

Large Gallery of Onlookers Is Rather Unusual, and is Accounted for by the Fact That It was Carried Through with- quirements were Supplied by Motor Trucks and Tractors

TRACTOR MAKER'S FIRST CARE IS STOCK OF SPARE PARTS

Spare parts are a necessary item in the tractor business, but not always does the maker establish a complete and elaborate stockroom for them before shipping a single machine. This was the procedure followed by a manufacturer in the central states, however. The room, devoted entirely to a stock of spare parts, is very large, and equipped with a systematic arrangement of cabinets and bins, with a capacity that assures a 24-hour delivery service on any emergency repair desired by a tractor owner.

The Elaborate and Capacious Spare-Parts Stockroom Established by a Tractor Manufacturer Before a Single Machine was Shipped, Assuring Immediate Emergency Service to Patrons

RAILWAY TIE-TREATING PLANT BUILT INTO SPECIAL CARS

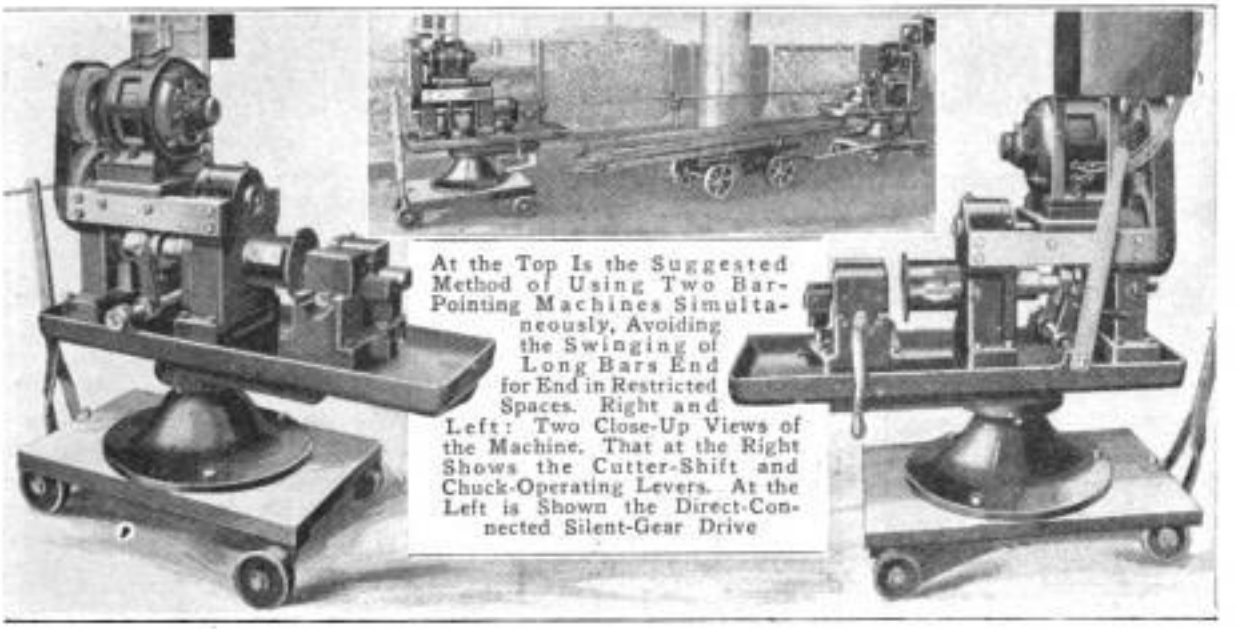
Preparing railroad ties, including adzing, boring, and creosoting, at the point where they are to be used, is a process now employed on a large eastern road, by virtue of an interesting portable treating plant arranged on four special cars. The car containing the adzing and boring machines has a 50-hp. boiler for operating the treating pumps, and a 60-hp. gas engine, which propels the whole plant when a locomotive is not available. Two cars bear double tracks on which small retort cars travel, and the fourth car carries the three big treating cylinders. Ties are carried from the adzing machine to the retort cars by gravity conveyor. The cylinders, 4 ft. in diameter and 63 ft. long, can treat about 100 ties an hour.

WASTE OIL FLOATING ON SEA MENACES SHIPS AND DOCKS

Floating oil from a variety of sources is accumulating in seaport harbors in quantities that constitute a serious fire menace, according to the report of a large mercantile agency. Dumping refuse oil into sewers, drainage from oiled roads, the practice of cleaning tank ships at anchor, the waste from oil-burning vessels, all contribute to the objectionable condition. The inflammability of most water-front structures, many of which actually overhang the oiled surface, completes the danger. As illustrating the ease with which floating oil may be fired, the engineer of a fishing schooner, a few weeks ago, threw some burning waste overboard off the New Jersey coast, where 1,000 tons of oil had been discharged by a grounded tanker. So brilliant were the flames that an explosion was rumored.

GLASS VENTILATING STACK RESISTS ACID FUMES

A French gunpowder factory has a glass chimney through which fumes from the gun-cotton department are ejected by a blower. It is said that, since the stack was erected, it has not been necessary to replace any parts, as the glass resists the action of the fumes perfectly. Although of considerable height, it is so perfectly protected by the surrounding steel structure that chances of damage from the outside are slight.



At the Top Is the Suggested Method of Using Two Bar-Pointing Machines Simultaneously, Avoiding the Swinging of Long Bars End for End in Restricted Spaces. Right and Left: Two Close-Up Views of the Machine. That at the Right Shows the Cutter-Shift and Chuck-Operating Levers. At the Left is Shown the Direct-Connected Silent-Gear Drive

PORTABLE BAR-POINTING TOOL HASTENS MASS PRODUCTION

In order to save the time usually consumed in tapering the ends of bars preparatory to starting them through automatic or hand-operated screw machines or turret lathes, a new tool has been developed for the express purpose of cutting a taper on the bar ends right at the stock bins, or at the time the bars are unloaded and placed in stock. The machine is self-contained, being directly geared to an individual motor, and is mounted on a four-wheel truck for easy portability. The stock is held loosely by a quick-action vise, so that it may not be twisted or sprung, should the cutters, which are hand-fed, be suddenly jammed into the work. Square or hexagonal bars are simply held against the cutter head by hand, the vise not being used. In establishments where large quantities of bar stock are processed, two of the machines may be used simultaneously, tapering both ends of the bars without the necessity of turning them end for end. The cutters are quickly removable for grinding, and a large flanged base prevents the littering of the floor with chips.

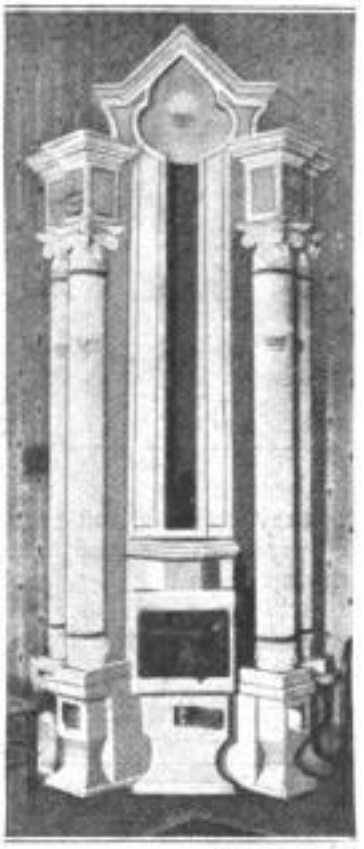
LANDMARK OF '49ERS IS REPRODUCED IN STONE

During the rush of gold seekers into California, when the precious metal was discovered there in 1849, a trail was established across the great central plains. This trail followed the Platte River closely through Nebraska, and on this stretch of over 400 miles hardly a tree was to be found. About midway of the trail there was a solitary cottonwood tree that had withstood prairie fires and the tramping and rubbing of the buffalo herds. Thus the old "lone tree" became a welcome landmark. To mark the location of the tree, which has long since been destroyed, a stone reproduction has been erected recently.

Stone Reproduction of the Lone Cottonwood Tree That Marked the Transcontinental Trail in 1849

PARLOR STOVES OF ROUMANIA ARE HUGE BUT EFFICIENT

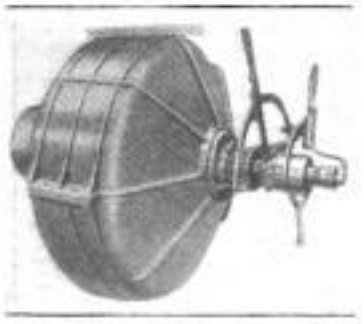
Visitors to Roumania who have occasion to enter some of the native homes are often impressed by a mysterious structure of enormous size, occupying a corner of the living room. This huge device, towering to the ceiling of the room, and quite ornamental in a dignified way, is a parlor stove. The fire door, and the amount of coal or wood fuel fed into it, are absurdly small in comparison with the total spread of radiating surface visible, and for that very reason the heaters are remarkably economical in everything but space.



WIDE WORLD PHOTO

NEW ROTARY STEAM ENGINE IS CONTROLLED WITHOUT GEARS

Although patents on rotary engines issue from the U. S. Patent Office at the average rate of about one a week, comparatively few of these ingenious conceptions ever reach the stage of successful test. A machine of this class, recently completed in Pennsylvania, however, has actually proved its ability to produce more than 120 hp., running at 1,200 r.p.m. on 600 lb. of steam pressure. The drumlike casing, 26 in. in diameter, contains four cylinders, each of 3-in. stroke and 3½-in. bore, the whole weighing 165 lb. One advantage of the circular arrangement is that the lead or point of cut-off can be changed, or the engine reversed, without using gears or eccentrics. The valve is designed to supply steam for one or several cylinders.

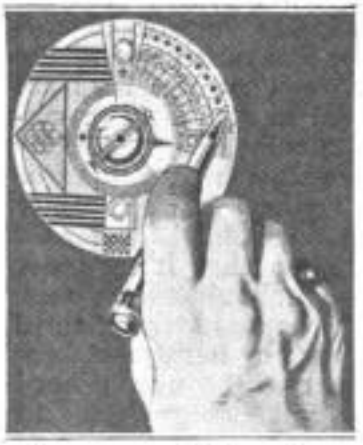


BALUCHISTAN YIELDS FOSSILS OF HUGE STRANGE ANIMALS

Neck bones and other fossil remains, of a size indicating their original possessor to have been the largest type of land animal yet known, have recently been unearthed in Baluchistan. The creature, ascribed to the Oligocene period, appears to have resembled a gigantic rhinoceros, except for its long, giraffelike neck. A single tooth, 4 in. across, also was found, as well as other specimens that reveal the paleontological possibilities of Asia's unexplored fields. Some of the bones have been sent to this country.

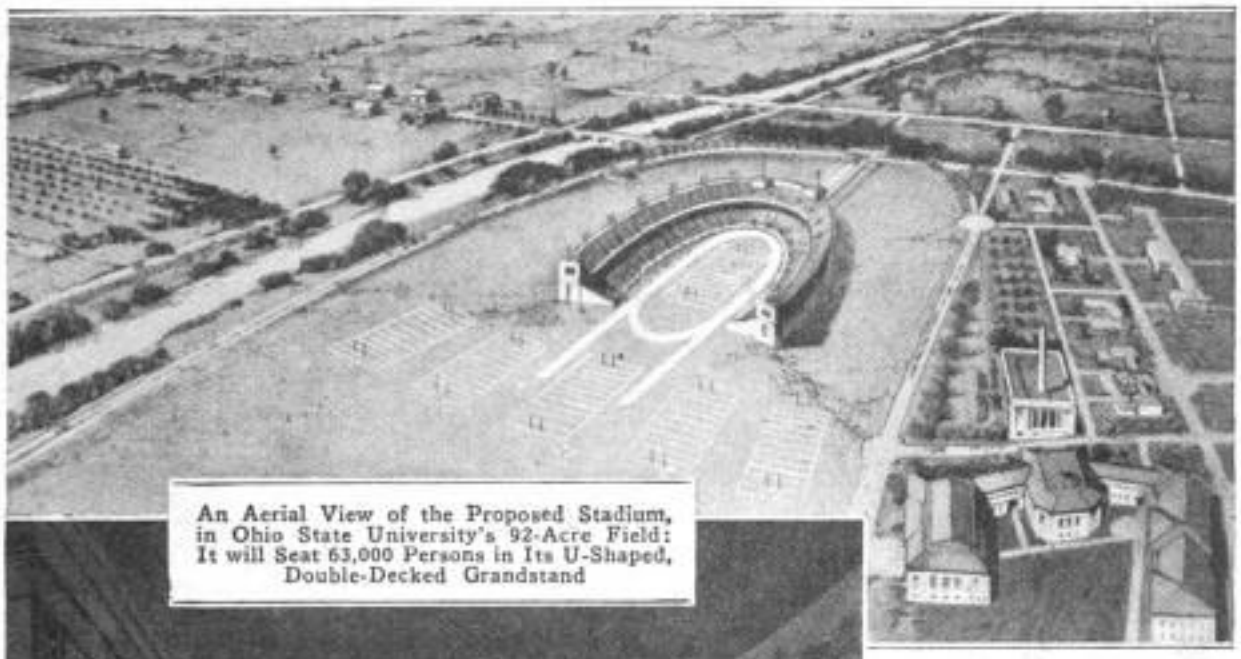
VERSATILE ADDING MACHINE IS CARRIED IN POCKET

A pocket calculating machine that adds, subtracts, and performs other operations with mechanical precision, has made its appearance on the market. The device is circular in form and consists of a series of revolving disks which are operated by inserting the point of a pencil, or stylus, in small holes around the edge, and opposite the numbers to be counted. The device is always started at zero. An opening at the right shows the totals of added or multiplied figures, while diametrically opposite is a similar opening to show the results obtained either by dividing or subtracting.



¶Since November 1st airplanes engaged in international transportation of passengers have been subject to the same quarantine regulations as those governing maritime shipping. The Cuban traffic was the first to be guarded. Aerial passengers from these ports are required to procure health certificates from the American consul before embarking.

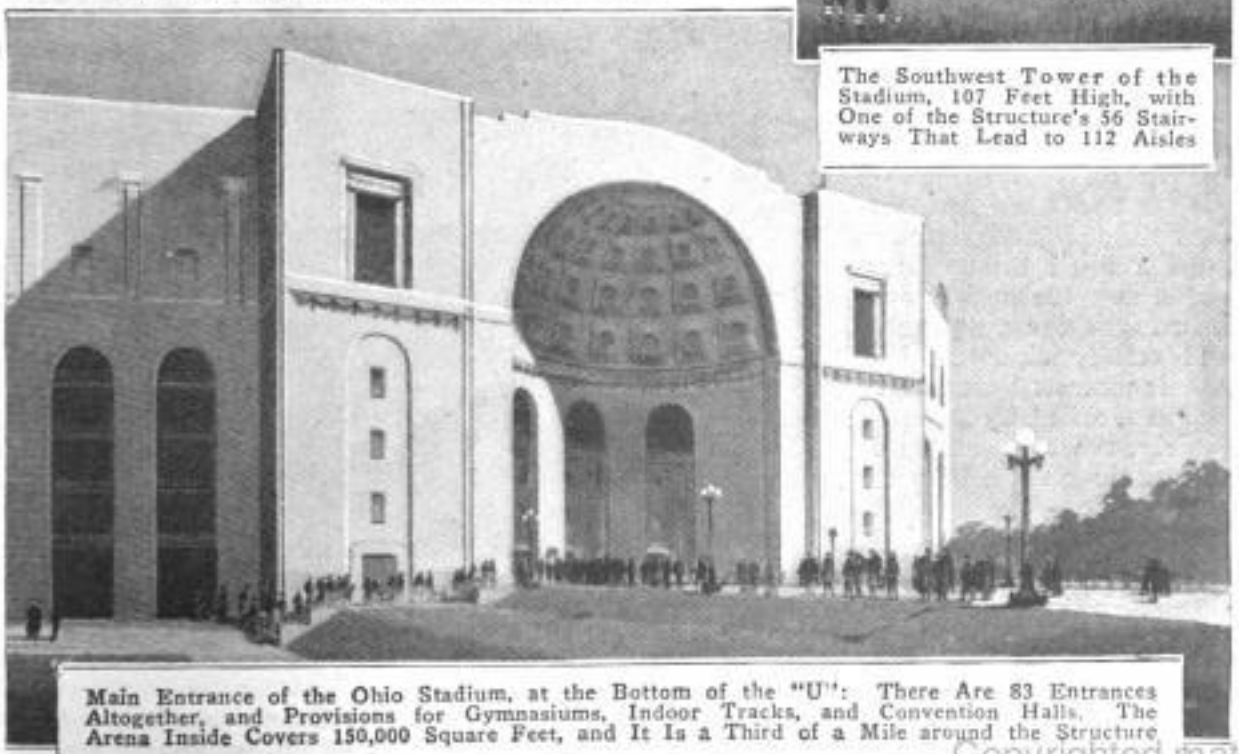
ENORMOUS STADIUM PLANNED FOR OHIO SCHOOL



An Aerial View of the Proposed Stadium, in Ohio State University's 92-Acre Field: It will Seat 63,000 Persons in Its U-Shaped, Double-Decked Grandstand

A Night View of the Remarkable Outdoor Stage, Located at the Closed End of the Big $1,000,000 Stadium, Where Plays and Exercises can be Held before 20,000 Persons

The Southwest Tower of the Stadium, 107 Feet High, with One of the Structure's 56 Stairways That Lead to 112 Aisles



Main Entrance of the Ohio Stadium, at the Bottom of the "U": There Are 83 Entrances Altogether, and Provisions for Gymnasiums, Indoor Tracks, and Convention Halls. The Arena Inside Covers 150,000 Square Feet, and It Is a Third of a Mile around the Structure

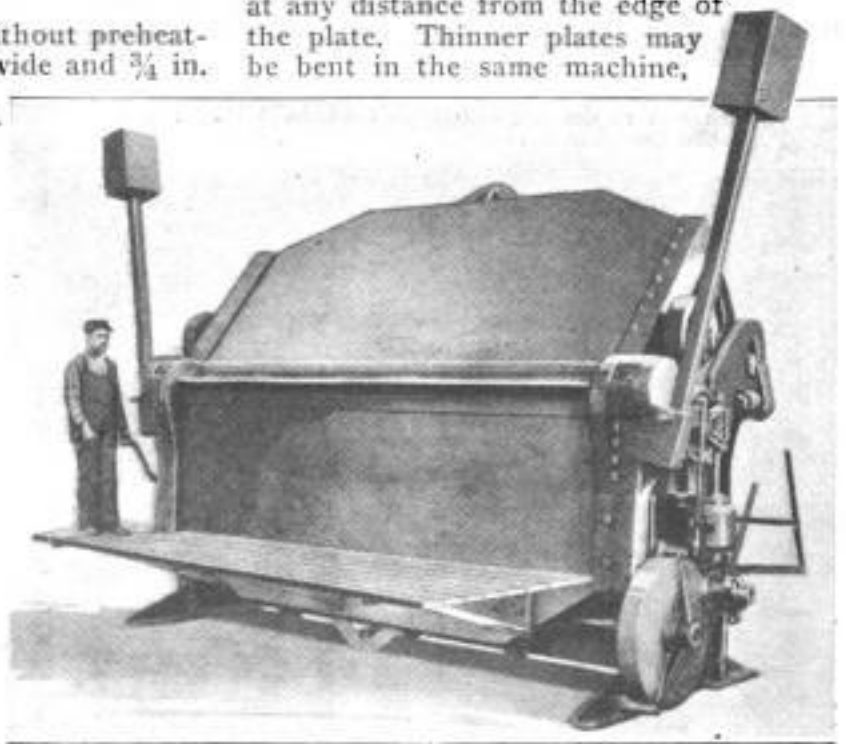
PIKES PEAK COG RAILWAY USED AS AUTO ROAD

A test of power, endurance, and stamina was recently undergone by a new-model motor car when it was driven to the summit of Pikes Peak by the most direct road, the right of way of the cog-railway line. The distance is nine miles, in many places over gradients of from 25 to 28 per cent, and it was considered impossible for an automobile to make the climb, as the footing is over the railway ties, switches, trestles, and other difficult impediments. The average rise is 900 ft. to the mile, and, of course, the increase in altitude causes a falling off in power and also a tendency to overheat and boil away the cooling water. One delay of 45 minutes was caused by a breakdown of the cog locomotive which the motor car was following.

This Rough Road was Safely Traveled by a Motor Car Which Recently Made the Climb to the Summit of Pikes Peak over the Ties of the Cog-Railway Line. The Grade Shown Here Is between 25 and 28 Per Cent. The Average Rise Is 900 Feet to the Mile

BIG MACHINE BENDS PLATES BOTH WIDE AND THICK

Making a sharp bend, without preheating, in a steel plate, 12 ft. wide and ¾ in. thick, which means bending a total section of 108 sq. in., requires a machine of unusual sturdiness and power. Such a cold-bending machine has just been completed by an Illinois manufacturer, for use in an eastern shipyard. The plate to be bent is fed horizontally onto a fixed lower jaw, and a massive upper jaw is brought down upon it, and solidly clamped, by an ingenious eccentric action worked by a power-driven worm and an automatic clutch. Three heavy pinion-driven racks operate the folding leaf that does the bending, and its movement may be automatically stopped at any desired angle of bend, up to 135°, though a right angle is most commonly wanted. The ¾-in. plate is normally bent on a 1½-in. radius. Larger radii are made by repeated bends, and a flange may be made at any distance from the edge of the plate. Thinner plates may be bent in the same machine, which has numerous adjustments and is equipped with a 40-hp. motor.



The Front of the Big Plate-Bending Machine: The Angular Face Is the Upper Jaw, the Lower Vertical Face Is the Folding Leaf, Counterbalanced by the Weights Above. The Plate to be Bent is Inserted Horizontally at the Top of the Leaf

This Photograph was Taken Several Days After an Indian Drive Had Sent a Herd of Deer to Their Destruction on the Floor of the Grand Cañon, a Thousand Feet Below. The Fawn Was the Sole Survivor

DEER IN GRAND CAÑON SAVED FROM EXTINCTION

The creation, last year, of the Grand Cañon National Park in northwestern Arizona brought satisfaction to many sportsmen throughout the state. For this action put an end to a nefarious Indian practice that was accelerating the threatening extinction of the deer. The Indians have everywhere been relentless destroyers of game, it is asserted, but along the Grand Cañon they "drove" the deer. Rounding up herds of the timid creatures, that is, they stampeded them over the cañon edge. Subsequently, from the rocks below they picked up meat enough to sustain the tribe for many weeks. And it is the aftermath of one of these drives that is pictured herewith. Unable to keep up with the stampeded herd, and overlooked by the pursuing Indians, the little fawn is awaiting death at the spot from which the herd plunged to destruction. The photograph was taken several days after a drive.

ELECTRIC SUBSTATION BUILT INTO BASE OF LINE TOWER

At a point on the upper Mississippi River, where a span of 1,675 ft. is necessary for the crossing of electric wires, an unusual combination of steel tower and automatic substation has just been completed. The crossing towers are 110 ft. high, with four 8 by 8-in. legs in a 35-ft. square, and weigh more than 21 tons. The concrete foundations are 17 ft. deep. Each of the four conductors of the span contains 19 strands of No. 10 gauge copper wound on a ⅝-in. steel core, and is pulled to a tension of 8,700 lb., making a total strain of 34,800 lb. It is the north tower that includes the substation, equipped with six 1,000-kw. self-cooling

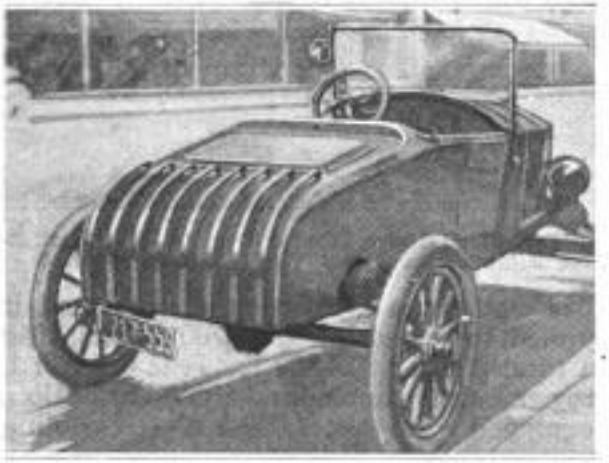
The 110-Foot Steel River-Crossing Tower for Electric Cables Is Remarkable for the Automatic Substation Built into Its Base, Equipped with Six Big Transformers and a Set of Remote-Control Oil Switches That are Operated from the Power Plant 1½ Miles Away

transformers, electrolytic lightning arresters, and automatic, remote-control oil switches that are operated from the power plant, 1½ miles away, no local attendants

being necessary. In this substation the voltage is stepped up from 13,200 to 63,000, for transmission over a 300-mile loop to 145 cities and towns.

AUTOMOBILE BODY PROTECTED BY COLLISION FENDER

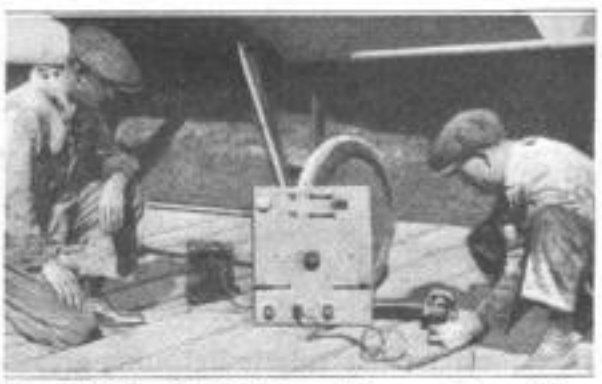
A survival of the war-time idea of protecting the radiators by heavy iron gratings is to be seen in present-day applications of the same idea to the rear of automobiles for protection against rear-end collisions. Light steel bars are used and do not detract from the appearance of the car.



Automobile Body Protected from the Damage of a Rear-End Collision by an Attractive Collision Fender of Light Steel Bars

MAGNETO-WINDING TEST SET IS ACCURATE AND RAPID

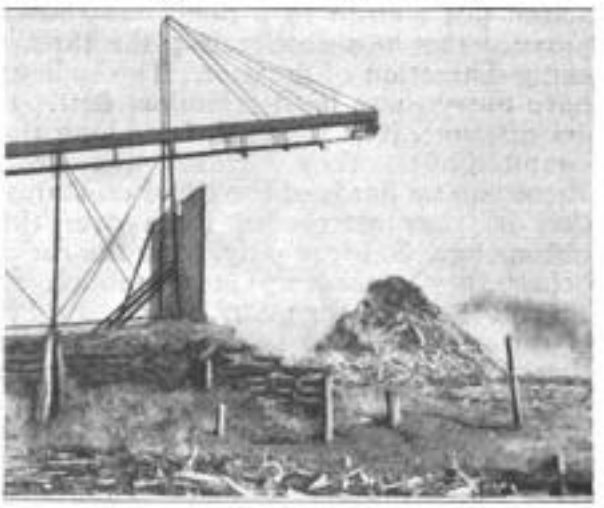
A portable test set to detect the presence of short or open circuits or grounds in magneto and coil windings and condensers, without the necessity of removing them from the engine, is the invention of a western airplane mechanician. The panel is so arranged that three varieties of current—direct, intermittent, or alternating—may be used in making various tests. Knowing the normal resistance of a winding, the current flowing through it at a known voltage will give a satisfactory indication of its condition. For this reason an ammeter is a valuable part of the apparatus. Although the device was designed, primarily, for the testing of airplane magnetos and coils, there is no reason why its sphere cannot be broadened to include the testing of all sorts of automotive ignition apparatus.



The Method of Conducting Magneto Tests with a New Ignition Test Set: The Device, Being Very Light, is Carried to the Work

FIRE HAZARD DIMINISHED BY CONCRETE WALL

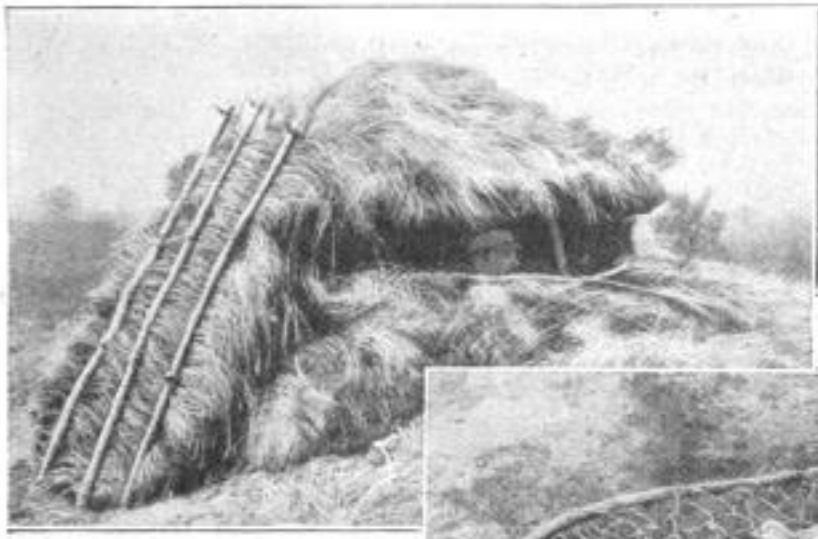
A concrete fire wall protects a large eastern wood mill from sparks and brands arising from a refuse-burning area upon which nearly 200 cords of sawdust, shavings, and other waste are consumed every 24 hours, the heap burning day and night. The great sheet of concrete, 30 ft. long by 15 ft. high, tapers from a thickness of 8 in. at the base to 4 in. at the top. It is protected against overheating by a sheet of water flowing down its face from a sprinkler pipe laid along the top. Formerly fire walls were made of wood reinforced by a covering of sheet iron.



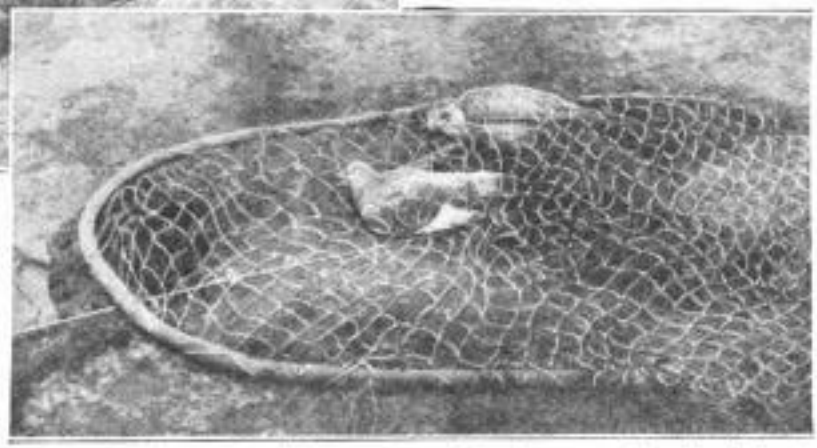
A Large Water-Cooled Concrete Wall has been Erected to Shield a Woodworking Mill from the Heat of a Refuse-Burning Dump

ANCIENT SPORT OF HAWKING, OR FALCONRY, STILL LIVES

Many who are conversant with tales of the days of chivalry have read of the ancient sport of falconry, in which hawks were trained to pursue and kill game birds and other small quarry. These will be interested to learn that the custom still lives and is perpetuated by a hawking club in England. The hawks



Falcon Trapper's Dugout Blind with Tame Decoy Hawk on Watch

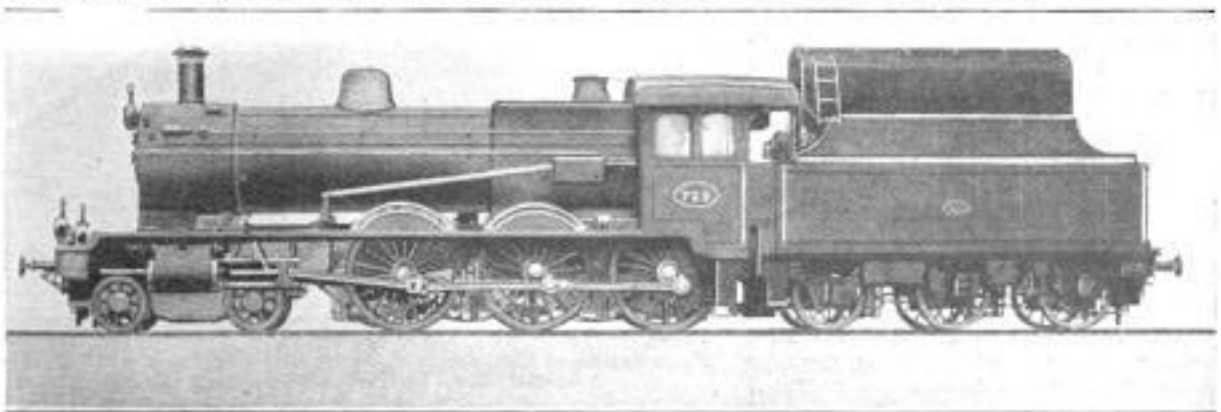


At the Top Is a Near View of the Blind, Showing the Trip Cord Leading to the Trap. In This Tiny Shelter the Trapper of Hawks Remains for Hours, Practically Motionless. Right: The Killer Snared Just in Time to Save the Life of the Live-Pigeon Bait. When the Falcon Walks under the Simple Drop Snare, the Supporting Stick is Withdrawn, and the Bird is Caught under the Meshes

are captured and trained in Holland by a specialist who uses a simple cord snare, a live decoy hawk, and a live pigeon as bait. The trapper must be possessed of exceptional skill and a cunning equal to that of the game, for, if the wary hawks see him enter his dugout blind, his hours of patient waiting are wasted. Though the stories of the sport of falconry are laid in medieval times, it is said to have existed in China 4,000 years ago.

LOCOMOTIVES IN ITALY BURN PULVERIZED LIGNITE

Forced, by the high price of imported coal, to make use of a low-grade native lignite, the railroads of Italy have solved their problem by ordering American locomotives, equipped to burn pulverized fuel. This material is drawn from the bottom of its tank in the tender by four 4-in. steel feed screws, operated in pairs by a two-cylinder engine that will run on 20 to 25 lb. of steam. From the screws, the fuel is blown, in suspension, by a fan through two 5-in. lines of hose to the firebox. The fireman controls the rate of feed from the cab, both by speed regulation and by clutches on the feed-screw shafts, that allow one pair to be used alone, and the range of adjustment is wide. Brick is used for the firebox arch and the combustion-chamber lining. These locomotives have a total weight of 148,000 lb., and a wheelbase of 55 ft. 3 in., with the tender. They run on the line between Rome and Viterbo.

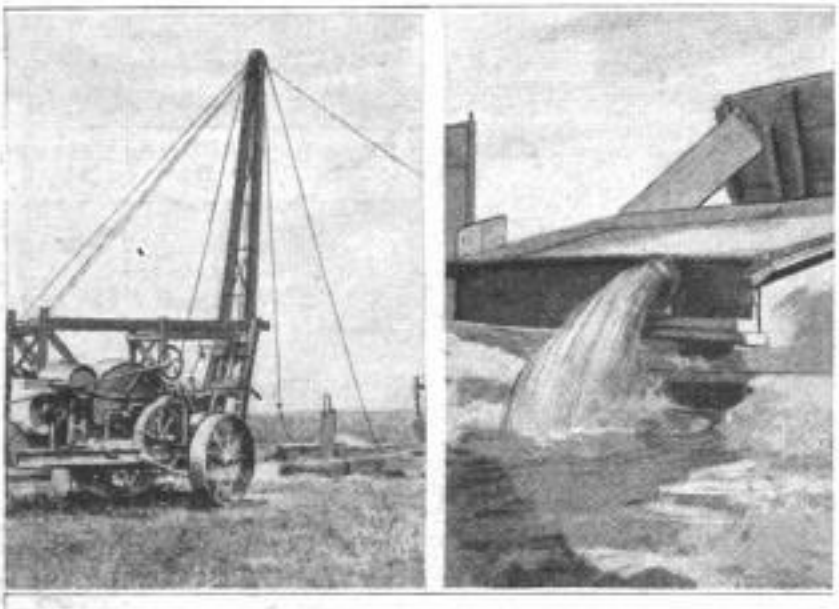


American-Made Locomotive for Use in Italy, Designed to Burn Pulverized Low-Grade Lignite: The Powdered Fuel is Drawn from the Tender by Four Steel Screws, and Blown into the Firebox through Hose

CHANGING A SALT LAKE INTO A FRESH-WATER BASIN

BY FREDERIC KINNEY

A RECLAMATION project out of the ordinary is being undertaken by a company in Iron County, Utah. Its purpose is the draining of Little Salt Lake, a body of water about 12 miles long and of an average width of two miles, and the use of its basin as a fresh-water reservoir, this water being drawn from underground sources. Little Salt Lake, like the great inland sea of Utah, is decidedly saline in character, but it receives fresh water from a number of small creeks, which will also be stored. After the lake has been drained and the bottom allowed to dry, the encrusted salt deposits will be completely scraped off.

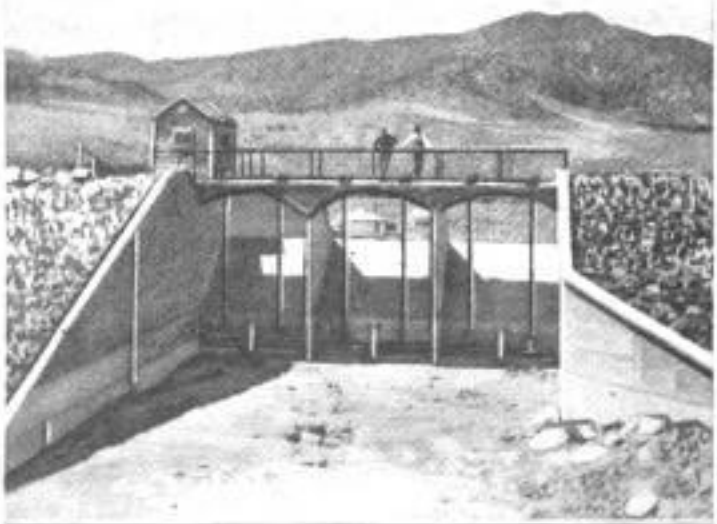


Left: The Type of Portable Drilling Rig, Electrically Operated, That is Used to Drill for Fresh Water in the Little Salt Lake Region of Utah. Right: One of the Hundreds of Gushing Wells That Result from Drilling in the Arid Land, and Which will Supplement the Water Supply from the Reservoir

Had the promoters of the scheme been dependent solely on the waters from the small streams connecting with Little Salt Lake, the plan would not have been considered. But tests by state and Federal authorities have shown the existence of abundant underground water supplies in what has been considered one of the most arid of Utah regions. Hundreds of wells have been drilled, and huge quantities of water have gushed forth. The power of an electric company operating in Beaver and Iron counties has been utilized for drilling purposes, and farmers in many sections are harnessing their drills to power lines and diverting the precious water to their fields.

Little Salt Lake lies in the midst of what engineers say can be converted into one of the finest grain, fruit, and alfalfa regions of the state, and when the plan to convert it into a fresh-water reservoir was broached some time ago, ranchers in the district organized a stock company, and the work of constructing conduits and diverting the water of the small streams was at once undertaken. The work has progressed so rapidly that it is expected the lake will be drained and fresh water from the underground wells and the tributary creeks turned into this natural basin early next spring.

This stored water will, of course, be used by the farmers for irrigation purposes. In the Little Salt Lake region about 10,000 acres of land will be watered from the lake reservoir. Independently of this project, other thousands of acres will be abundantly irrigated by systems of drains constructed as a result of the discovery of the never-failing underground water supplies. In Beaver, Iron, Millard, and other counties wells are being drilled by the score.



One of the Dams Already Constructed in the Irrigation District North of Little Salt Lake, to Impound Fresh Water for the Reclamation of Thousands of Acres of Land That, without This Artificial Aid, Is Virtually an Arid Desert

Water is obtained at depths of from 40 to 70 ft., and the cost of the wells varies from $200 to several times that amount. Wells tested have proved successful, averaging 400 gal. per minute and around 60 ft. in depth.

Much of the water at present used for irrigation purposes in Utah is obtained from streams, the state allotting a given "water" right to each farmer. The water is diverted by means of irrigation ditches constructed individually by the farmers. This system has been the cause of innumerable disputes, however, as one farmer uses more water than his neighbor thinks he ought to use. For this reason the state is promoting the system of separate irrigation projects, and encouraging the drilling of fresh-water wells in the arid regions.

Of the reclamation projects, that of the drainage of Little Salt Lake is the most unusual. The lake is one of the most picturesquely situated bodies of water in the state. To one side lies a valley; on the other is a ridge of small mountains topping another valley of absolute desert land, irreclaimable by any means, a waste of rock and sand. It is proposed to drain the lake by digging a ditch following the descending grade to the hills, allowing the salt water to flow to the desert below through what is known as the "Gap," an opening in the mountain ridge. The cost will be practically no more than that of constructing the ditch, which will be about 15 miles in length.

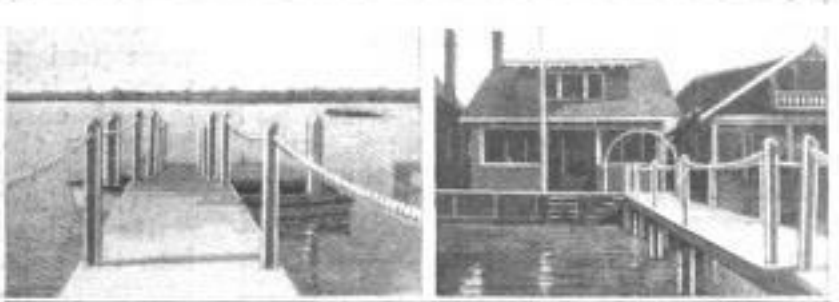
A series of ditches and conduits, for the greater part built of wood, will convey water from the creeks and the driven wells, to the drained lake basin, the sides of which will be cemented. Two dams, with spillways, already have been built. Another water-supply source is contemplated, engineers considering the plan of impounding the waters of the mountain streams, which now are going nowhere in particular and are entirely wasted.

The Concrete Spillway of One of the Two Dams Already Built at Little Salt Lake, Designed to Convert That Useless Saline Basin into a Reservoir of Fresh Water, from Which 10,000 Acres of Land will be Irrigated

The cost of the Little Salt Lake project is estimated at about $150,000, which will be borne by the farmers of the region, payments being extended over many years.

ATTRACTIVE PLEASURE PIER STRONGLY BUILT

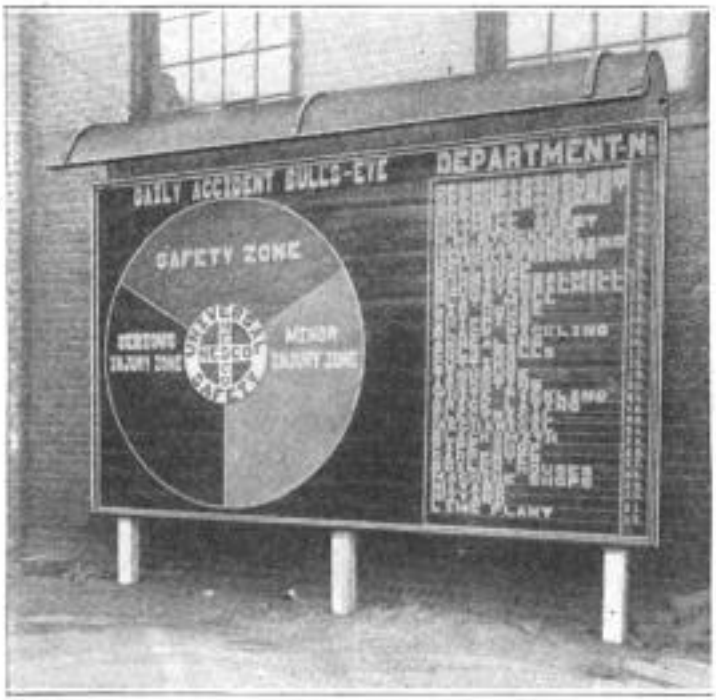
Private piers are usually of such temporary construction that they greatly detract from the appearance of a beach, and their life at the best is limited to only a few years. A neat and fairly permanent pier of recent construction removes these objections to a considerable extent. The wooden flooring of the pier is carried by longitudinal beams, which are secured by galvanized-iron pipes, sunk in the top of every concrete pile. Hand ropes, like those on a ship's gangway, lead from the landing float to the cottage.



Left: The Seaward End of the Pier, with Its Rope Railings. Right: Looking toward the Shore, with the Concrete Piles Visible

PLANT DEPARTMENTS COMPETE FOR SAFETY RECORD

Wholesome competition and department spirit are being utilized with success, in an Illinois manufacturing plant, to reduce the number of accidents among the several thousand employes. There are 32 departments in the plant, each of which is assigned a number that is posted on a large bulletin board. The feature of the board, however, is a big, round bull's-eye, painted in three zones, one for safety, and the others for minor and serious accidents, respectively. Each foreman has a disk with the department number on it, which he hangs, at night, in the appropriate zone.



The Big Bulletin Board, with Its Bull's-Eye Zoned for Safety and Injury, and the Plant Departments Listed and Numbered for the Daily Safety Contest

PLANS ODD VIADUCT TO MAKE CITY'S HILLS ACCESSIBLE

Steep hills that run up 400 to 600 ft. within less than a mile of the city, and retard its development in that direction, have given Duluth, Minn., a problem that a local railroad engineer plans to solve with an ingenious viaduct system. The proposed structure, coming down from the high lands in a gentle grade, would carry street-car tracks and roadways, and terminate on the roof of a 350-ft. building in the business district. Passengers, wagons, autos, and even street cars, would be raised and lowered by huge elevators in the building.

THIN ASBESTOS IS USELESS AS FURNACE-PIPE COVER

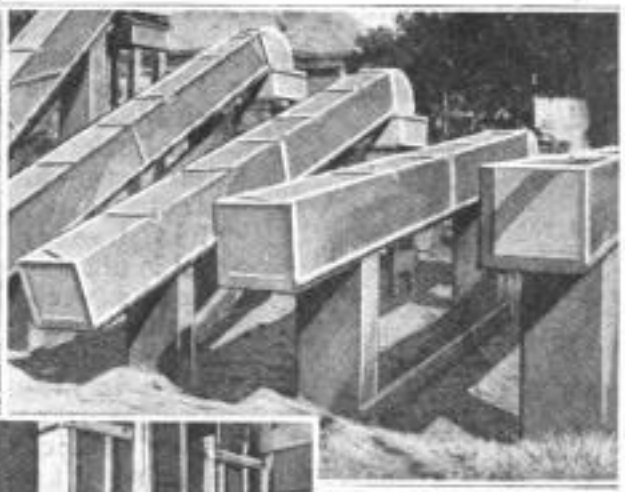
Coverings of thin asbestos paper on the pipes of hot-air furnaces are worse than useless, actually increasing the loss of heat about 35 per cent. That is the conclusion reached after a series of careful experiments at the University of Illinois. Bare, bright tin pipes, even when coated with $\frac{1}{16}$ in. of ash dust, held their heat better than the papered pipes. Paint and calcimine also proved inefficient as pipe insulators, but bare, black, rusty pipes are found to be the worst of all. Among the best coverings for retaining the heat are corrugated air-cell asbestos in one to three layers, with paper outside; a second pipe surrounding the heat pipe, with a $\frac{1}{16}$-in. dead-air space between, and asbestos blocks, $1\frac{1}{4}$ in. thick, covered with $\frac{1}{2}$ in. of cement and a cheesecloth jacket. These methods range in efficiency from one and a half to nearly four times the value of the bare tin, though the latter is superior to many of the simple systems of insulation used, because the radiating powers of its bright surface are very much lower.

TELEPHONE-LINE INSULATORS MADE OF BEER BOTTLES

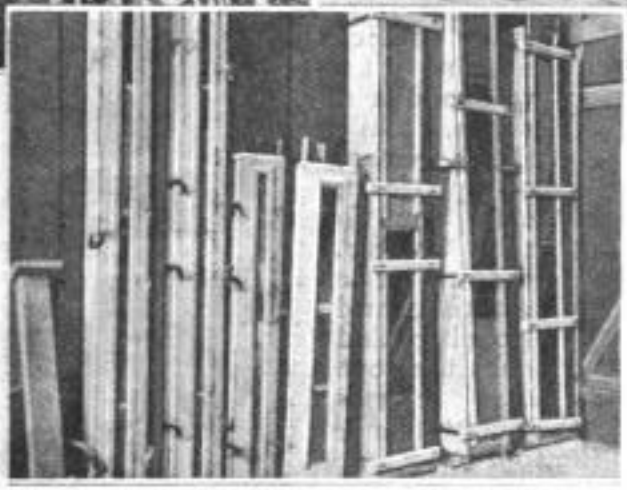
The lowly but versatile beer bottle has had another laurel added to its crown. A telephone line 25 miles long is insulated throughout by bottles which, first having the bottoms knocked out, were tied to poles. A lashing of cords between the necks of the bottles and nails driven into the poles assure security. Insulation is accomplished by tying the line wire close to the top of the bottle neck. This novel line has been in operation for some time and is said to be giving excellent service.

IRRIGATION EXPERIMENTS CONDUCTED IN FLUMES

Exceptionally Long Seepage-Test Flumes: Workmen are Replenishing the Water and Measuring the Amount Consumed Daily



Shorter Test Units Arranged at Various Angles Decreasing to the Horizontal: The Seepage Was Slowest through the Latter

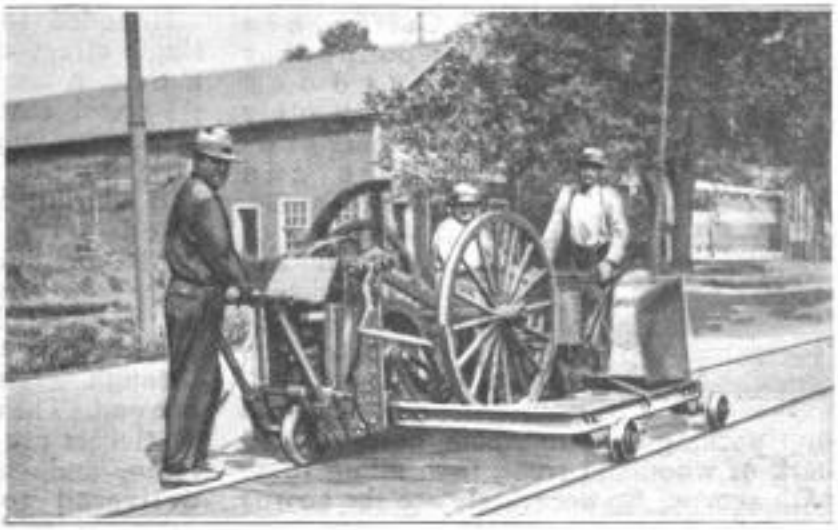


In the Vertically Placed Flumes the Seepage Was Quite Rapid, Illustrating the Wastage through the Beds of Irrigating Ditches. Capillary Action Caused an Upward Movement in Some Cases

Desiring to know the percentage of wastage of irrigation water caused by capillary seepage through soil, the irrigation engineer of one of the large western states recently used flumes packed with various kinds of soil and arranged at all angles from the perpendicular to the horizontal. Each flume is 10 by 10 in. and is equipped with one glass side through which the moisture movement is noted. As one might expect, it was found that the capillary action was greatest in the vertical plane, the most decided effect being downward, next followed by a horizontal movement, and last by an upward one. Valuable data were secured bearing on the correct surveying of irrigation lines and wastage of water through the side and bottom soil of canals.

RAIL-JOINT GRINDER EASILY MOVED ON OR OFF TRACK

To grind rail joints of a street-car track on which a two-minute schedule is in force, requires a machine that can be placed on the track and removed easily so that cars may pass without interruption. A grinder that meets these conditions is balanced on two wagon wheels when off the track, but when at work is supported on the track by small flanged wheels. The weight of the machine is placed on either set of wheels by turning a crank at the rear.



A Special Grinding Machine for the Welded Joints of Street-Car Tracks: Two Sets of Wheels are Provided for Rails and Ground

TYPICAL OF ORIENTAL SPEED IS CHINESE PILE DRIVER

There is always plenty of time in China, and the operation of the Chinese pile driver is typical of oriental deliberation. Mechanically, this useful tool is not unlike its occidental counterpart, but it differs in motive power. Five coolies turn its wooden winch, while the foreman, on a platform, part way up the frame, directs the starting and stopping, and pulls the rope that releases the iron weight when it has crawled, literally inch by inch, to the top.

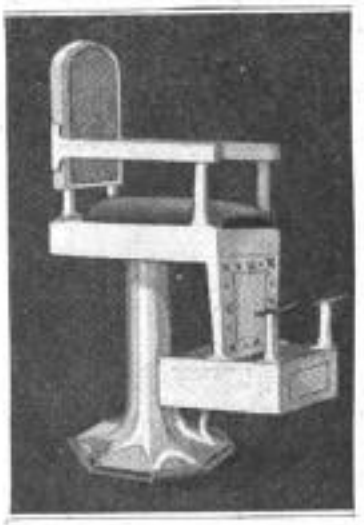
PHOTO BY HARRY BEARDSLEY

CALIFORNIA BIRD UNRIVALED FOR PROVIDENT INDUSTRY

Every good Californian admits that in his state things are done thoroughly and whole-heartedly, yet to date, oddly, little publicity has been given the work done by a number of California's earliest settlers. The California woodpecker outdoes every other member of its large and varied family, as a matter of fact, in the activity with which it provides for the "rainy day." This it does by "pecking" innumerable holes in the bark of woodland trees, then filling these with acorns. So accurately are the acorns fitted to the holes that they can usually be removed only with a knife. And so numerous are the acorns stored in this way that, as one authority puts it, "a large pine, 40 or 50 ft. high, will often present the appearance of being closely studded with brass nails, the heads only being visible." Unfortunately, however, the industrious bird often follows instinct too blindly, and stuffs the holes, not only with acorns, but with pebbles of similar shape.

SHOE-POLISHING ART ATTAINS DIGNITY OF SPECIAL CHAIR

After long association, often intimate, with the homes of tonsorial art, the shoe-shining parlor finally has conceived an ambition to have a special chair for its own patrons, and a mid-west inventor has supplied a design. The new seat, which achieves quite a professional appearance, is mounted on a pedestal instead of legs, and the footrests are an integral part of the construction. Its mechanical feature is a commodious supply drawer in the footrest base, which springs open when a button is pressed.



METAL CASE DELIVERS CARDS OR TICKETS ONE AT A TIME

Intended to be used for delivering a single street-car ticket or visiting card at a time, a neat little metal case has made its appearance on the market. The device is filled with the cards or tickets, and slight pressure on a small knob pushes the ticket through a slot in one end. The cards or tickets are kept clean, and can be delivered to the recipient with no finger-print decorations.

MASKS FIND NEW PLACE IN THESPIAN ART

Personally Fitted Masks of a New Type, Designed by an American Artist, have Gained Renewed Favor on the Modern Stage. The Designer is Seen Explaining, to the Actress Who is to Wear Them in Her Dances, the Construction of Her Special Collection

The Designer Demonstrates the Complete Alteration of Personality Effected by His Masks, by Donning One Himself

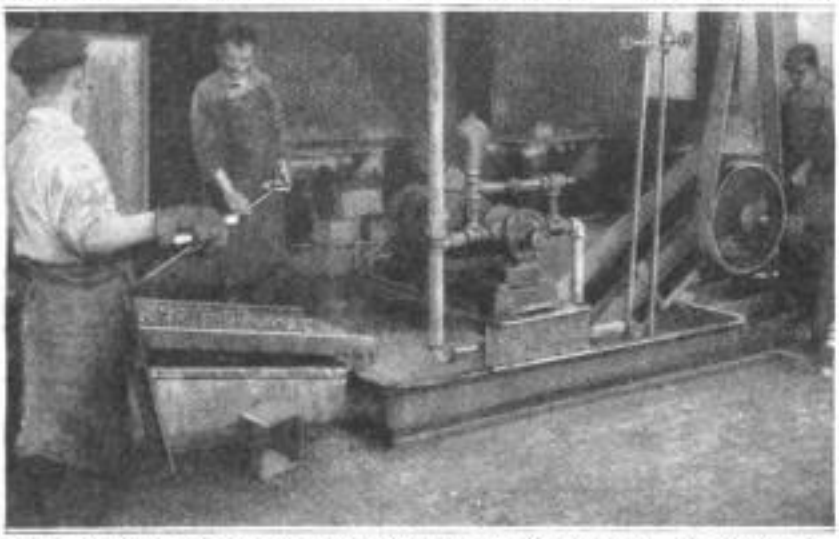
The Inside Surface of the New Masks Receives as Much Attention as the Outside, That It may Conform Comfortably and Effectively to the Features of the Wearer. In This Picture, the Actress is Having a Fitting, to Assure the Success of Her Latest Disguise

The Mask is Built Up to the Correct Form and Contour by the Simple but Painstaking Process of Pasting Strips of Wrapping Paper on Its Surface, and the Artist-Inventor Here is Engaged in Improving the Counterfeit Features and Cranium of an Indian Savage

PHOTOS COPYRIGHT, KEYSTONE VIEW CO.

MACHINE CLEANS AND COOLS TEN TONS OF NUTS IN DAY

An interesting machine, said to have a capacity of 10 tons in 24 hours, has lately been installed in a factory at Cleveland, Ohio, for the work of cleaning and quenching nuts as they come from the tempering fires. On an inclined screen at one end of the machine the nuts are dumped, first of all, to free them from the carburizing compound in which they have been packed and heated. Falling off the screen, the nuts drop into the quenching tank, where cold water is kept in constant circulation by a pump. As the bottom of the tank consists of a grate with inwardly sloping sides, the nuts gradually move toward the middle. Here they fall upon a conveyor which carries them out of the water, up an incline, and dumps them into baskets, while the pulverized compound goes through it.



Hot, and Still Mixed with the Carburizing Compound, the Nuts are Dumped on the Cleaning Screen at the Left. From the Screen They Fall into the Cold Water. The Conveyor Takes Them, Finally, to the Baskets at the Right

LITTLE RED SCHOOLHOUSES GO WITH COMING OF GOOD ROADS

Though less apparent than the fattening effect on the farmers' purses, the service of the "good-roads" program to the farmers' children of several counties in West Virginia is no less real. Prior to the building of the splendid concrete highways which these localities now boast, the boys and girls commonly made their way on foot or horseback to dozens of little one-room district schools. Now they are whisked in automobiles to a few centralized, consolidated institutions, administered like the best city schools. The busses operate on schedule, and on every day of the school year, rain or shine.

This Bus is Taking Its Load of 48 Children to One of the Consolidated Schools in West Virginia, Which the Advent of Concrete Roads has Substituted for the Scattered One-Room Schools of Yesterday

FINDS LIVE MICROÖRGANISMS THOUSANDS OF YEARS OLD

Many persons have seen specimens of prehistoric insects imbedded in amber, where they were imprisoned when that substance solidified many thousands of years ago. The extraordinary announcement is now made by a French scientist that he has found other organisms, of microscopic size, incased in amber, and by special processes has brought them back to life, so that they moved about and multiplied. The same investigator some time ago reported the existence of living microörganisms in the fiber of Egyptian papyrus of great antiquity. If further examination bears out this appearance of immortality among infinitesimal creatures, some new theories of life may become necessary.

IRRIGATION CANALS KEPT OPEN BY ODD DREDGE

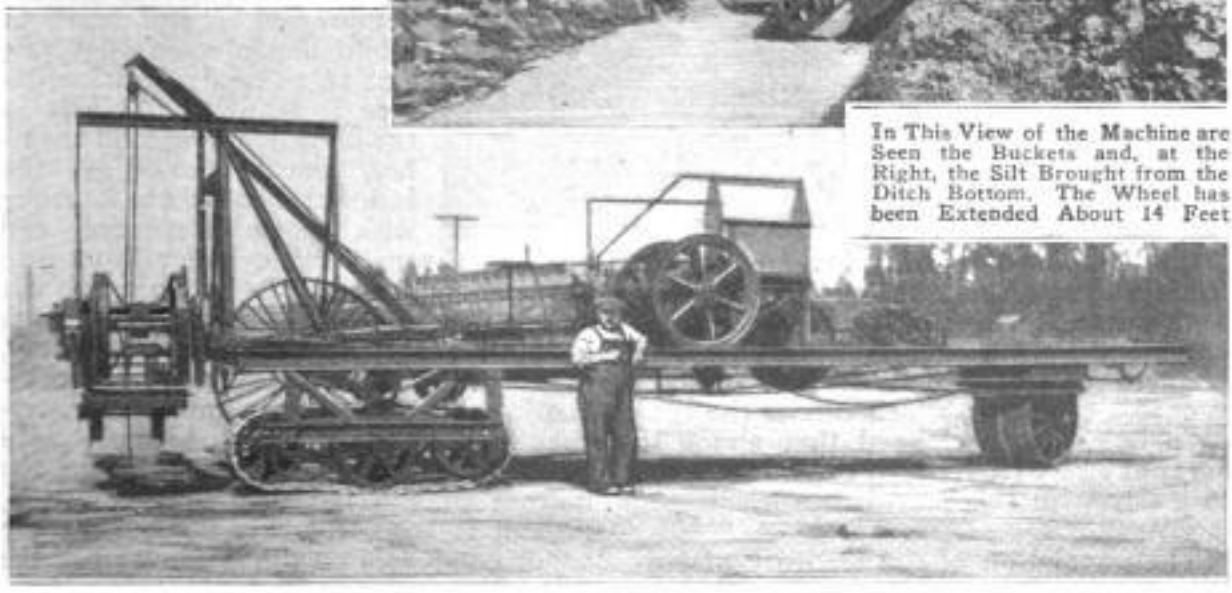
BY E. L. POOR

FOR a great many years Florida held the record for early-vegetable and garden-truck production on a commercial scale. But no more, for the Imperial Valley in southeastern California is now providing enormous quantities of "garden sass" even for the Christmas holidays. Trainload after trainload of its products reach northern and eastern markets considerably earlier than from other sections. This stuff is grown out in the open, with no thought of glass protection, where once sagebrush reigned supreme. Irrigation is the miracle worker that has made this possible.

The soil of the valley, hundreds of feet deep, consists of silt washed down by the Colorado River, most of it through the Grand Cañon. It is so impalpably fine that it follows wherever the water runs. One would even draw it at the kitchen sink or into the bath, if special precautions were not taken to settle it. So it finds its way into the irrigation canals, and spreads out over the land, the best fertilizer in the world, but it would soon fill the canals unless cleaned out frequently. No satisfactory method was found until a continuously operating dredge was built by a blacksmith resident in the valley. The work is done by large steel buckets of special design, attached to an endless chain operating on an elevator at the rear of the machine. As the machine advances, the buckets revolve with this chain, and scoop up the mud in the ditch, depositing it on the bank. This elevator may be operated for the excavation of a new ditch or to clean the bottom of a canal 8 or 10 ft. deep.

The power is derived from a twin-cylinder 15-hp. gasoline engine of marine type. Traction is secured by a simple tractor tread, and the machine will climb over all kinds of obstructions as well as across soft or boggy places with the utmost ease. Steering is done by a simple arrangement of handwheel and cables, which can turn the outfit completely around within a radius of 35 ft. Being regularly built 14 ft. wide, it can be extended to 28; and even 60-ft. canals have been dredged by carrying one wheel on a barge. The operation is so simple that two men will handle 2,500 cu. yd. of mud in an eight-hour day. It will pass checks and weirs, and other obstructions, so easily that these are hardly noticed in the day's work. The passage simply involves raising the lower end of the elevator.

In This View of the Machine are Seen the Buckets and, at the Right, the Silt Brought from the Ditch Bottom. The Wheel has been Extended About 14 Feet



This Continuously Operating Dredge is Used for Removing from Irrigation Canals the Silt Which would Soon Choke Them. If Undisturbed. The Side View Shows the Endless Tread at the Rear, and at the Front the Roller Wheel with Which Steering is Done. This Particular Machine is Not Driven by a Marine Engine but by a Power Plant of the Stationary Type

A NEW MACHINE FOR THRESHING CLOVER SEED

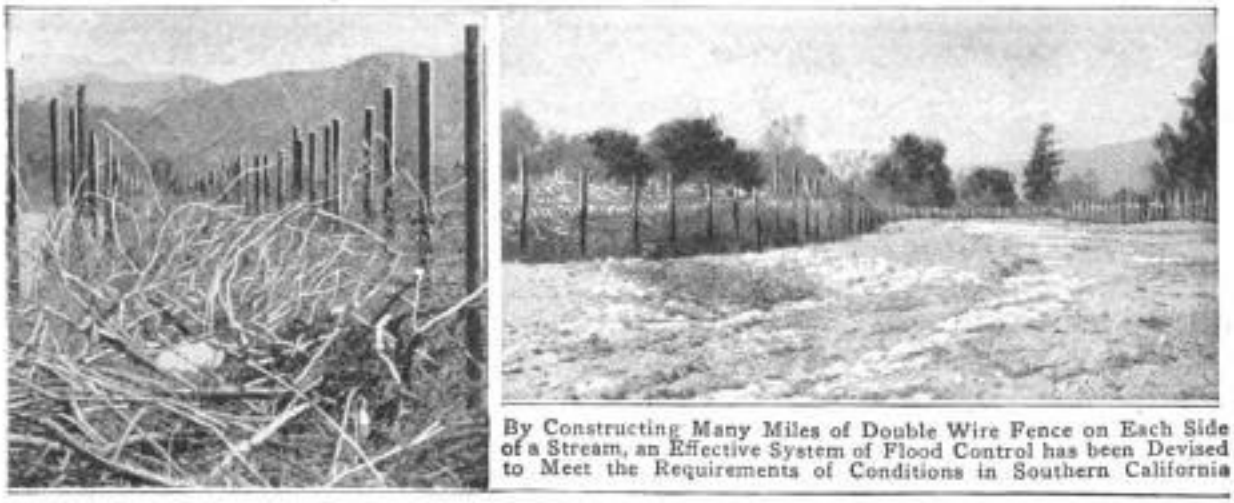
A machine for threshing sweet-clover seed in the field, without cutting the plants, has been recently invented by an Illinois man. The thresher is pushed by four horses. The plants are bent at an angle and guided against a beater, which removes the seed. An air draft then blows it onto a conveyor, which carries the seed to a box. It is claimed that about 15 acres of sweet-clover seed can be threshed in a day with this machine.

Above: Front View of the Machine That Threshes Sweet-Clover Seed in the Field, Indicating the Method of Bending the Plants into the Beater Wheel without Cutting Them. Right: Rear View, Showing That the Four Horses Push, Instead of Pull. This Curious Implement, Below: The Thresher Seen from the Side, as It Appears in Action, Threshing Sweet-Clover Seed over About 15 Acres a Day

¶The population of the territory of Hawaii increased from 191,909 to 249,992 in the ten-year period from 1910 to 1920, according to the official census recently made public in Honolulu.

BOILING MERCURY USED IN OIL-ENGINE IGNITER

A recently developed heavy-oil-burning engine of only medium-high compression, that is, a semi-Diesel type, is adapted to uses in oil fields and other localities where the water contains large quantities of gritty substances, making it unsafe to inject into the cylinders. The Diesel design is adhered to in the new type with the exception that the excessively high compression pressures of 400 to 500 lb. per square inch are not used. This avoids the necessity of injecting water into the combustion chamber to prevent preignition. However, it also has the effect of not raising the temperature of the compressed air sufficiently to ignite the injected oil spray, and an auxiliary ignition device is required. This is in the form of an inclosed chamber, water-jacketed at the top but not at the bottom, which contains mercury and projects through the cylinder head into the combustion chamber. To start the engine, the mercury is brought to a high heat with a blowtorch. After starting, the heat of the compression and combustion maintains the temperature. Mercury is used for the reason that it is a fairly good heat insulator and keeps the bottom of the chamber hot, and that, though it boils, there is no loss, as the vapor condenses on the inside wall of the water-jacketed top of the igniter and returns to the bottom. As water injection is not necessary to prevent preignition, this new type is called a "dry" engine.



By Constructing Many Miles of Double Wire Fence on Each Side of a Stream, an Effective System of Flood Control has been Devised to Meet the Requirements of Conditions in Southern California

NEW FLOOD-CONTROL SYSTEM HAS POSSIBILITIES

When the winter rains are at their height in the mountains of southern California, the volume of water that comes rushing into the lowlands is a problem that has occupied the attention of engineers for years. The great forest fires of the summer of 1919 have increased the flood menace and at the same time been responsible for what promises to be a satisfactory method of flood control. Many miles of wire fencing, in double rows on each side of the stream, have been built. Gradually the space between the fences fills with débris and forms an effective barrier against the formation of new channels.

FREAK THUNDERBOLTS AVOID DARK COLORS

A peculiar preference of high-voltage discharges for a path over light-colored areas was disclosed upon examination of a herd of several black and white calves recently struck by lightning. All the animals survived, suffering more or less severe burns. It was noted that the burned areas were those covered by white hair, the black-haired portions being untouched.

The Arrow Indicates an Area, Formerly Covered by White Hair, Completely Denuded and Severely Burned by Lightning. Black Hair Seemed to Afford a Protection from the Bolt

ONE-ARMED INDIAN TRAINS SELF AS SLED MAKER

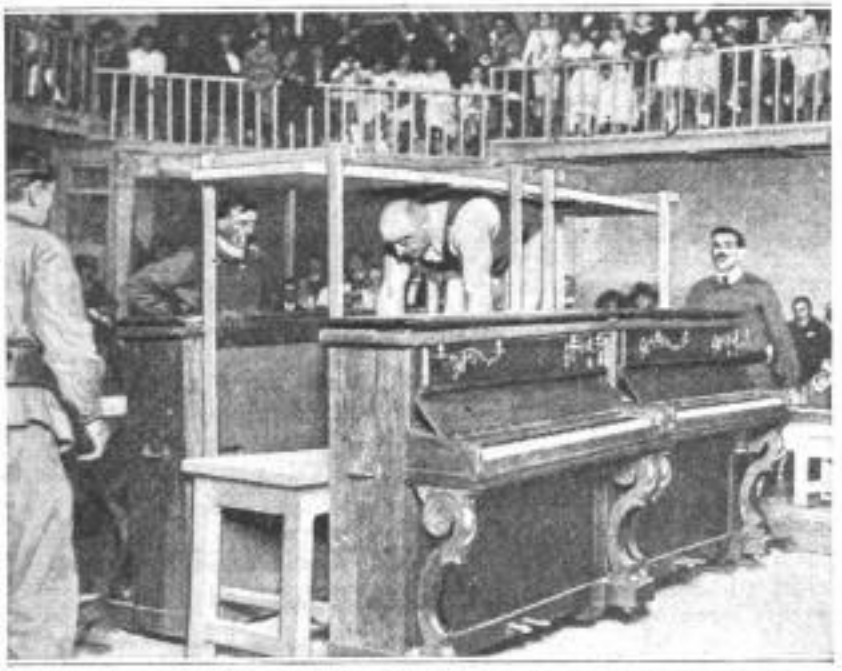
An inspiration in these days of painful reconstruction is the photograph on this page, forwarded to this magazine from Alaska. Though handicapped by the loss of his left arm, the illiterate Indian boy has pluckily perfected himself in his trade of sled making, the correspondent explains, and recently was able to complete the sled to which, in the photograph, he is giving a final coat of paint. The work was done practically without assistance. The sled is of the type pulled by dog or reindeer team over the frozen tundras.

Undiscouraged by the Loss of His Left Arm, This Indian Boy has Trained Himself to Proficiency in the Trade of Sled Making

¶Treatment of pyorrhea by electrical means has recently been made the subject of experiment by an English electromedical worker. The object in the use of current is to force antiseptic medicines well into the gums, where ordinary methods of application would not suffice.

THE WORLD'S STRONGEST MAN CAN LIFT FOUR PIANOS

Except in myth and scripture, there is probably no record of a "strong man" who has been able, by virtue of his own strength, to raise a ton and a half from the ground. France claims to be the residence of the world's greatest piano mover and strong man generally. While a good union piano mover would never consider moving more than a single piano at a time, France's prize strong man, in a recent demonstration, lifted four pianos, weighing 3,000 pounds.



The Prize Strong Man of the World Lives in France. In a Recent Demonstration of His Great Strength He Lifted Four Pianos, Having a Total Weight of a Ton and a Half, from the Ground

SPIRAL TOOTH-MILLING TOOL MAY SUPPLANT HAND FILING

A new milling cutter, developed in Germany, has teeth like a file arranged in spirals in such a way that the cut is made with a smooth sliding movement. In competition with a workman using a hand file, the new cutter removed 17½ oz. of cast iron in 15 minutes. The man's record was ⅗ oz. It is said that the tool will penetrate the scale of castings and forgings, and polish the surfaces in a remarkably short time. According to the manufacturers, the soft metals and materials, lead, copper, hard rubber, celluloid, etc., may be worked advantageously, as the teeth of the cutter do not clog. It may be used in a lathe, drill, miller, or mounted on the arbor of a grinder. The teeth may be sharpened by grinding.

AMERICANS MAKE GERMAN SUB BREAK ITS OWN RECORDS

Considering the reputation German crews gained as expert handlers of submarines, it is interesting to note that men of the United States Navy, without previous submarine experience, recently made the captured German "U-111" break its own records. The sub, allotted to this country, made the 3,357-mile trip from England alone, on its own power, but would make only 13.8 knots on the surface, the highest German figure having been 16.4. A crew of untrained men then practiced with the boat around Florida and Cuba for six months, and standardization trials were made. A surface speed of 17.08 knots, or nearly 20 miles an hour, was the result, and a submerged speed nearly one knot greater than the Germans ever had attained also was made. While the German boat was found worth studying, the navy report notes many advantages of the United States type of submarine.

CONSPICUOUS NO-PARKING SIGN ON FIRE PLUG

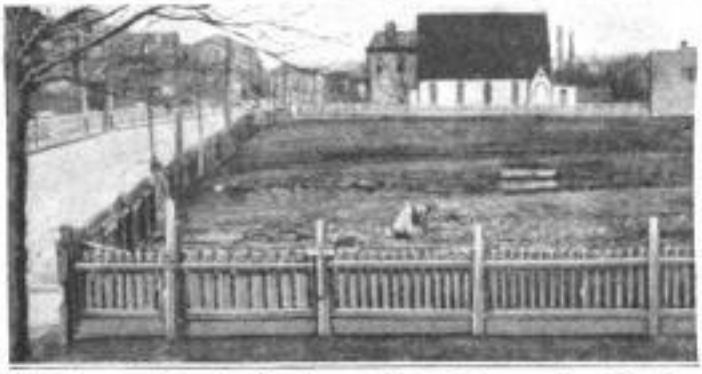
As motorists are prone to forget the fire regulations in regard to parking, neat, though conspicuous sheet-metal no-parking signs, to be securely attached to fire-hydrant plugs, are being manufactured. If the printed injunction is obeyed, a clear space of 10 ft. is left on each side of the plug.

¶Rust and tarnish on the surface of any kind of metal are immediately removed without rubbing, it is asserted, by the application of a cloth saturated with a new kind of metal polish, invented by a California man. The metal is left dry and susceptible of being worked to a luster.

CINCINNATI, OHIO, PLANS RIVERSIDE PARK

The Height to Which This Dwelling on Eastern Avenue has been Raised Indicates the New Level of the Street

Eastern Avenue between Lewis and Collins Streets: Trees and Shrubbery will Replace Tenements and Signboards

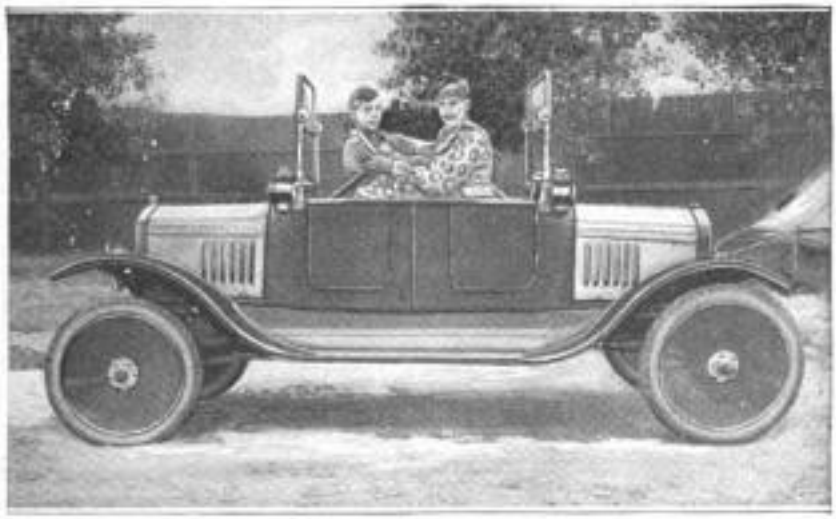


The Former Site of a Lumberyard is to Blossom into Verdure When the Great Riverside-Drive Project is Completed

The city fathers of Cincinnati, Ohio, in a praiseworthy effort to keep the city in the front rank as regards parks and playgrounds, are negotiating for the properties fronting on the Ohio River, with the object of transforming a most unlovely expanse of débris-strewn yards and ugly frame factory buildings and shacks into a riverside park and driveway approximately 17 miles long. It is realized that the work will take time, as part of the plan contemplates raising the street level to a point beyond the reach of high water during the periodical floods. A number of pieces of property have been acquired, and it is planned to plant trees and shrubs, and to sod immediately, thus relieving a bleak landscape with full-fledged parks in miniature.

CIRCUS-CLOWN AUTOMOBILE IS A SIAMESE TWIN

Circus comedy has been motorized. Long-eared "January" and his trick cart are destined to pass from everything but the memory of the old-time circus "fan." He has been supplanted, as a fun maker, by the two-way auto, the antics of which possess the great cardinal humorous elements of uncertainty and surprise. The two clown chauffeurs of the comedian auto never being of the same mind as to the direction in which they wish to travel, the result is a series of comical sudden starts, stops, twists, turns, reversals, plunges, bucks and other antics just avoiding seemingly certain disaster, and stopping short of complete rolling over and wreckage. The car and drivers are a feature of the 1st Division Regular Army Military Circus. The car has two independent engines, transmissions, driving axles, and steering wheels.

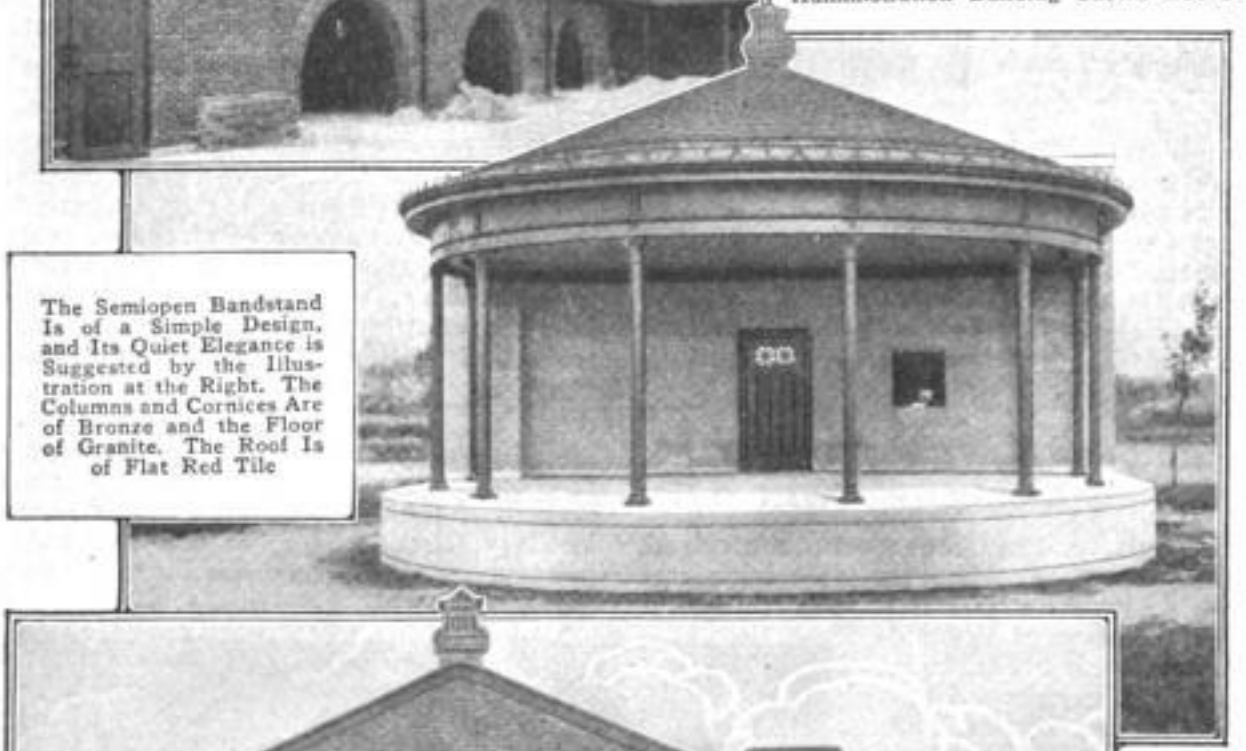


COPYRIGHT, INTERNATIONAL
The Siamese-Clown Car Has All Important Units in Duplicate. This Permits Travel in Either Direction at Equal Speeds

NEW BUILDINGS OF PHILADELPHIA'S LEAGUE

This Building, Which might Easily be Mistaken for a Country Residence, Houses the Offices of the Park Directors. The Suggestion Conveyed by the Design Was Intentional

The Clean-Cut, Commodious Buildings at the Left Are the Park Stables, and Are Immediately in the Rear of the Administration Building Shown Above



The Semiopen Bandstand Is of a Simple Design, and Its Quiet Elegance is Suggested by the Illustration at the Right. The Columns and Cornices Are of Bronze and the Floor of Granite. The Roof Is of Flat Red Tile

The Rear Portion of the Bandstand Shown Above Somewhat Resembles a Chapel in the Severity of Design, and the Chaste Effect is Enhanced by a Plain White-Stone Foundation and Large Ornamental Urns

ISLAND PARK COMBINE BEAUTY AND UTILITY

The Combined Refectory and Boat-house Adds to the Beauty of League Park as the Glazed Brick of the Ground-Floor Boat-Storage Room Contrasts Pleasingly with the Differing Shade of Buff-Brick Walls of the Second Story. To the Right is Shown the Interior of the Canoe-Storage Floor

The Temple, or Lookout, is the Gem of the Collection from the Standpoint of Beauty of Design and Execution. From the Granite Steps to the Bronze Ornament at the Top of the Dome, Conservatism Is the Dominant Note. The Severity of Line is Somewhat Softened by the Pale-Blue Glazed-Tile Lining and the Red-Tile Roof of the Dome

OVERHEAD CARRIER MECHANISM CONNECTS WHARF AND FACTORY

A mechanical carrier, 30 ft. above the ground, now connects the receiving wharf to a fish-canning factory in Wilmington, Calif. The necessity for the erection of the high structure is understood when it is explained that between factory and water front there lies a much-used public highway. Previously, the work of hauling the fish to the factory was often interrupted, and as frequently halted, by the flow of traffic. This condition no longer exists. Fish received at the wharf are now raised by an elevator to the top of a wooden tower. Here they are dumped automatically upon the broad belt of the carrier, and carried across the street to the factory.

The Hoisting Tower and Long Overhead Conveyor, by Which Fish are Carried from the Boat Landing to the Canning Factory at the Right, Saving Much Labor and Avoiding the Difficult Crossing of the Water-Front Highway

LARGE-CAPACITY AIR LINERS DISCUSSED BY ENGINEERS

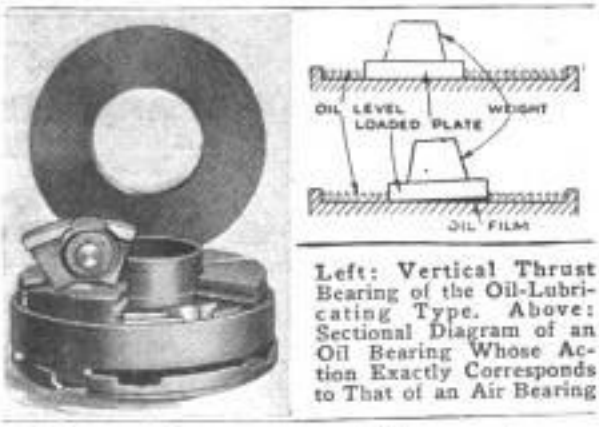
At a recent conference of the aerial engineers of one of the leading foreign powers a paper was submitted in which were given some interesting figures and data bearing upon the ultimate design of freight and passenger-carrying airships of the dirigible type. To be commercially practicable the engineers' specifications called for a craft having a gas capacity of 4,000,000 cu. ft., a lifting power of 120 tons, and accommodations—staterooms, saloons, observatories, etc.—for 100 passengers. The estimated cruising radius was 3,500 miles, at a rate of speed of 80 miles per hour. The estimated rates of passenger fare were about 50 per cent in excess of present steamship tariffs.

NEW BEARING LUBRICATED BY AIR INSTEAD OF OIL

Although it is doubtful whether any wide use will ever be made of it, a bearing that uses air as a lubricant instead of oil will nevertheless find many applications in delicate, high-speed machinery.

The new bearing is of extremely simple construction, but involves exceedingly accurate machine work. It consists of but three main parts, a base, six shoes arranged circularly upon it, and the inner revolving thrust collar.

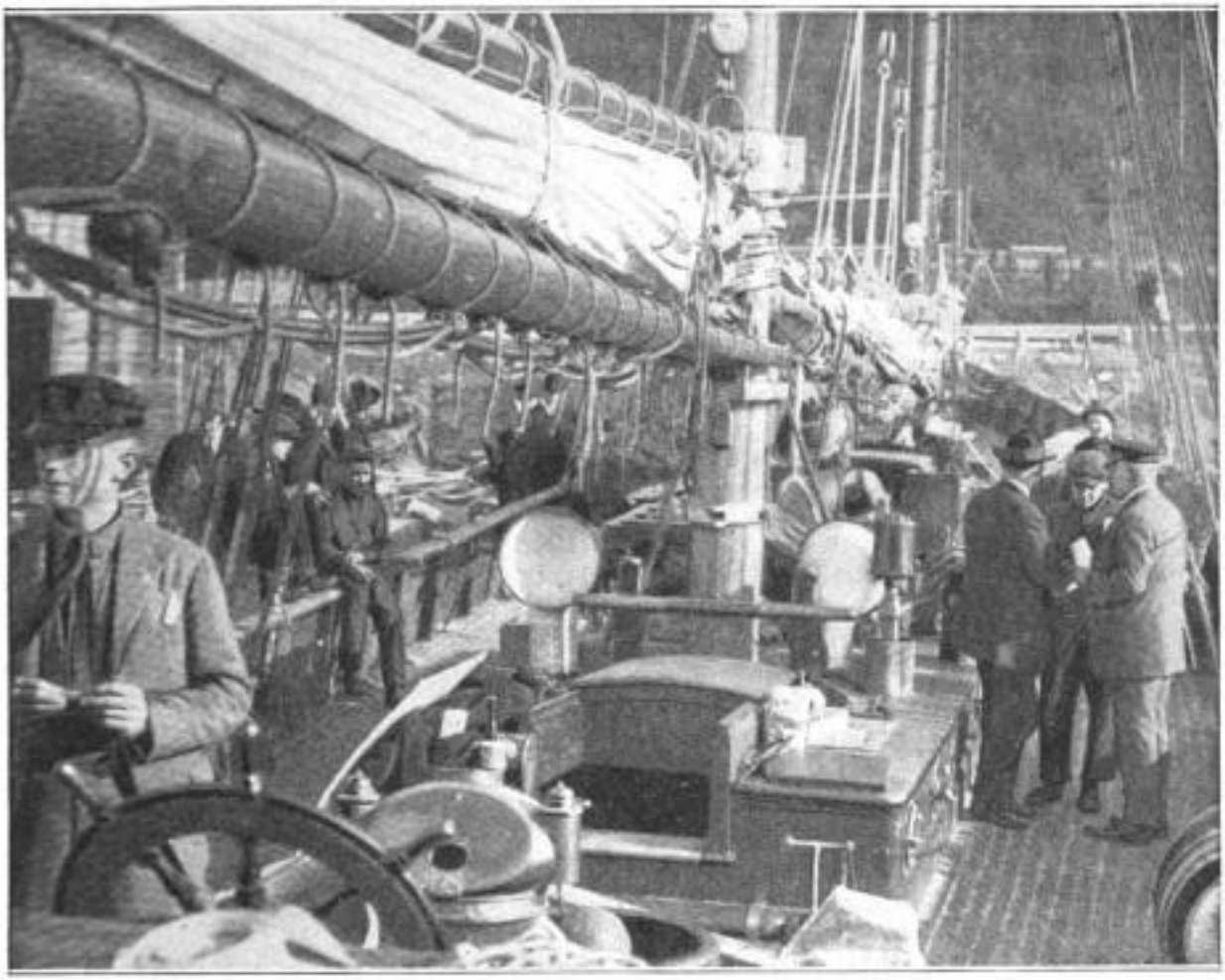
When the collar begins to revolve some air clings to it, and this is dragged in between its surface and that of the loosely fitting shoes, which are free to tilt. This infinitesimal amount of air pries the edge of the shoes downward, creating wedge-shaped openings through which more air is drawn until finally a very thin wedge of air entirely separates both parts.



Left: Vertical Thrust Bearing of the Oil-Lubricating Type. Above: Sectional Diagram of an Oil Bearing Whose Action Exactly Corresponds to That of an Air Bearing

Owing to the extreme delicacy of construction and adjustment, it is easily disarranged, and abrasive particles of dust easily scratch the finely lapped bearing surfaces.

¶In commemoration of Armistice Day, flowers were showered from airplanes flying low over the city of Chicago. Each flower stem bore a card with the information that soldiers and sailors, victims of the great war, shut in in army and navy hospitals, were to be made to feel that they and their deeds have not been forgotten.



Looking along the Deck of the Yacht "Wisdom II," Formerly the United States Naval Cadet-Training Ship "Anemone IV": The Craft has been Completely Refitted for Scientific Work, and is About to Depart from Puget Sound on a Thirty Months' Cruise of the Seven Seas and Their Coasts

FREE-LANCE NATURALIST TO ENCIRCLE GLOBE

In a small ketch-rigged yacht, with a crew made up of adventurers, including two motion-picture camera men, a Pacific-coast naturalist recently sailed out of Puget Sound, entering upon a cruise which is scheduled to occupy two and a half years and carry him to every land, civilized or savage, upon the seven seas.

The yacht is the "Wisdom II," formerly the "Anemone IV," of the U. S. Naval Training Station, Puget Sound. It is 120 ft. long and of 83 tons' burden, equipped with a 135-hp. auxiliary engine and specially fitted for scientific exploration and research. There is storage space for 4,500 gal. of gasoline, sufficient to drive the vessel 4,000 miles on a continuous cruise about 10 miles an hour, independent of its sails. For drinking and cooking purposes, 3,500 gal. of fresh water are carried, and an additional tank holds 1,200 gal. of water for developing photographic films. Motion pictures are to be taken of every subject gathered during the cruise, and the ship contains a complete laboratory for this purpose.

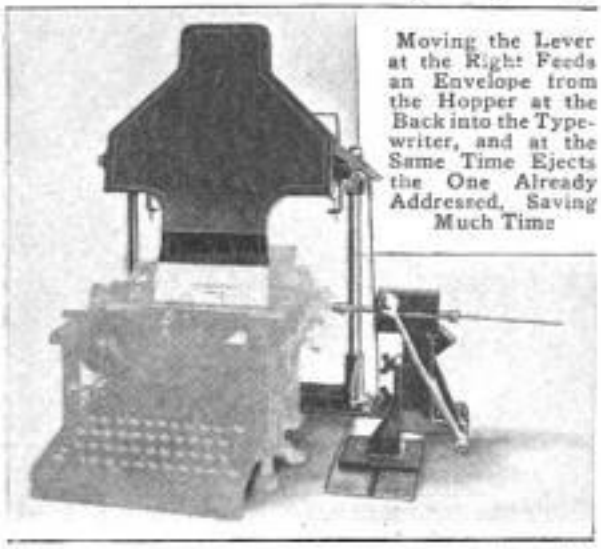
The master of the "Wisdom II" is a free lance, and has no connection with any society or firm. He has spent most of his life in the earth's little-known places.

SEEK COOL VACATION PLACE FOR CANAL ZONE WORKERS

Proximity to the equator, and a high degree of humidity, combine to give the Panama Canal Zone a climate somewhat enervating to persons accustomed to more temperate regions. As a measure of efficiency as well as comfort for Canal Zone workers, a committee of officials is conducting a search for a convenient vacation spot of cooler climate. Change of altitude rather than latitude is relied upon for the success of the experiment, and it is likely that some high point in Costa Rica or the Chiriqui Province of Panama will be selected.

ATTACHMENT FEEDS ENVELOPES RAPIDLY TO TYPEWRITER

Addressing a series of envelopes on a typewriter is rather an unsatisfactory performance, because inserting, adjusting,

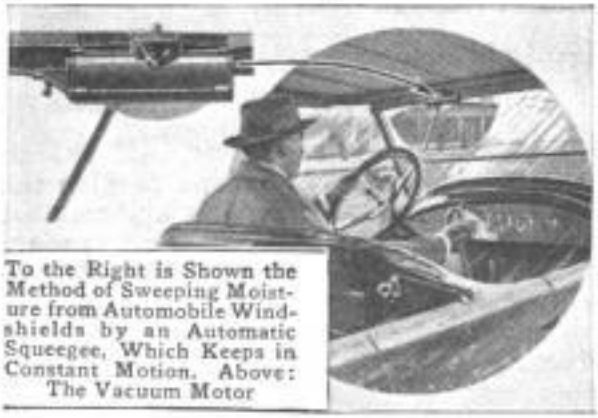


Moving the Lever at the Right Feeds an Envelope from the Hopper at the Back into the Typewriter, and at the Same Time Ejects the One Already Addressed, Saving Much Time

and removing them takes longer than the actual writing. In a new and ingenious attachment, some 200 envelopes are carried in a hopper at the back of the machine, while a lever at the right is geared to the typewriter platen. Moving the lever to the right and back again ejects the envelope already addressed, and at the same time rolls another into exactly the right position for addressing. It is asserted that the resulting increase in the operator's output amounts to 125 per cent or more.

VACUUM SQUEEGEE CLEANER FOR AUTO WINDSHIELDS

A novel motor-car fitment, recently placed on the market, is a windshield

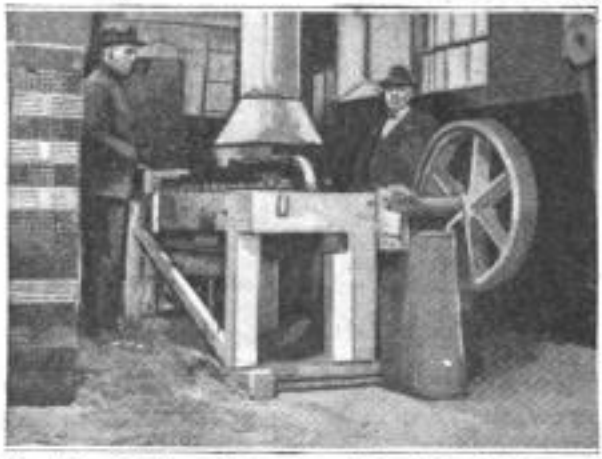


To the Right is Shown the Method of Sweeping Moisture from Automobile Windshields by an Automatic Squeegee, Which Keeps in Constant Motion. Above: The Vacuum Motor

cleaner kept in constant motion, at any speed desired, by means of a self-contained vacuum motor. The device is mounted on the top of the windshield and is piped to the engine intake manifold by means of flexible tubing. A touch on the finger-control valve starts or stops the squeegee and regulates the speed. The cleaner remains in operation, the squeegee swinging back and forth across the glass, until the control valve is turned to the off position.

SAWING MACHINE PRODUCES WOODEN SPIKE-HOLE PLUGS

Fifty thousand wooden plugs, of the sort used for filling up old spike holes in railroad ties, are the daily product of a sawing machine recently invented by the superintendent of the woodworking mill maintained by one western line. The machine consists, in the main, of a horizontal, pocketed conveyor belt which moves past four small circular saws, all mounted on one vertical shaft. Placed in the conveyor pockets, blocks of wood measuring 4 by 4 by 20 in. are carried past the saws, and receive four longitudinal cuts, about 9 in. deep. Each block is then lifted out,



The Four Horizontal Saws and One Vertical Saw of This New Machine Cut 25 Spike-Hole Plugs from the End of a Wooden Block

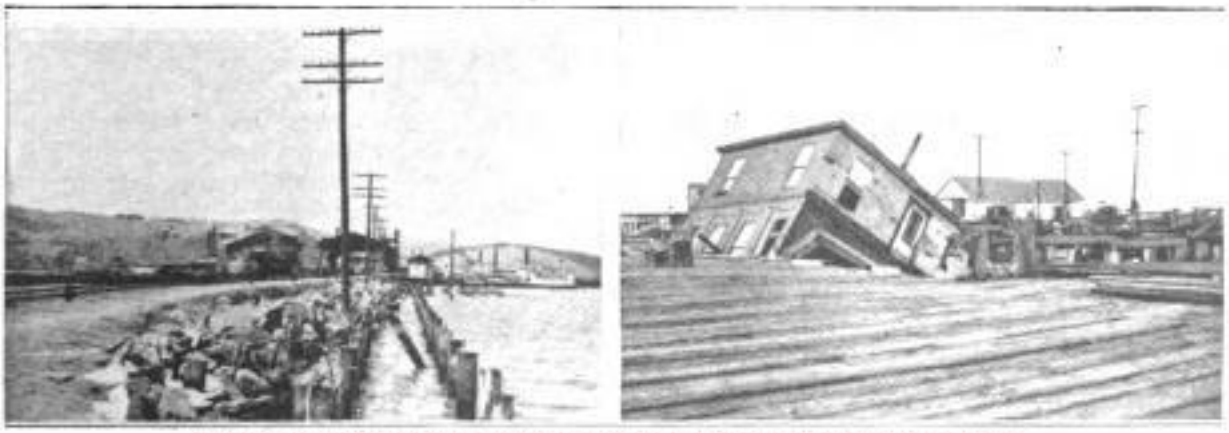
given a quarter turn, and sent past the saws again. The result is a "cluster" of 25 plugs, all 9 in. long, and all connected at one end to the butt of the block. So, without being lifted from the belt, the blocks are now shoved forward, and sent past a vertical saw which severs the plugs from the butt.

¶A motor ambulance especially designed for the care of sheep, and containing 10 pens, five on each side, is an unusual but highly valuable adjunct to an enormous sheep ranch in Alberta, Canada. During the past season some 7,000 lambs were born on the ranch, and the busy ambulance was the means of saving the lives of hundreds of them.

FROM WIDE WORLD PHOTOS

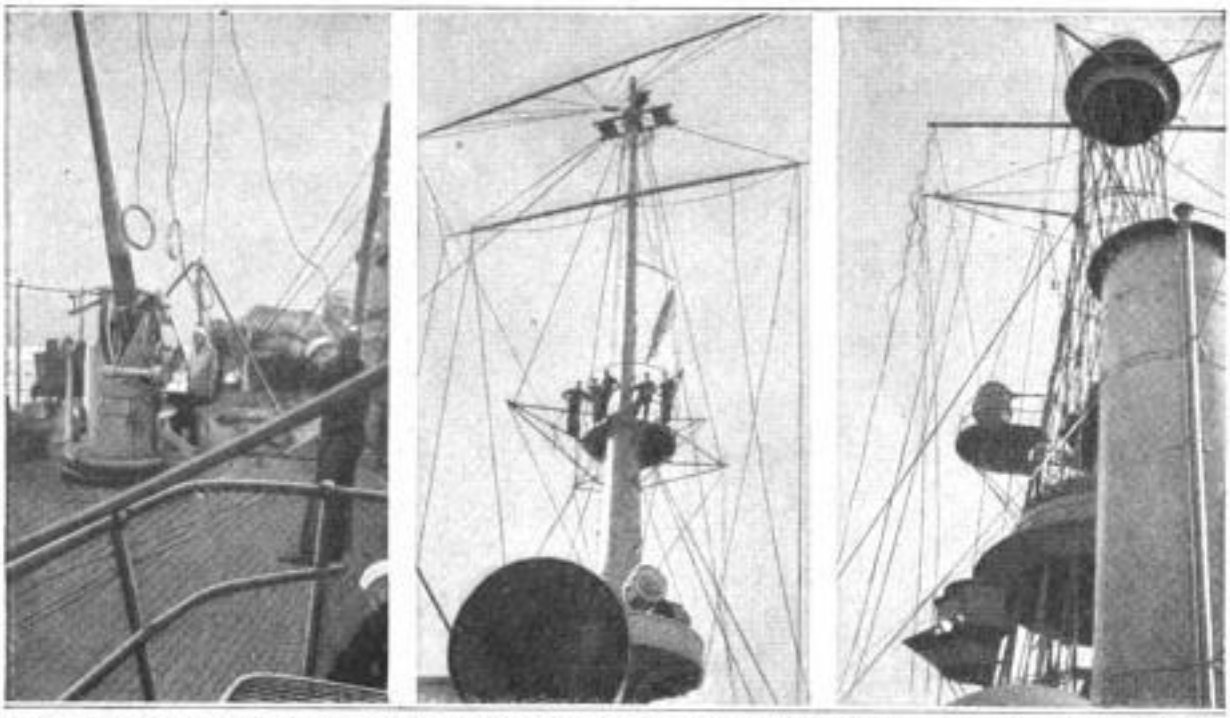
NIAGARA FROM A NEW VIEWPOINT IS PRODUCT OF AERIAL CAMERA

NOT so very long ago, a photographer requested to take a picture of Niagara Falls from an entirely new viewpoint would have refused the impossible commission. Now, with airplane photography an everyday incident, almost an infinity of new angles are available. The whole sweep of the American and Canadian falls, with the rapids above and the gorge below, is laid bare to the lens held far aloft, and the relations of land and water are given new interpretation. In the specimen reproduced here, the mile or more that separates the international bridge from the great hydroelectric plants on the upper Ontario shore, a hopeless handicap for the humble tripod camera, means nothing to the aerial instrument, which includes cities, villages, and farms in its impartial field. An interesting detail, occupying almost the exact center of the picture, is the specklike "Maid of the Mist," the tiny steamer whose seemingly perilous excursions into the caldron of waters below the cataract provide a thrilling adventure for so many tourists. The geometrical arrangement in the lower left-hand corner, is, of course, a part of the city of Niagara Falls, New York.



TEREDOS DESTROY A PIER AND WRECK TWO BUILDINGS

WITHOUT warning, a large wharf in Benicia, Calif., suddenly collapsed and allowed a warehouse, standing upon it, to slide into 30 ft. of water, where it lies completely submerged. Another two-story building, the dwelling of the wharfmaster and his wife, was saved from a like fate by a precarious hold on some stub piling. The collapse was the result of the tunnelings of the teredo, or shipworm. A section of the ferry slips along the same coast also was destroyed by the borers.



Left: Just after the Collision with the Bridge; the Broken Wires Coiled to Clear the Deck, While the Blacksmith, behind the Anti-Aircraft Gun, Makes New Fittings. Center: The Repair Crew, 1½ Hours Later, Guarding the Improvised Antenna While a Message is Received. Right: Looking Up at the Tangled Wires

A RADIO ACCIDENT IN THE KIEL CANAL

BY SAMUEL W. BEACH

AT twenty minutes after seven o'clock Sunday morning, Sept. 12, 1920, the United States cruiser "Frederick" suffered practically complete destruction of its wireless antenna equipment while passing under one of the many railroad bridges spanning the Kiel Canal, Germany. At nine o'clock the radio operator on watch received with comparative ease the regular messages sent by the Annapolis station, 5,000 miles away, by means of an impromptu antenna rigged up in that short time. This established a record for rapid radio repairing at sea. Of special interest is the fact that three-fourths of the "Frederick's" crew were naval reservists who had been out of the service since the war, but had volunteered for the cruise to Antwerp, Belgium, where the international Olympic games were then going on. Not long before, the U. S. S. "Pittsburgh" had gone hard aground in the Baltic Sea, off Libau, Russia. After efforts had been vainly made to float the ship, and, fearing disaster if the weather turned, its commanding officer flashed a hurry-up call for help to the "Frederick." In response to this call the "Frederick" took the short cut through the Kiel Canal into the Baltic, and it was during the passage through the canal that the accident to its radio rigging happened.

One of the Bridges across the Kiel Canal, That Smashed the Ship's Antenna Masts, Because It was Answering a Hurried Call for Help and Had No Time to Lower Them

The existence of the railroad bridges was, of course, known by the officers of the cruiser, but it was thought that the wooden antenna masts, which extend above the main steel towers of the ship, would pass beneath them freely. Nevertheless, a force of shipfitters was sent

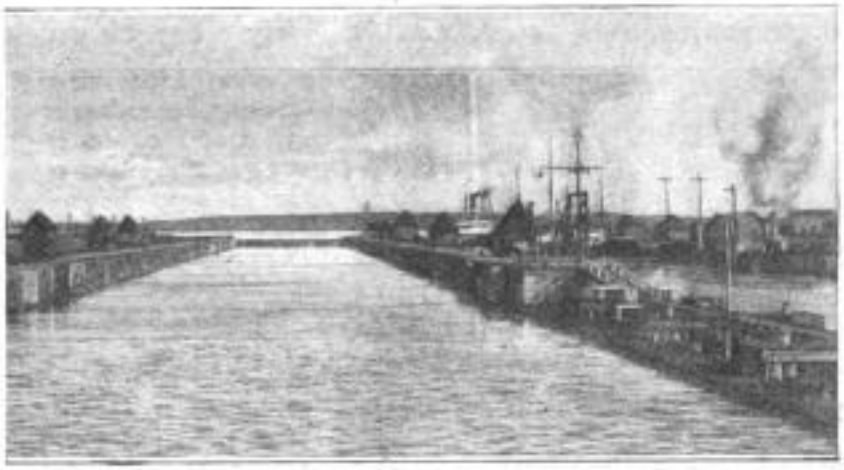
aloft to lower these masts, as a matter of extra precaution. But there was not time enough to do this, and short lines were hastily secured so as to prevent them from going overboard in case of accident.

As the big warship approached the first bridge it became evident that the masts and the bridge would collide. All hands were ordered to safety below decks, and then followed moments of intense suspense.

The forward antenna mast struck the bridge, bent into a huge bow, snapped and crashed downward, carrying away both the port and starboard aerials, until, caught and held by the emergency line, it stopped with a jerk, while the main antenna swung to and fro just above the ship's funnels. Three of its wires had been torn away, while the other three were hopelessly entangled, grounded, and useless. A few seconds later there was another crash: the mainmast had followed its mate.

It was twenty minutes after seven o'clock, ship's time. In one hour and forty minutes the naval radio station at Annapolis was due to broadcast its regular official telegrams to the "Frederick," and there was not one inch of wireless antenna yet aloft that could possibly be used.

Events now followed with astounding rapidity. The ship's radio officer took charge of a husky repair gang. Shipfitters sprang aloft with their ropes and tackles, while radio men patched together a temporary antenna of four wires. One end of this aerial was made fast to the starboard end of the aft, or mainmast, yardarm. There was not time to rig the forward end, so a sturdy sailor sat astride the forward yardarm and held the free end by its insulator. Nine o'clock struck. The radio operator on watch "tuned in," and received with very little trouble the signals from home.

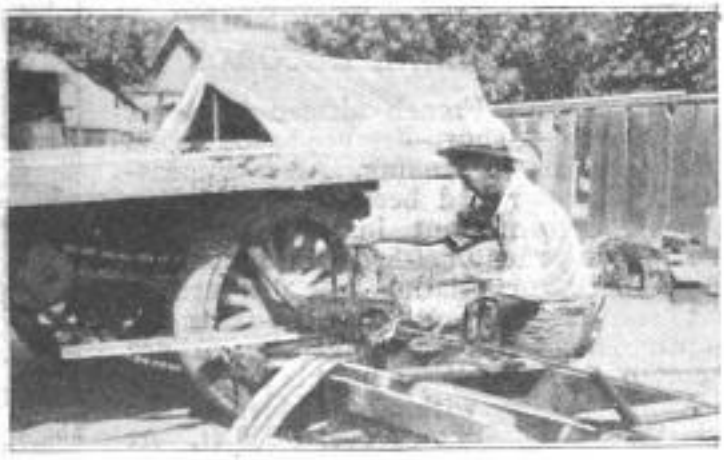


The Eastern End of the Kiel Canal, Where the Vessel Arrived with a New Set of Antenna Masts and Wires, Fabricated on Board: Beyond Is the Baltic Sea, Still Mine-Strewn

In the meanwhile the ship's blacksmith was busy at his forge, making new clamps and other tackle, and the carpenter's mates were fashioning new wooden poles. By nightfall the "Frederick" had left the Kiel Canal, and was plowing into the Baltic Sea. Every one of its wireless antennæ was in its proper place and working, full tilt, as before.

THREAD CUTTER FOR SILO RODS DRIVEN BY TRUCK

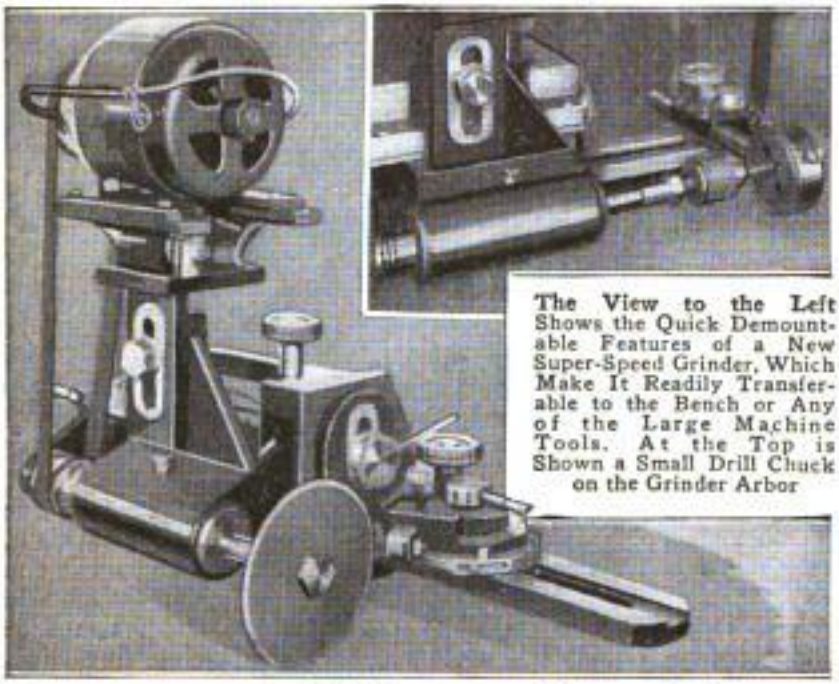
By merely jacking up one of the rear wheels of his motor truck and attaching a thread-cutting die arrangement of his own design, a silo contractor was enabled to cut threads on the iron rods which hold the cement staves in place at a great saving of time and labor. A concrete-stave silo is held together by scores of ⅝-in. iron rods which are threaded for several inches on each end. The rod is held during the threading operation by a vise on a sliding carrier. When the thread has been cut, a reversing arrangement revolves the die in the opposite direction.



A Silo Contractor Threads the Scores of Iron Rods Needed for a Concrete-Stave Silo by Jacking Up His Truck and Attaching a Thread-Cutting Die to the Wheel

NEW NONVIBRATING GRINDER WORKS TO CLOSE LIMITS

Announcement is made of an extremely high-speed precision grinder, which, so the manufacturers assert, may be safely driven to a speed of 20,000 r.p.m., when used with a small wheel on small internal work. Larger wheels are limited to a speed of 10,000 r.p.m. It is further claimed that, owing to an improved method of mounting the grinder shaft as an independent unit, it runs without vibration and makes possible the working to the extremely fine limit of .0001 in. The tool is designed as a universal and may be used in connection with a lathe, shaper, or miller, the framework being designed to permit attachment to these machines, or it may be used as a bench grinder.



The View to the Left Shows the Quick Demountable Features of a New Super-Speed Grinder, Which Make It Readily Transferable to the Bench or Any of the Large Machine Tools. At the Top is Shown a Small Drill Chuck on the Grinder Arbor

FRENCH FLIERS ESTABLISH NEW AIRPLANE RECORDS

Two famous French airmen have set new figures for short-distance speed flights and precision in landing. After a measured kilometer had been covered by an American contestant in 12.5 sec., his French opponent bettered the record by ⅖ seconds, negotiating the distance in 12.3 sec., or at the rate of 181.95 miles per hour. In the landing competition France scored again, the pilot in this trial making his landing within nine feet of the mark from a height of over 3,000 ft. At a later date, the first French flier covered the same distance at the rate of 191⅔ miles an hour.

PRECAUTIONS AGAINST FIRE IN OIL-BURNING SHIPS

Use of oil fuel for ship propulsion has introduced at least two new fire hazards, one of which comes from the explosive residual gases in empty tanks, and the other from leakage at defective pipe joints and seams. Tanks that are to be examined should be thoroughly blown out with air, or, better still, filled with water and emptied again. British authorities recommend that all oil-pressure pipes be of seamless drawn steel, with flanges accurately machined, and gaskets of very thin, impervious material. The whole piping system should be tested at well above the working pressure, and kept accessible for frequent inspection. Certain precautions also are to be taken in the location and construction of oil-storage bunkers, and in the outlet points and screening of vent pipes. The fire-fighting equipment recommended includes perforated steam pipes, chemical extinguishers, boxes of sand or treated sawdust, and foam-making apparatus.

TRUCK COVER REMOVED WHILE LOAD IS TAKEN ON

A western miller, having suffered damages to the contents of his open trucks through unexpected rains, has provided

The Truck with Its Detachable Top Hoisted Aloft to Facilitate the Process of Loading or Unloading

an effective preventive against a recurrence. As it is inconvenient to load cov-

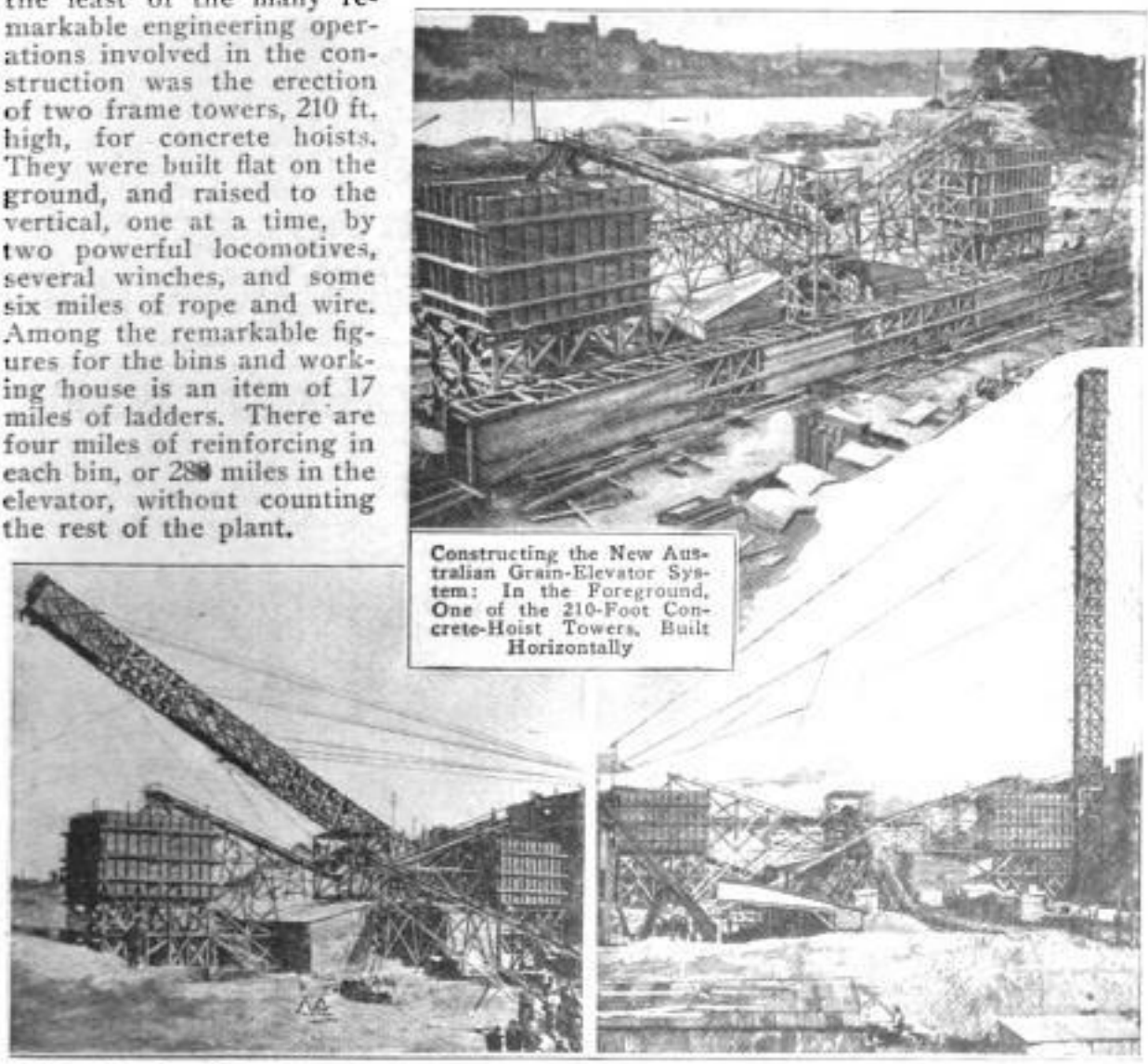
ered trucks, he equipped his trucks with removable tops, which are suspended from the roof of the loading shed while the load is being taken on, and lowered into place just before starting out. In this manner the possibility of damage is minimized, and loading is more easily and quickly done.

AUSTRALIAN ENGINEERS BUILD HUGE GRAIN ELEVATORS

Wheat growers of New South Wales, Australia, where crops are large, now are assured of a safe place to store them, under government protection. A system of grain elevators recently built at Sydney has a capacity of 5,597,000 bu., in 72 reinforced-concrete bins, 108 ft. high and 31 ft. in diameter, and 71 interstice bins. A modern working house and shipping gallery are included in the big plant. Not the least of the many remarkable engineering operations involved in the construction was the erection of two frame towers, 210 ft. high, for concrete hoists. They were built flat on the ground, and raised to the vertical, one at a time, by two powerful locomotives, several winches, and some six miles of rope and wire. Among the remarkable figures for the bins and working house is an item of 17 miles of ladders. There are four miles of reinforcing in each bin, or 288 miles in the elevator, without counting the rest of the plant.

SAW-EDGED GARDEN TROWEL IS DOUBLY USEFUL

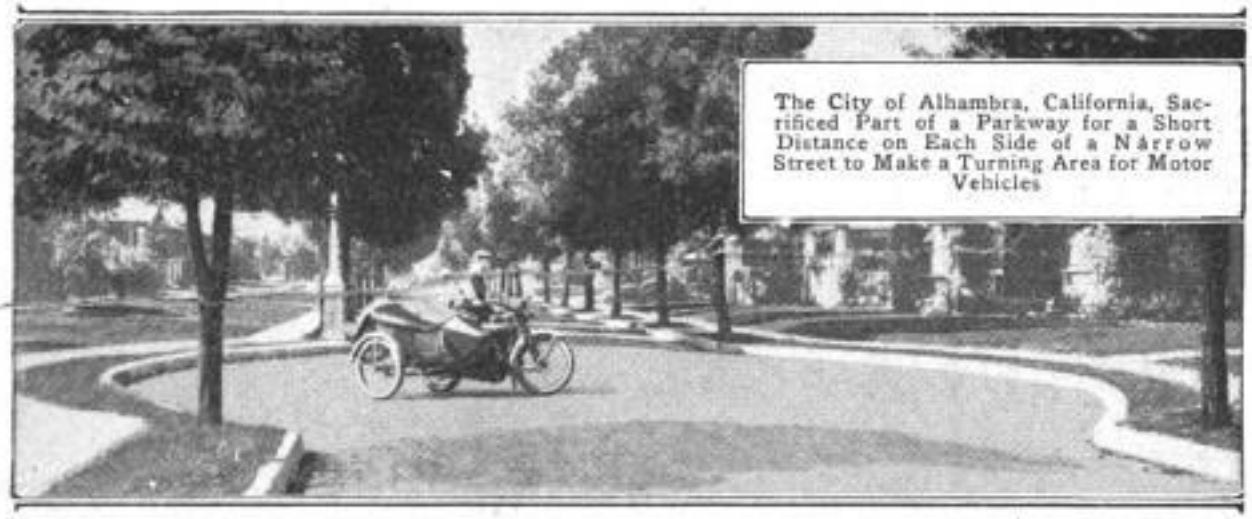
By the simple expedient of putting a row of saw teeth along one edge of a garden trowel, an eastern manufacturer has developed a new tool with a number of applications to which the usual smooth-edged type is not adapted. The work of eradicating small weeds is made easier by use of the toothed side, which can be applied also to cultivating the ground around seedlings just coming up, as well as to flower and plant beds.



Constructing the New Australian Grain-Elevator System: In the Foreground, One of the 210-Foot Concrete-Hoist Towers, Built Horizontally

Left: Raising One of the Big Hoist Towers, 210 Feet High, to the Vertical Position, with the Aid of Six Miles of Rope and Wire, Two Locomotives, and Many Winches. Right: The Task Successfully Completed

CIVIC FEATURES THAT PROMOTE THE COMFORT



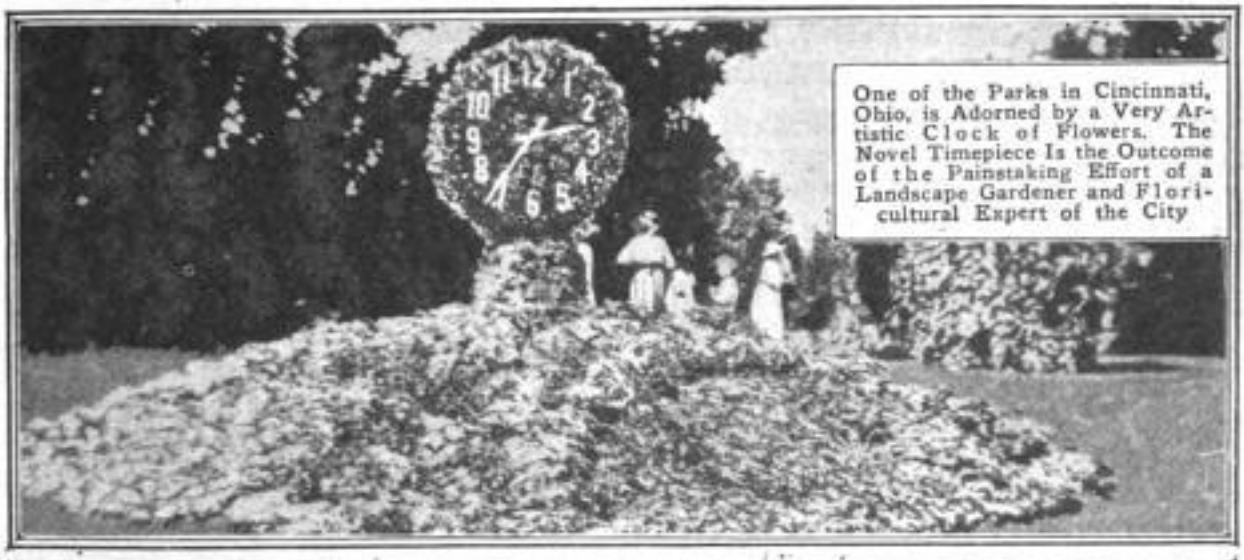
The City of Alhambra, California, Sacrificed Part of a Parkway for a Short Distance on Each Side of a Narrow Street to Make a Turning Area for Motor Vehicles

A Constant Though Silent Warning is Given to Both Vehicle Drivers and Pedestrians by the Wording on the Signs Erected at the Traffic Officers' Posts in Washington, District of Columbia. They Drive Home the Point That Accident Prevention Is the Reader's Personal Affair. The Signboards Also Serve the Purpose of Windshields for the Officers' Feet and Legs

Ample Warning of the Approach of Fire Apparatus is Given to the Street Traffic of Santa Ana, California, by Signs, Bells, and Red Lights Suspended over the Center of the Roadways

Neat, Unobtrusive Refuse Incinerators, Made of Concrete, are Placed at Intervals along the Streets of Hermosa Beach, California. They Solve the Problem of Refuse Disposal as, When They become Filled, the Contents are Simply Burned in the Receptacle and the More Easily Handled Ashes are Carted Away

AND ENJOYMENT OF VISITORS AND RESIDENTS



One of the Parks in Cincinnati, Ohio, is Adorned by a Very Artistic Clock of Flowers. The Novel Timepiece Is the Outcome of the Painstaking Effort of a Landscape Gardener and Floricultural Expert of the City

A Public, Open-Air Garage Is an Adjunct of the Courthouse Grounds in Yuma, Arizona. It is Floored with Concrete in Order That Cars may be Washed. The Posts Supporting the Shingled Roof, Although of Slender Proportions, are Given a Rather Massive Appearance by a Latticework Masking

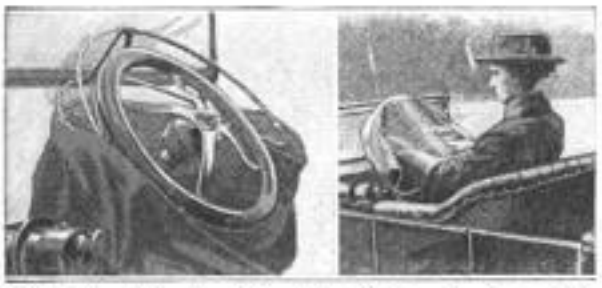
A Speed-Limit Sign Which Arrests Attention and should Have the Desired Effect was Painted by a Wounded Soldier While Undergoing Treatment at the Walter Reed Hospital, Washington, District of Columbia. It was Set Up at the Entrance of That Institution

The Merchants of Fergus Falls, Minnesota, Engaged in a City-Publicity Campaign, Erected These Road Markers within a Radius of 50 Miles of the Town

Actually Presenting the "Key of the City" to Prominent Visitors, as a Token of Hospitality, Is One of the Ceremonies Performed by the Citizens of Des Moines, Iowa

MUFF FOR STEERING WHEEL SHIELDS DRIVER'S HANDS

Safety as well as comfort demands that the auto driver's hands be kept warm in winter, and thick gloves are not wholly satisfactory. An Oklahoma inventor now has brought forth a steering-wheel muff, consisting of a cover of fabric, fur, or leather attached to a wire frame of semi-circular shape. Clamps fasten the frame to the steering column, and it embraces the front of the wheel with plenty of room for free operation.



Left: The Steering-Wheel Muff Hanging from Its Frame. Right: As It Appears in Use

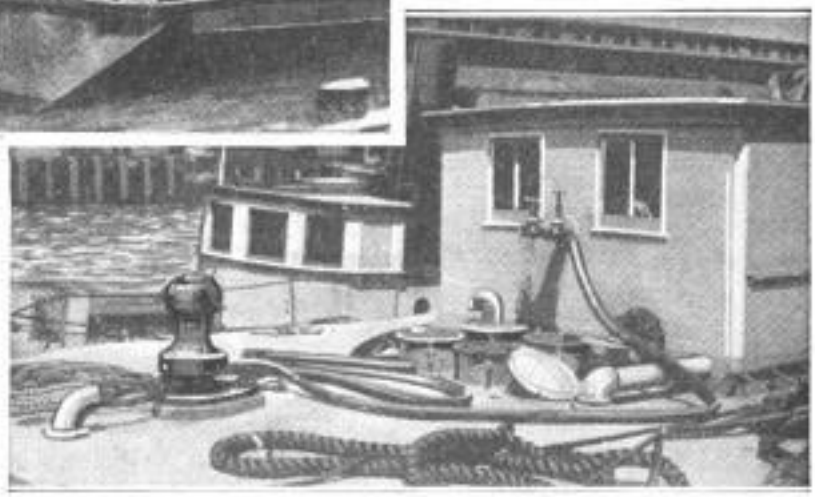
WOULD USE ELECTRIC CORONA AS VOLTAGE "SAFETY VALVE"

Electrical corona, the luminous discharge from lines carrying very high voltages, apparently acts as a form of safety valve, since it is noted that in its presence the lines suffer less damage from lightning. An American engineer now proposes to use this property by maintaining line voltages just below the corona point. Any excess voltage caused by lightning or other disturbance would then establish the corona, and relieve the dangerous pressure.

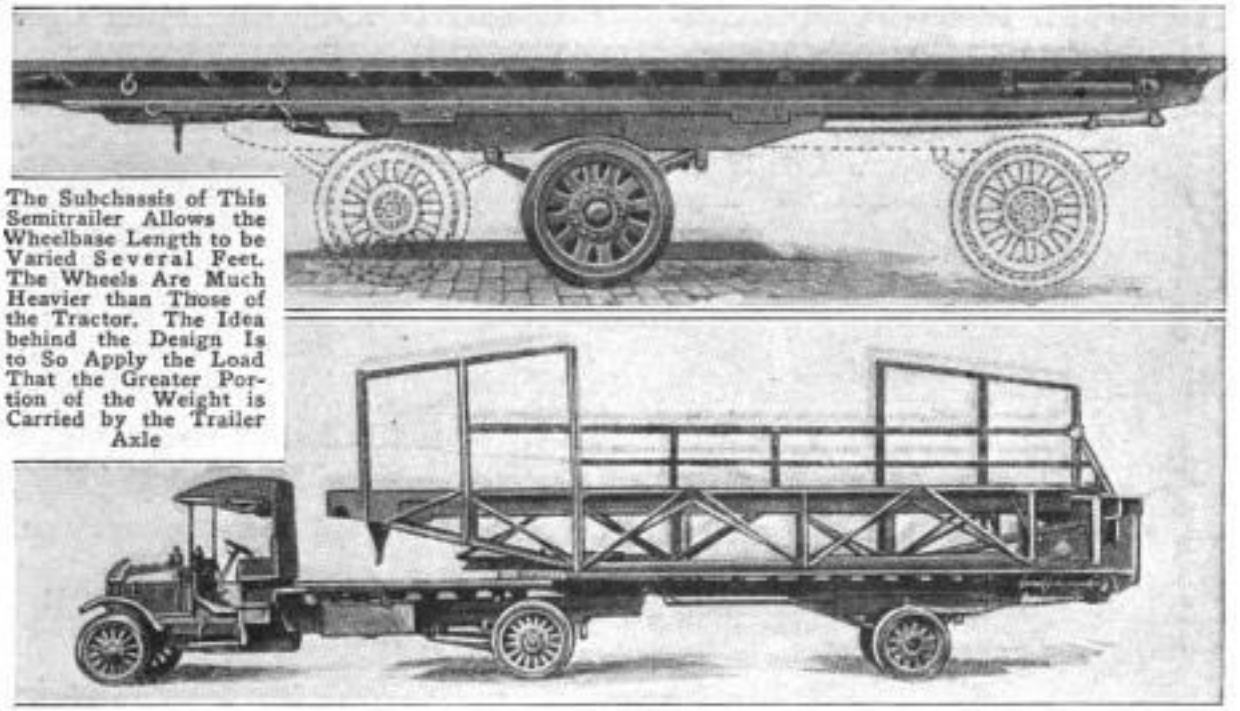
CONCRETE WATER BARGE IS EASILY REPAIRED

Repairs made recently in San Francisco harbor to the hull of one of the few concrete water barges now in service on the Pacific coast recall, by reason of their small cost and quick completion, the work done on a larger vessel in an eastern port, as described in August, 1920, by this magazine. This smaller job was handled differently, in that the barge was not towed into drydock, but was simply given a decided list to starboard, at its slip, by filling the water tanks on that side, and emptying those to port. This brought the ragged, two-foot hole high out of the water, where it was conveniently accessible for repair. This work, which on a wooden or steel barge would have entailed an outlay of $500 and a week's delay, was handled by two cement finishers at a cost of $9, and in two hours' time. The barge has a capacity of 42,000 gal. of fresh water, incidentally, and carries pumps of great power. These are used not only to raise the fresh water to the tanks of the many vessels served, but also to pump sea water, in case of accident, from the hull of the barge itself. The hole was made when the barge was struck by the wooden fender of a tug, which was being used to tow it on its rounds about the bay.

The Barge Listed to One Side for Repair by Water-Ballasting the Other Side: The Arrow Indicates the Hole in the Concrete Shell



Deck View of the Concrete Barge, Showing the Heavy Hose and Valve Connections for Emptying Any or All of the Four Water Tanks



The Subchassis of This Semitrailer Allows the Wheelbase Length to be Varied Several Feet. The Wheels Are Much Heavier than Those of the Tractor. The Idea behind the Design Is to So Apply the Load That the Greater Portion of the Weight is Carried by the Trailer Axle

HEAVY-DUTY SEMITRAILER HAS MOVABLE WHEELBASE

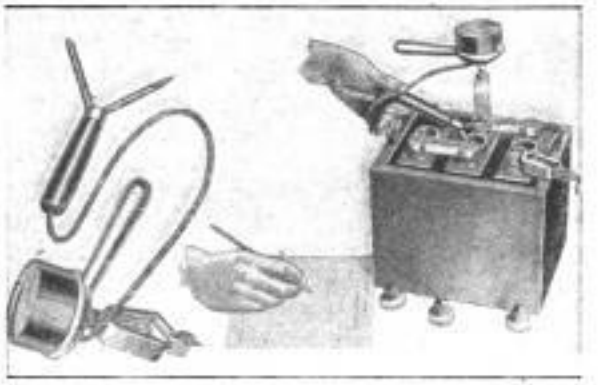
A French manufactory is producing a heavy semitrailer in which the complete axle and spring assembly may be moved from front to rear of the platform, or body, for a distance of several feet. This allows a wide variation in the length of wheelbase, which, it is claimed, permits the more even balancing of a wide variety of loads, thus relieving the tractor axle of excessive strains and transferring them to the less sensitive dead axle of the trailer. By expertness in loading, the tractor axle may be relieved of all load other than sufficient to insure traction.

HOLDER FOR ERASER STUBS PREVENTS FINGER CRAMP

An ingenious holder for short stubs of erasers is made of a section of bamboo and a noncorrosive metal ferrule. The bamboo section is slotted, something on the order of an old-fashioned clothespin. The eraser is gripped between the open ends and locked into place by forcing the ferrule down, thus bringing pressure upon it. Due to the generous gripping surface offered to the fingers, it is said that fatigue is much diminished.

CADMIUM TESTING SET FOR STORAGE-BATTERY WORK

A compact storage-battery testing set which has particularly convenient features for this class of work, has made its appearance on the market. The compact little voltmeter is attached to one of the battery lugs by a spring clip to form one side of the test circuit, and thus it is unnecessary to hold the instrument in the hand. The opposite side of the circuit is formed by two metallic electrodes, one of which is cadmium for accurately determining, among other things, the state of charge of either or both groups of positive and negative plates.



An Improved Storage-Battery Testing Set Leaves the Hands Free to Manipulate the Electrodes

¶Common iron nails are now considered so valuable by the Russians that they readily pass as currency. They are accepted as payment for minor services and courtesies.

IMPROVED REAR-AXLE STAND SPEEDS AUTO REPAIRS

An improved, solid, substantial stand for holding automobile rear axles while repairs are being made, will, it is said,

The Top View Shows the Axle Stand Close-Coupled to Accommodate a Final-Drive Assembly with a Short Torque Tube. Bottom: Drive Shaft Support Extended to Balance an Extra-Long Propeller Shaft and Torque Member

work equally well with the worm or the bevel-gear types. Owing to the fact that the standard which supports the drive shaft, or torque tube, is adjustable as to height, it is claimed that the new stand is particularly efficient when used in repairing worm-drive axles. The over-all width of the stand is 33 in., and the length can be varied from 44 in. to 60 in. The work is held at the handy height of 36 in. A removable grease pan, placed between the axle-supporting uprights, catches all grease and gasoline when the axle is cleaned up preparatory to the work.

SOUTH AFRICAN GOLD REGION TO HAVE ITS FIRST MINT

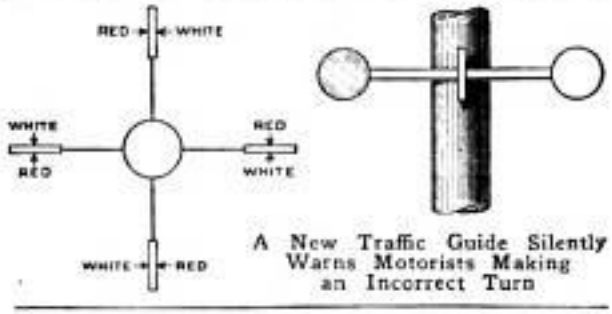
Although South Africa contains one of the world's greatest gold-producing regions, it has never had a mint, and there is little or no gold coin in circulation. By 1924, however, the government expects to have completed, at Pretoria, Transvaal, a mint with a yearly capacity of 40,000,000 gold coins and 7,500,000 other pieces. The cost of the new institution, based on plans already finished, is estimated at $1,500,000 or more. A refinery is being erected at Germiston, consisting of a number of detached buildings. As 2,000,000 bricks will be needed for these structures and only 200,000 a month can be obtained, operations necessarily will be slow.

MAMMOTH ELECTRIC SIGN CAN BE SEEN FIVE MILES AWAY

The returns of the recent election were flashed to the residents of Pittsburgh, Pa., on the world's largest electric signboard. This immense structure is 750 ft. long, 20 ft. high, and the lighting element consists of a battery of seven hundred 60-watt incandescent bulbs. These are fed electrical power at the rate of 42,000 watts over a system requiring 23 miles of wire. Fifty complete sentences in 14 minutes are flashed without repetition. The wording on the control drum is changed weekly and consists of advertising matter and news items. The sum of $20,000 was expended in the erection of the huge sign.

STATIONARY TRAFFIC GUIDE HAS COLORED TARGETS

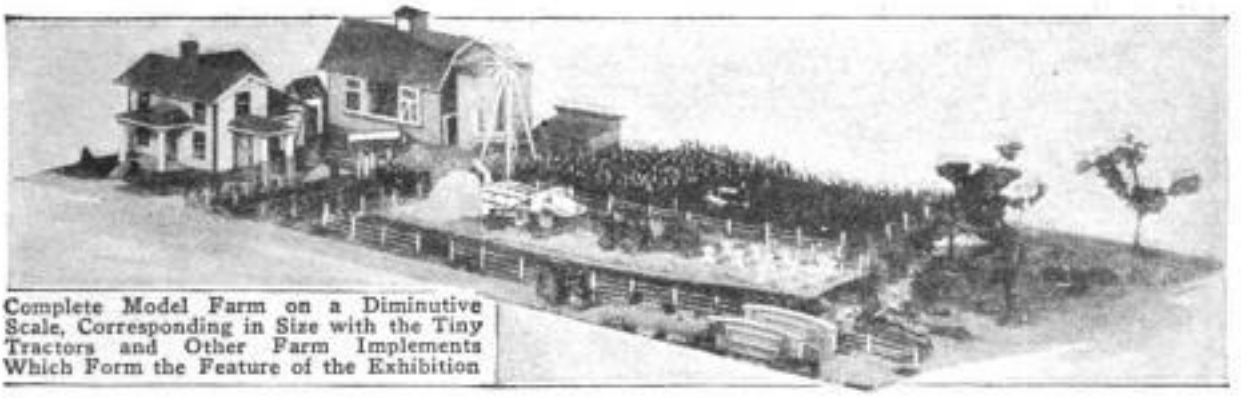
The aldermen of a mid-western city, depending upon the assumption that motorists understand the time-honored system of signaling in which red indicates danger and white safety, have replaced the hackneyed "Keep to the Right" street-intersection signs with semaphores having round targets attached to metal crossarms intersecting each other at right angles. All the targets are painted red on one face and white on the other. They are attached to the crossarms in such a way that a person will always see a red target to his left and a white one to his right.



A New Traffic Guide Silently Warns Motorists Making an Incorrect Turn

Upon turning a corner in the proper way, a motorist will always be faced by a white target, showing all clear. Should he attempt to turn to the left or cut the corner, he will be confronted by the red target, a universal danger signal.

¶Two interesting reels of motion pictures, now ready for use by army recruiting offices, show the remarkable educational and Americanizing work being done at recruit educational centers. Some 190,000 men are being given instruction, elementary or advanced, at army schools.



Complete Model Farm on a Diminutive Scale, Corresponding in Size with the Tiny Tractors and Other Farm Implements Which Form the Feature of the Exhibition

MINIATURE MODEL OF FARM IS FEATURE OF TRACTOR SHOW

A complete miniature farm, laid out on a big table, constituted one of the most attractive features of a series of tractor exhibitions recently held in different parts of the country. A number of tiny, toy-like tractors formed the keynote of the display, and the farm buildings, including a modern chicken house, a double silo, and a windmill, were built to corresponding scale. A trailer truck and various pieces of farm machinery were among the diminutive equipment, and realistic fields of wheat and corn, as well as trees, flowers, and shrubbery, completed the effect.

LIGHTWEIGHT METAL HEELS SAVE LEATHER

A patent, recently issued, covers a hollow, all-aluminum heel which may be quickly and easily applied and is not subject to the fault of springing sidewise, thus giving shoes a "run-over" appearance. The new heel is so designed that the rubber taps may be very quickly changed by removing screws instead of nails. It is made in a large variety of shades to match current styles.

FINGER-PRINT METHOD DISCOURAGES THIEVES

The chief of police in a progressive western city has rid his town of thieves and burglars by the simple expedient of requiring every pawnbroker and proprietor of a secondhand store to take the thumb prints of every person who sells or pawns an article. The police department supplies the forms upon which the impressions are made. As there is a fine of $100 assessed for each failure to comply with the regulation, the class of dealers mentioned lend hearty coöperation. Then again, it is a protection to them as well as to the public. Any person offering an article to the dealers and objecting to comply with the regulation falls under suspicion, and becomes an object of police investigation.

NOVEL ELECTRIC STETHOSCOPE FOR AUTO REPAIRMEN

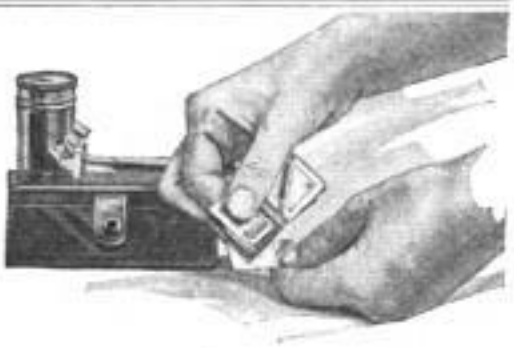
A new stethoscope for locating automobile-engine "knocks," rattles, and other sounds, utilizes the telephone principle. A long, slender rod is arranged with one end very close to a sensitive transmitter. This latter is wired to a flashlight battery and a receiver. Any sounds of sufficient volume to set up vibrations in the rod, are amplified by the transmitter. As all sounds, other than those coming through the instrument, may be shut out by holding the hand over one ear, the rod very quickly locates loose bearings, worn valve tappets and guides, noisy timing gears, and other abnormal engine sounds.

¶What is believed to be a new record in wireless receiving was recently established when an expert operator took down 75 messages of an average length of 15 words in one hour's time. Most of the messages were in the Italian, French, and Dutch languages.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

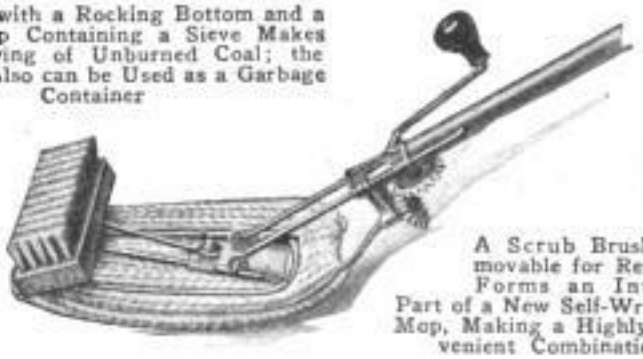
Rubber Applicators and a Metal Nozzle Permit a Shower, Shampoo, Massage, and Rubdown with One Bath Brush. The Hose Attached to the Handle Terminates in **a Form of Universal Connector That Fits Any Bathtub Faucet, and the Most Vigorous Use of the Brush cannot Stop the Flow of Water**

A Razor-Blade Wiper That Consists of a Brass Clip with Tiny Squeegee Rubbers and a Pair of Felt Pads, Which Dry the Safety as Well as a Towel, and Save the Latter from the Tiny Cuts That Soon Ruin It



A Gas Hose That Closes Automatically When It is Accidentally Detached from the Stove, Shutting Off the Gas. A Soft-Rubber Valve in the End Does It

An Ash Can with a Rocking Bottom and a **Separable Top** Containing a Sieve Makes **Easy the Saving** of Unburned Coal; the **Lower Part Also** can be Used as a Garbage Container



A Scrub Brush, Removable for Renewal, Forms an Integral Part of a New Self-Wringing Mop, Making a Highly Convenient Combination

Hooks Strung on a Ring That Clamps around the Kitchen Boiler Feature a New Device for Quickly Drying Clothes, Towels, or Utensils

The Library-Table Motif Predominates in a New Brand of Phonograph, in Which the Playing Mechanism Pulls Out like a Drawer

A Simple Three-Heat Electric Stove, Small and Light Enough to Pack in a Suitcase or Traveling Bag

A Folding Pipe-Cleaning Tool Whose Pocket Case may be Used to Tamp a Fresh Charge

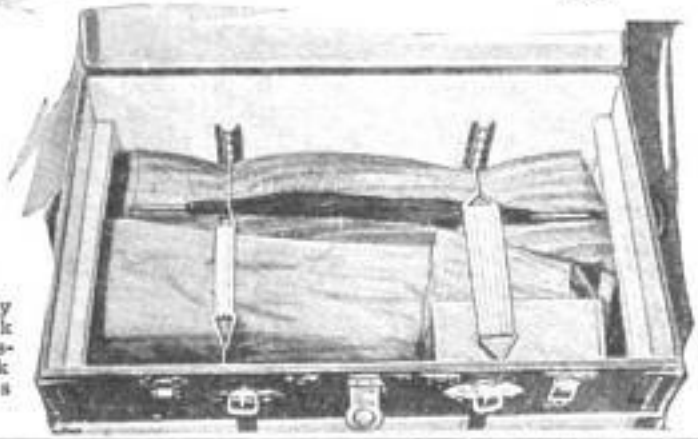
A Telescoping Ruler and Pocket Pencil are Now Combined in an Interesting Way

The Self-Contained, Portable Electric Washing Machine Pictured at the Right may be Used in the Bathtub, as at the Left, or on Top of the Gas Stove

When the Pedal Openings of a Piano are Protected by This New Guard, the Instrument is Made Mouse and Verminproof

Baking Dish, Chop Plate, Casserole, and Salad Server are Combined in a New Utensil of Heatproof China and Silverplate

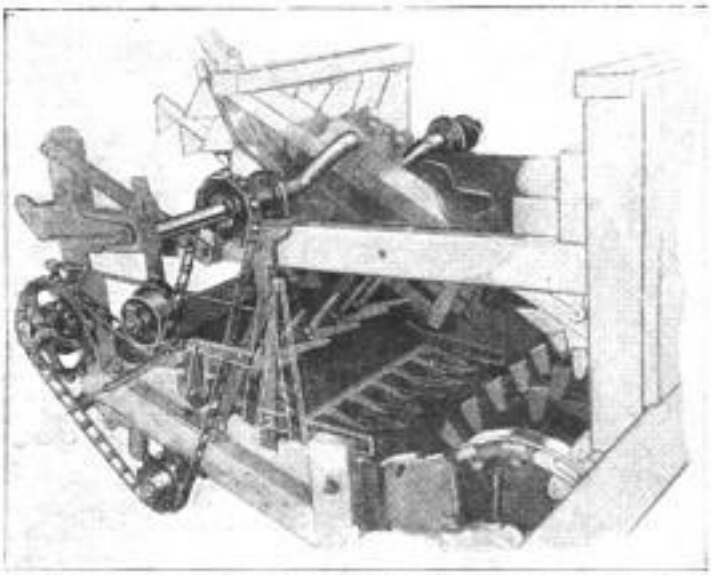
A New Method of Countersinking the Metal Toeplates of Boys' Shoes Saves Both the Shoes and the Floor



Articles That Only Partly Fill a Trunk are Held against Disturbance by Spring Crosspieces That Hook Adjustably into Slotted Bars on the Sides

AUTOMATIC STRAW GOVERNOR FOR THRESHING MACHINE

A manufacturer of grain-separating machinery is equipping his threshing machines with a straw governor that

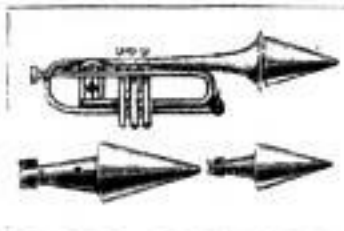


An Automatic Attachment for Grain Separators That Operates Independently of the Cylinder Speed and Prevents the Cylinder from Slugging and Wrapping

automatically adjusts the width of the throat between the cylinder and retarding fingers, and prevents the cylinder from slugging or wrapping. The device also stops the carrier so that no more straw is drawn into the feeder until what is already there has been taken care of by the cylinder, the operation of the governor depending entirely upon the amount and condition of the straw.

SAXOPHONE'S TONES IMITATED WITH CORNET ATTACHMENT

Made especially for use with a cornet, but adaptable also to trombones and bass horns, a new form of mute permits all the curious tones of the saxophone to be produced without the presence of that popular instrument. Two brass cones mounted base to base, the smaller one having perforated sides and a cork collar to fit it tightly into the horn, make up the appliance. Inside the smaller, or rear, cone is a tightly stretched membrane, which acts as a buzzing resonator, and is responsible for the close imitation of the saxophone's "jazz" effect.



FIGURES ON OIL-WELL LOSSES SHOW WAY TO CONSERVATION

What may be done in the way of saving gasoline that now evaporates before it even reaches the refinery is shown by recent figures of the Bureau of Mines, which indicate that in the mid-continent oil field alone, about 122,000,000 gal. of gasoline were lost in one year by open storage of the crude oil for a period of five days. Tightly covered tanks enable these vapors to be saved by the compression-plant process. A very large percentage of oil remains underground, and cannot be recovered. It is estimated to require about 1,500 cu. ft. of gas to force 1 bbl. of oil out, and when the gas is allowed to escape from open wells, the oil is lost. Condensed paraffin often clogs the wells. In Oklahoma, 1 bbl. of gasoline was poured into a well each afternoon, and pumped out again the following morning. After three days of this, the well's flow increased from 7 to 15 bbl. a day, a remarkable return on the gasoline invested.

TRUCK-PERFORMANCE RECORDS KEPT BY MACHINE

An instrument that may be attached to the dash of any motor car or truck of which an efficiency or economy record is desired has lately been introduced. The mileage-recording mechanism is operated by the conventional flexible-shaft method. Stops for load, unloading, tire changes, the taking on of fuel and oil, or other reasons, are measured and recorded by a clockwork mechanism. The human element has been almost entirely eliminated, as such notations as it may be necessary for the driver to make can be made by simply turning a knurled indicator to the proper position. Along with other desirable information the machine advises of trip, daily, and season mileage; gaso-

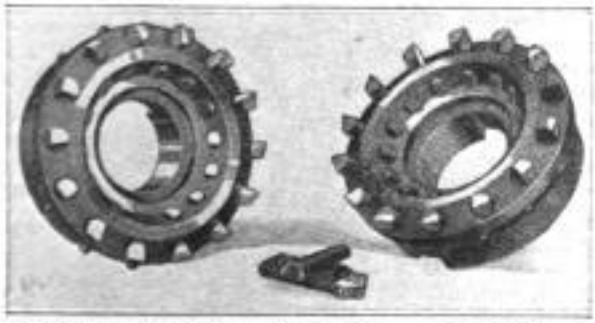
line, oil, and tire consumption; operating speeds; weights of load carried various distances, and number of daily trips and idle time.

MINIMUM BREAKAGE OF COAL CONVEYED BY GRAVITY

As the management of a West Virginia coal mine discovered a loss on account of the desirable lump coal being broken up into slack by repeated handling on its trip down a mountainside, the usual methods of transportation were discarded and a system installed by which the coal slowly slides the greater portion of its journey from the pit to the storage bins. The first part of the trip is made in the regular two-ton cars in which the coal leaves the mine. It is next discharged into a receiving tube, sloping at an easy angle down the mountain, through which it slides, to be again loaded, by sliding, into a monitor. This conveyor carries it, without undue jarring or jolting, to the final storage bin, of a tubular form, into which it again slides. At no stage of the journey is the coal handled by shovel, and as the gradients are all small, the sharpest being 30°, the coal moves gently and steadily with no abrupt stops or bumping.

POSITIVELY LOCKED CUTTING TEETH IN MILLING CUTTER

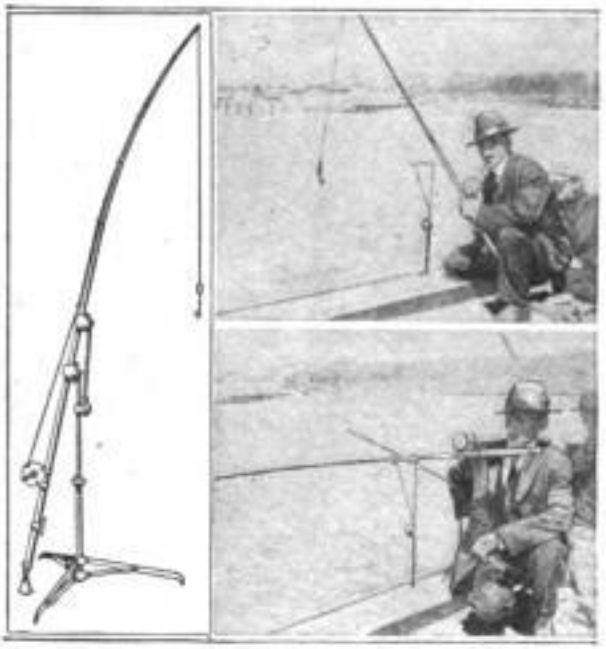
A new high-speed, vertical-milling tool has a body of hardened steel designed to last indefinitely. The only wearing parts are the replaceable cutting teeth and the small parts which lock them, positively, into position. The cutters have fine-pitch gear teeth cut transversely along one side. Depth adjustment is positive, so claim the manufacturers, and is accomplished by placing a toothed, half-round key at various heights on the cutters and locking the whole into the tool body by means of a half-round taper pin.



Two Views of a New Milling-Cutter Head, Showing the Contour of the Detachable Teeth. Center: Tooth and Split Taper-Pin Lock

FISHING ROD RINGS BELLS TO SIGNAL A BITE

Still fishermen who regard their pursuit seriously, and are ambitious to handle a number of rods at one time, will be



Left: The Signal Stand and Rod. Top: The Rod Removed to Land a Fish. Bottom: Awaiting a Signal

interested in a signaling invention. For each rod a collapsible tripod stand is provided, to the top of which the rod is pivoted at about its center of gravity. A small bell is hung from the butt of the rod, and another mounted on the stand, where a moving plunger will strike it when the rod tip is pulled down. The bell at the butt signals a nibble, and the other indicates that a fish is hooked, or at least that it is time for the fisherman to pull up.

FIREPROOF BASE FOR WALLS HOLDS NAILS SECURELY

An all-mineral substitute for wood, composed of portland cement, sand, and asbestos fiber, has been found to serve excellently as a base for walls, floors, etc., as, being cellular in structure, it takes nails easily and holds them firmly. The new material has the advantages over wood of being fire and warp-proof. This latter quality makes it especially suitable for use as a subflooring when composition floors are used, as cracking of the latter is said to be eliminated. As it has the property of holding nails well, interior wood trimming and shingles may be nailed directly to the new base material. It is also said to possess good insulating qualities.

FOLDING BEDSIDE TABLE FOR THE SICK ROOM

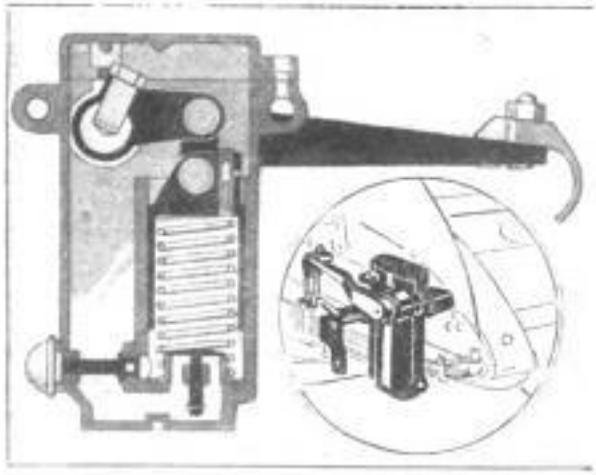
For the use of invalids and in hospitals, a recently developed folding bedside table has numerous commendable points, not

A Bedside Table That Combines the Advantages of Lightness and Portability: When Folded, It Occupies but Little Space. The Table Leaf Is Adjustable to Any Convenient Height

the least of which is its portability. When folded, the table occupies but very small space and can be easily carried. The operating mechanism is very simple, and the table leaf is readily adjustable to any desired height.

OIL CUSHION IS PRINCIPLE OF AUTO SHOCK ABSORBER

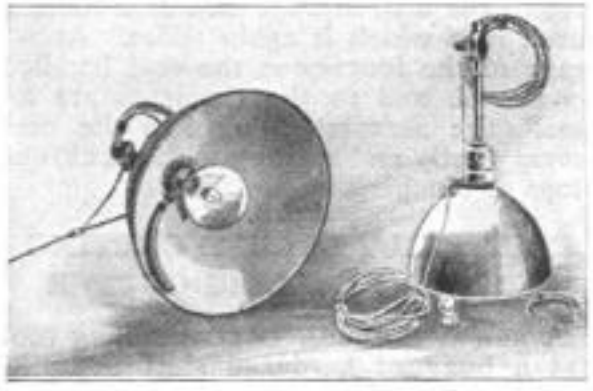
Resistance of oil flow through a fixed opening is the principle employed in an automobile shock absorber now on the market. Inside a closed casing, fastened to the auto frame, is a small cylinder filled with oil, its piston actuated by a lever attached to the car spring with a flexible cable. On the rebound of the car spring, the piston ejects oil through a hole in the top, giving a cushioning effect. An automatic valve at the bottom of the cylinder opens to relieve excess pressure, and adjusts the operation to the changing viscosity of the oil. Another large valve returns the ejected oil when a coil spring moves the piston back.



The Large Sectional View Shows How the Oil-Cushion Shock Absorber Works. The Inset Indicates the Method of Attaching It to a Car

NEW LIGHT FIXTURE CLEANS ITSELF AUTOMATICALLY

Poor illumination is a cause of low efficiency in many large factories and the chief offender in interfering with proper lighting is the dirt that accumulates upon the reflectors and bulbs of fixtures hung high in inaccessible places where cleaning is difficult. A new device, designed to overcome this difficulty, has two rotating wipers, one to clean the inside of the reflector, the other to clean the bulb. These are actuated by the switch pull cord and



Every Time the Switch Cord is Pulled, the Two Wipers on This Light Fixture Clean Both Bulb and Reflector

make a complete revolution every time the light is turned on or off.

VENEER-FACTORY WASTE MAY BE USED TO MAKE PAPER

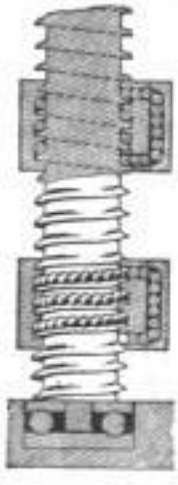
During a survey of the possible sources of supply of woods suitable for paper-pulp making, the Forests Products Laboratory officials have found that considerable quantities of such material are now going to waste at the various factories producing veneers. This waste is in the form of clippings and trimmings, and the cores of logs which are unsuitable as veneer material, but perfectly satisfactory for pulp. These, after a comparatively light cut is taken, are burned for fuel. Among the woods so wasted are red gum, poplar, cottonwood, and bass. The last named is becoming somewhat scarce.

HUGE LIQUID-OXYGEN OUTPUT FOR GERMAN WAR MACHINE

That the use of liquefied oxygen for explosive purposes by the German army reached huge proportions during the World War is revealed by recent figures. American observers account for a total of 136 plants manufacturing the liquid gas, with an aggregate production of 4,024 qt. an hour. A year's output at this rate, working only 300 nine-hour days, would amount to 10,864,800 qt., or 23,902,560 lb., equivalent to 35,000,000 lb. of dynamite. It is estimated, however, that only about one-fourth of the production was available for use in the field. Portable outfits mounted on trucks, and producing 3 to 5 qt. an hour made an interesting detail in this curious industry.

BALL-BEARING SCREWJACK SAVES EFFORT

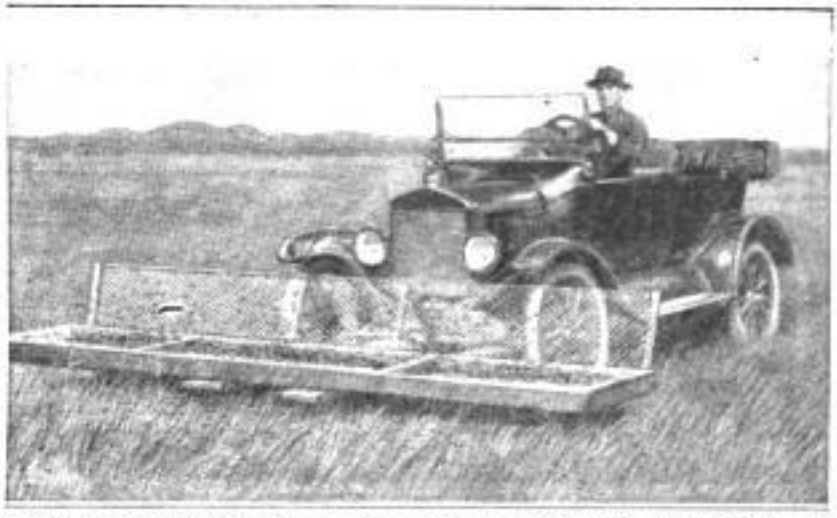
Saving of effort is aimed at in a new model screwjack recently brought forward. The threads of the screw and of the lifting member are made in the form of spiral ball races, and a series of ball bearings, rolling between them, eliminates most of the friction. As the balls are continuously rolling forward while the jack is in operation, a means of returning them to the starting point must be provided. This is done by making a channel through one side of the lifting member. Upon reaching the top of their travel, the balls return through the channel. An increase in efficiency of 60 per cent is claimed for the new device.



¶Peculiar discolorations of the skin prevalent among Albanian babies, highly alarming to American Red Cross workers when first noticed, were discovered to be caused by the native practice of using pulverized coffee for the customary purposes of talcum powder.

LIGHT CAR AND IRON TROUGH HARVEST GRASSHOPPERS

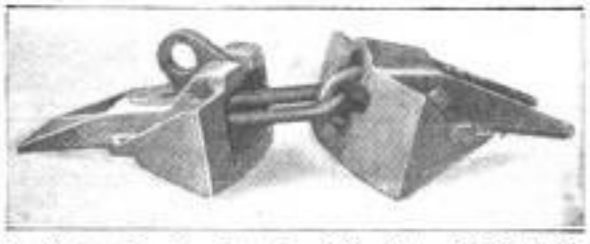
Poison proving ineffective, two western ranch owners recently constructed grasshopper traps by slinging sheet-metal troughs, on wooden supports, in front of their cars and driving through their fields after sunset. The record harvest was 20 bu. and the next best figure 10 bu. for the work of one evening. The troughs are 10½ ft. long, 14 in. wide, and 6 in. deep. Space is left between the trough and the front end of the car so that cranking is not interfered with.



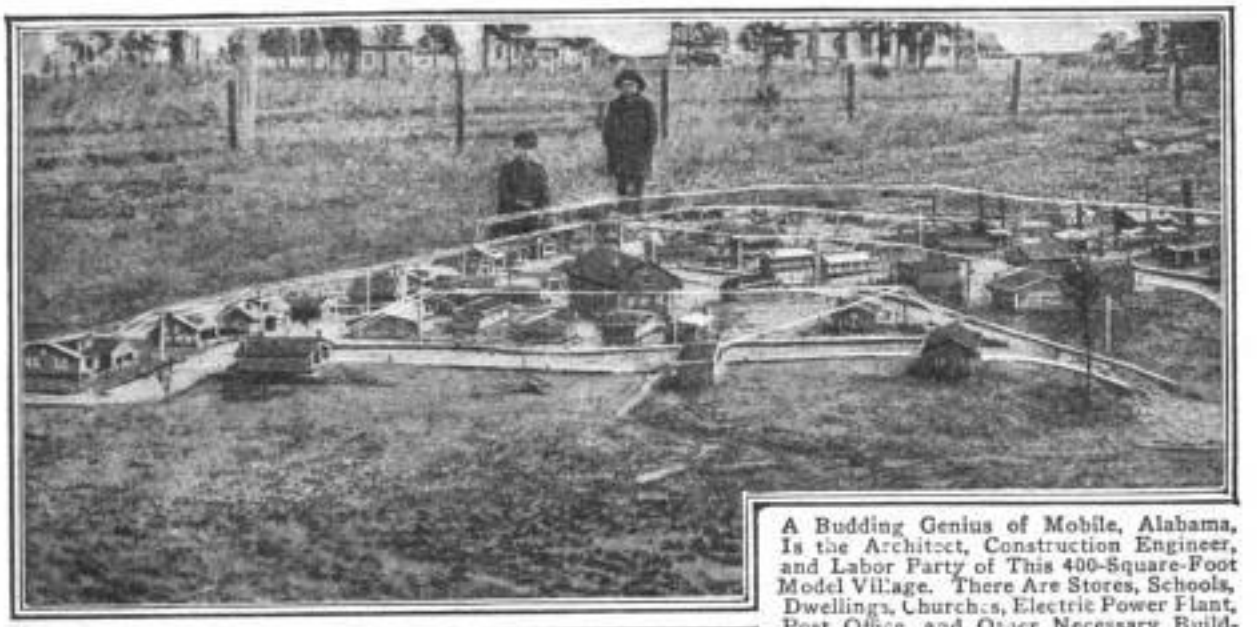
A Highly Efficient Grasshopper Trap Made of a Light Sheet-Metal Trough Suspended from the Front of an Automobile

AUTOMATIC MINE-CAR COUPLER TO REDUCE ACCIDENTS

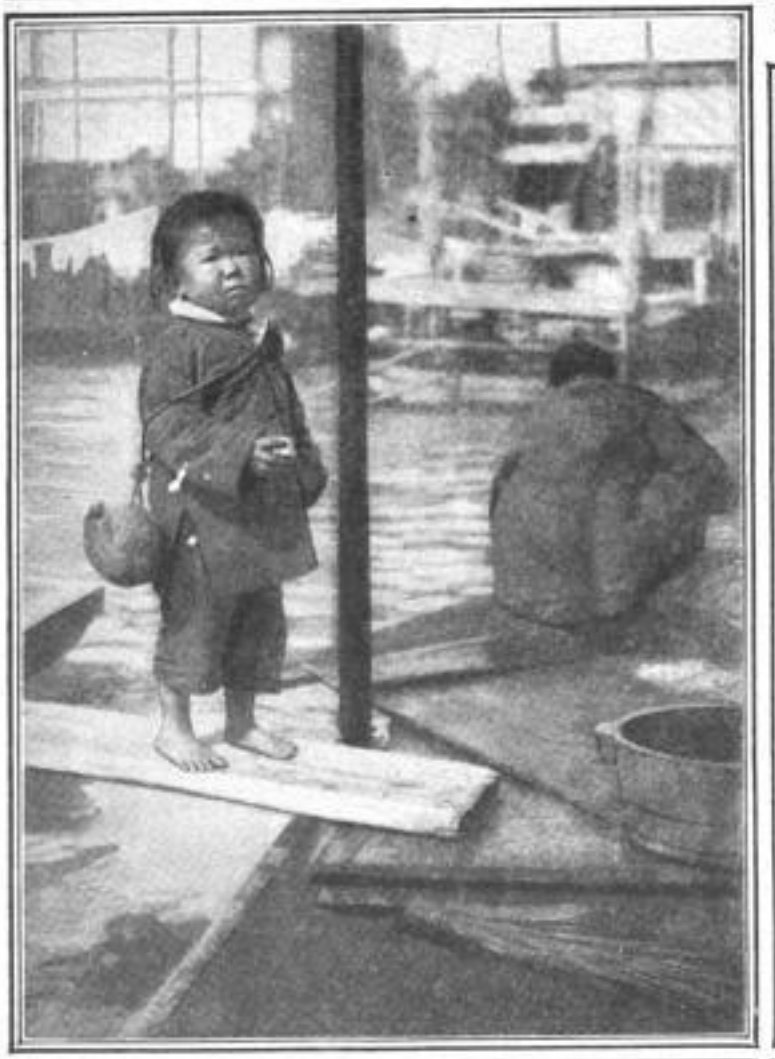
Many a crushed hand or foot has been suffered by coal-mine workers in coupling or uncoupling cars equipped with the primitive link-and-pin coupler. To make this work safer and reduce the number of accidents, is the aim of a new automatic coupler for mine cars. The link is set to slide into the opening of the coupler, which automatically releases a drop dog and makes the connection fast without the necessity of first lining up the link with the pinhole. The new couplers also take the place of a bumper.



An Automatic Coupler for Mine Cars Which Does Away with the Old-Time Link-and-Pin Coupling Which Is Responsible for a Large Percentage of Mine Accidents



A Budding Genius of Mobile, Alabama, Is the Architect, Construction Engineer, and Labor Party of This 400-Square-Foot Model Village. There Are Stores, Schools, Dwellings, Churches, Electric Power Plant, Post Office, and Other Necessary Buildings. A Miniature Steamboat Sails the Tiny Canal



Hollow-Gourd Life Preservers, Tied to Cords Passing under the Arms, Are Part of the Dress of the Children Living aboard the Sampans—Fishing Boats—of China. As Soon as a Baby Is Able to Crawl, Tumbles into the Water Are Frequent, and the Child Soon Becomes an Expert Swimmer. It Is Easy to Believe That the Mothers are Not Much Troubled by the Bathing Problem

A Little Animal, with Brilliant Eyes the Size of a Five-Cent Piece, Which might Easily be Mistaken for a Squirrel on Account of Its Size and Long, Bushy Tail, Is, Really, the Smallest of the Monkey Tribe

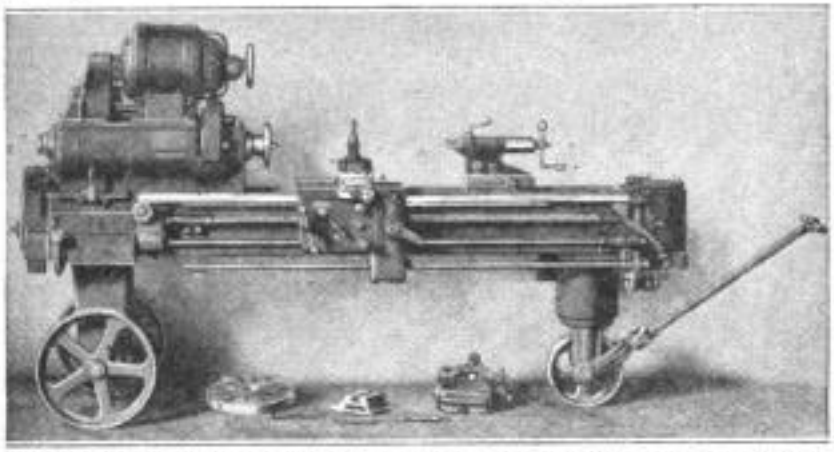
In One of the Primary Schools in Germany, the Pupils are Required to Learn the Game of Chess. Tournaments, under the Direction of a Master, are Held Frequently, and Daily Games Are a Part of the Regular Work. The Pupils Seem to Enjoy the Difficult Game

Action, Movement, and the Life about Him Are the Main Points in the Silhouettes Made by an Eight-Year-Old Indian Boy Living on an Oregon Reservation. These Action Figures are Cut from Old Shoe Boxes. His Art Is Natural and Untrained, as He has been Cutting Silhouettes Since He Was Five Years of Age

This Specimen of Clay Modeling, Entitled the "Goddess of Courage," is the Work of a 19-Year-Old Schoolboy, Resident of Illinois. The Figures Are Nearly Life-Size, Being Five Feet Tall. The Meaning of the Group Is That the Goddess is Inspiring the Soldier and Red Cross Nurse with Courage. The Idea and Composition Are Strictly Original, and, for an Artist of the Age of This One, the Treatment may be Considered as Heroic. The Choice of Clay as a Medium of Expression Is Somewhat Unusual, the Juvenile Mind, as a Rule, Turning toward the Pigments

TRUCK-MOUNTED LATHE IS HAULED TO WORK

A self-contained, direct-connected lathe, mounted on heavy wheels so as to be quickly moved wherever needed, originally designed for use in railway erecting shops, is now offered to the public. In those frequent cases where cuts must be taken from heavy or bulky machine parts, located in a part of a large plant at a considerable distance from the machine shop, it would be an economy to have the lathe, drawn by one man, moved to the work, rather than the work, transported by truck, or carried by two or three men, to and from the lathe. This tool has a 14-in. swing and is equipped with a quick-action gear-changing device.



A Complete Self-Contained Lathe, Which may be Quickly Hauled to Any Part of the Plant: It is Designed for Railway-Car Erection Shops

CAR AND DRIVER PROTECTED BY ILLUMINATED TAG

An illuminated automobile number plate that signals the driver's intention to stop or proceed to a following car, also makes the license number distinctly visible for upward of 100 ft. The design on the license plate is routed out and backed with a piece of celluloid. The plate is placed in a metal box containing a red and green electric lamp. The lamps are connected in such a manner that when the clutch is withdrawn or brakes are applied, the number is shown in red; when the clutch is thrown in, a green light is shown.

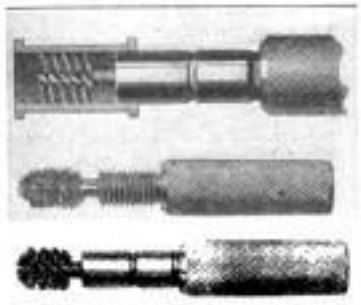
The Number Plate Partly Removed, Revealing the Red and Green Signal Lamps in the Metal Box

NEW PAPER MILLS USE BAMBOO AS SOURCE OF PULP

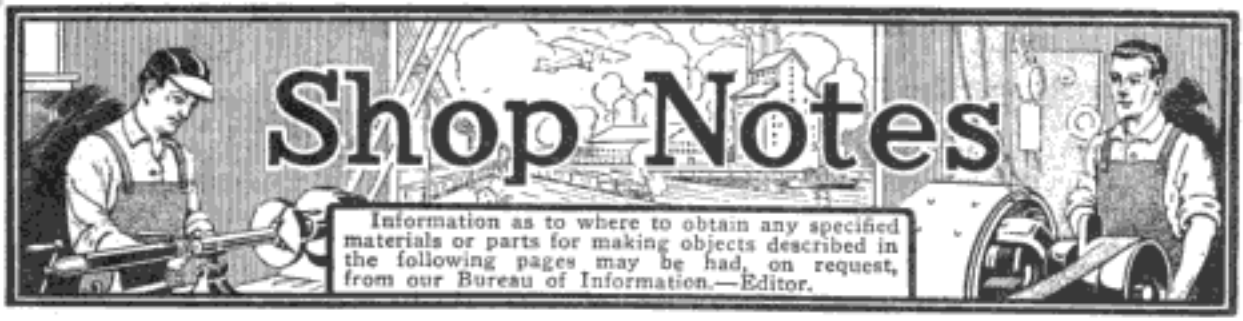
Construction of three large factories, two in Burma and one in Calcutta, India, for the manufacture of paper pulp from bamboo, is reviving interest in the value of that material as a source of relief from the present exigencies of the paper situation. Not only is the world's crop of bamboo so abundant as to assure an ample supply of excellent paper for all purposes, but the giant grass reaches its growth in a year, and about 40 tons of bamboo are available from an acre of land. The pulp obtained is about half the bulk of the raw material. The three new plants already provided for will have a total output of some 70,000 tons of pulp a year.

PILOT BRUSH PROTECTS GAUGE AND INCREASES ACCURACY

Gauges, especially of the plug and screw varieties, often are applied to work taken directly from the machines, and carrying particles of grit. The result, in time, is a worn gauge and a loss of accuracy. An eastern concern now is putting out a special form of small brush, the stem of which is fixed into a hole in the end of the gauge. The brush not only serves as a pilot for the gauge, but automatically cleans out the bore, assuring an accurate test and an uninjured gauge. The brushes are made for gauges from 5/16 to 2 in. in diameter.



First-aid and emergency nursing are new services that go with a passenger ticket on certain of the fast trains between New York and Chicago. The maids employed on the trains are being given instruction in these subjects in special classes conducted by the American Red Cross.



A Combination Table and Reading Desk

By F. E. LEITCH

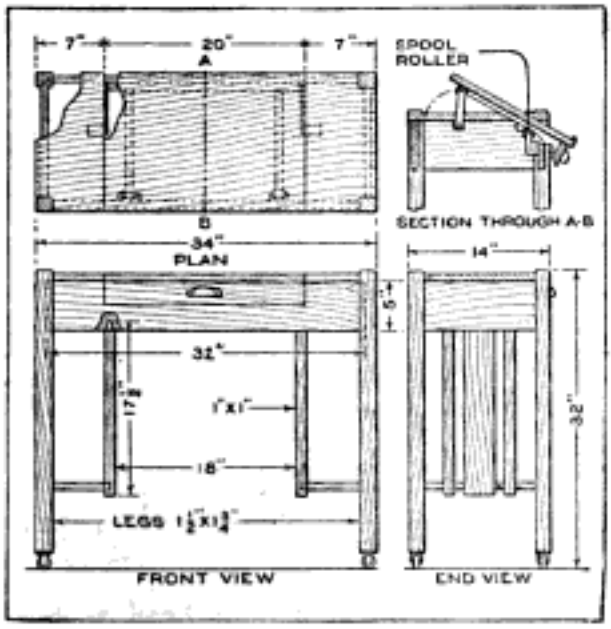
WHEN using a heavy dictionary, or similar ponderous volume, it is essential, both for convenience in reading and to avoid eye strain, that the book be tilted so that the top of the page is at the same distance from the eyes as the bottom. The usual type of stand sold for this purpose is anything but ornamental, while the combined table and desk described herein is not only pleasing to the eye, but in addition is useful for other purposes.

Better results will usually be obtained if the constructor will order the material, which may be either quarter-sawed or straight-grained white oak, from the mill, cut to dimensions and planed, the following pieces being necessary:

One top board, ¾ by 14 by 34 in.
Two (front and back) boards, ¾ by 5 by 32 in.
Two end boards, ¾ by 5 by 12 in.
Two shelves, ¾ by 7 by 13 in.
Four legs, 1½ by 1¾ by 30½ in.
Four side-shelf supports, 1 by 1 by 17½ in.
Four end strips, ½ by 1 by 17 in.
Two end strips, ½ by 2¼ by 17 in.
Two cleats, 1¼ by 2 by 12 in.
Two pieces flat iron, ¼ by 1 by 5 in.
Four casters; two spools.

Two small wooden brackets, which hold the spools on which the tilting section rolls, are fastened to the inside of the front rail. The cleats under the tilting section run on the spools, being cut as shown in the section through A-B. A stop is secured to the cleats, which prevents the section from falling forward too far. No description of the method of making the table is necessary, except that all joints should be mortised and glued. The table may be finished to suit the other furniture in the room it is to occupy, although the following finish suits the simple style of the piece. The wood is first gone over with a wax grain filler; when this is dry, apply a coat of burnt umber ground in oil with a little black, this being thinned with turpentine to the proper consistency. One or two coats of wax are then applied and rubbed to a dull finish. A commercial fumed or weathered-oak finish may be used instead of the burnt umber, if desired.

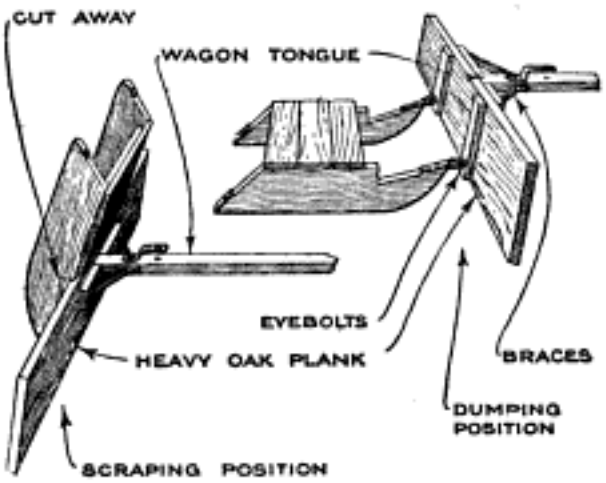
When Using a Heavy Dictionary or Similar Volume, This Convertible Table will Prove Convenient



The Design of This Table is Simplified So That It may be Constructed with the Minimum Number of Tools. Tenons and Mortises are Employed as Joints

Snow Scraper for Ice Harvest

For removing the snow from the surface of his ice crop, an iceman devised



A Scraper That Possesses Some Unusual and Desirable Features, Used for Clearing Snow from an Ice Pond: A Sled was Attached to the Back of the Scraper with Two Eyebolts

the implement shown in the illustration. The scraper proper consisted of a heavy oak plank of the desired dimensions, in this instance 2 by 12 by 18 in. An ordinary wagon tongue was mortised into the center of this plank, iron braces being added to increase strength and rigidity. A sled was made and attached to the back of the scraper with two eyebolts. The runners were cut away, as shown, so that when the scraper was in use the sled could be raised and held out of the way; this also increased the efficiency of the scraper by adding more weight to it. When the snow had been pushed to the edge of the ice, the driver pulled the sled down and stood on top of it, thus raising the scraper and dumping the snow at the same time. The sled is also useful for transporting the scraper from one place to another.—D. D. Boice, Decorah, Ia.

Preventing Frozen Radiators

Alcohol, either wood or the denatured variety, forms the best and cheapest antifreeze solution available for automobile radiators.

The proper proportions of wood alcohol and water to prevent freezing at various temperatures are: 10° above zero, 80 parts water and 20 parts alcohol; zero, 75 parts water, 25 parts alcohol; 7° below zero, 70 parts water and 30 parts alcohol; 22° below zero, 60 parts water and 40 parts alcohol.

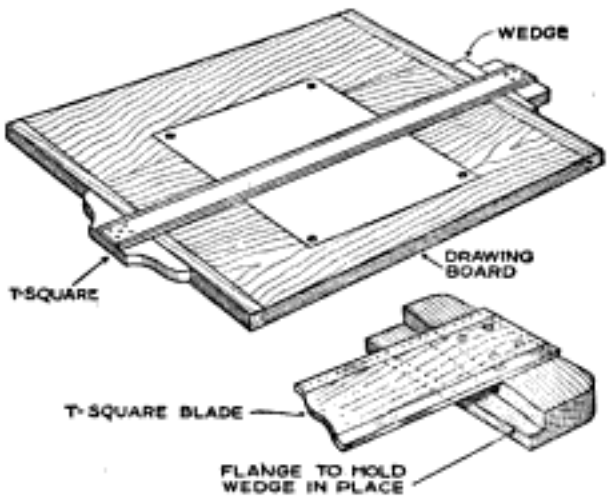
If denatured alcohol is used, a 15 per cent stronger solution should be used; for example, for 10° above zero, use 23 parts alcohol and 77 parts water. Owing to the fact that denatured alcohol is cheaper, and boils at a higher temperature than wood alcohol, its use is to be preferred. Alcohol evaporates rather rapidly when heated and the mixture, to be effective, should be replenished from time to time with a mixture of 75 per cent alcohol to 25 of water. Care must be taken in using wood alcohol not to allow it to touch cuts or abrasions on the hands, as it is very poisonous.

Calcium chloride should not be used as an antifreeze solution.

When alcohol is unobtainable, an emergency solution to prevent freezing can be made from water, salt, and baking soda, the corrosive effect of the salt water being diminished by the effect of the soda. The proportions are about 2 lb. of salt and ⅛ lb. soda to each gallon of water. The salt and soda should be dissolved in the water while boiling, and the solution allowed to boil for about 15 minutes. The use of such a mixture is inadvisable except where alcohol is not obtainable, and the cooling system should be drained and thoroughly washed out with clean water at the end of each run.

Clamp Holds T-Square on Board

When working at a slanting drawing board, or table, the draftsman is likely to lose much of his time retrieving his T-square from the floor, or juggling it across his lap; this inconvenience can be prevented by wedging the square to the



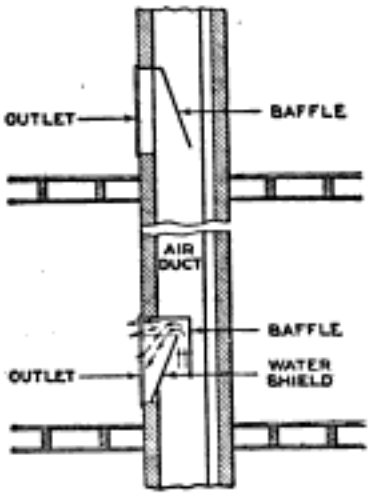
The Annoyance and Inconvenience of Working with a T-Square on a Slanting Drawing Board can be Easily Eliminated by Wedging It to the Board

board. To do this, an extra head, with a flange to hold the wedge in place, as shown in the drawing, is attached to the

end of the blade with small screws, holes first being drilled, to prevent splitting. In use, the T-square is held or released by pressure on the small wooden wedge which bears against the edge of the board and the special head, as shown in the drawing.

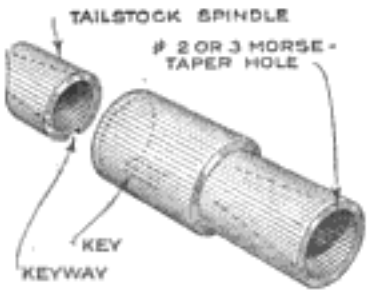
Improving Hot-Air Heating System

In a building heated by hot air, difficulty was experienced in getting the warm air to come from the registers on the lower floors unless those on the upper floors were closed. To overcome this trouble, the baffle arrangement shown in the drawing was tried and found successful. Owing to the character of the work done on the lower floor it was necessary to flush it with a hose frequently. To prevent water from entering the tin air duct and causing it to rust, a water shield was fitted, as indicated; this shield also prevented water from flowing down onto the hot cast-iron dome of the heating furnace, thus removing the danger of cracking it and thereby disabling the heating plant.—J. E. Noble, Portsmouth, Ontario.



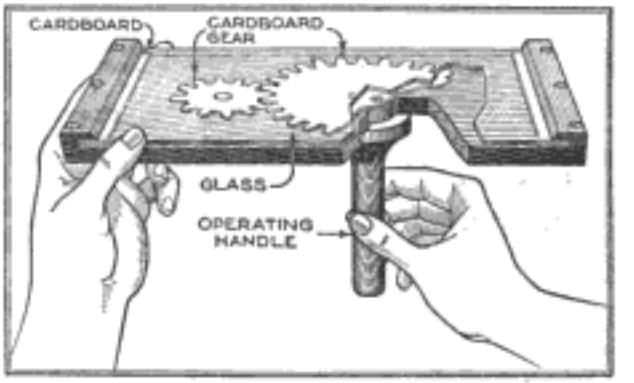
Drill Holder for Lathe Tailstock

An attachment which prevents damage to the taper hole in the tailstock, when drilling in the lathe, is shown in the illustration. It consists of a chuck, made from cold-rolled steel, which slips over the tailstock spindle, a key in the chuck fitting the spindle keyway. The taper hole in the chuck may run through, if desired, so that the drill can be knocked out from the end, instead of cutting a drift slot in the chuck.—H. A. James, Wilmington, Del.



Studying the Action of Mechanical Movements

In making a study of the action of gears, cams, and other mechanical movements, it is of great advantage to be able to observe the various elements in operation, and, while it may not always be practicable to observe an actual movement, or to build a working model, a satisfactory alternative is to lay out the movements on cardboard or Bristol board, cut them out with a sharp knife, and assemble them on a baseboard, using pivots and guides where necessary.



As a Substitute for Working Models in Metal, Simple Cardboard Models Afford an Easy Method of Studying the Action of Mechanical Movements

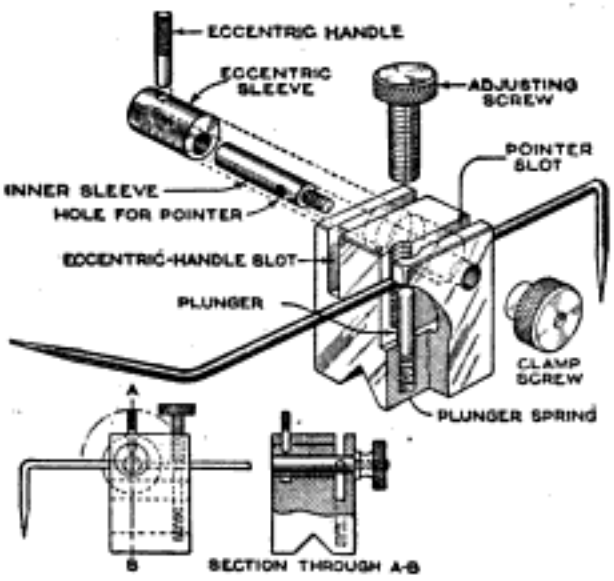
The sketch illustrates such a device used to study the action of gear teeth, to show where modification of the theoretical shape of the teeth is necessary to avoid interference, or to observe the difference between the action of cyclodial and involute gears at varying center distances. The driving gear may be mounted on an extension of a wooden handle, which is used to rotate the gears. The whole fixture may be covered with glass, mounted on two strips of the same thickness as the material from which the gears are cut; this will prevent the gear teeth from riding over each other, and keep the model flat.

Devices of this character are also very useful in studying the action of slide valves, plotting new cams, the action of steam-engine eccentrics in relation to the crank movement, etc., and by the exercise of a little ingenuity, it is surprising what complicated mechanisms can be built up, and how the action of the movements becomes simplified when thus observed.—H. H. Parker, Oakland, Calif.

¶Glue is rendered insoluble in water by adding a small amount of potassium bichromate, and exposing the joint to sunlight.

A Small Surface Gauge

In laying out small work on the surface plate, a block-type surface gauge is a



A Cheap but Efficient Surface Gauge, Which will Prove Handy in Laying Out Small Work

convenient addition to the toolmaker's kit. The drawing shows a gauge of this type made from a piece of cold-rolled steel, 1 by 1 by 1½ in. The block rests directly on the surface plate, the conventional spindle not being used. Two slots, one for the scriber and one for the eccentric handle, are milled in the top of the block; a hole is drilled and reamed for the spring and plunger, and the upper portion tapped for the adjusting screw. A large hole is drilled partly through the block, and continued eccentrically with a smaller hole. The scriber is held in a sleeve, which is a working fit in the eccentric sleeve, and is clamped against the wall of the scriber slot when set. After being clamped lightly, the scriber may be closely adjusted longitudinally by means of the eccentric, and vertically by the adjusting screw, being then clamped firmly. The bearing surfaces of the block should be accurately finished, and the working fit of the sleeves as good as can be made. The block should be case-hardened and ground if possible.

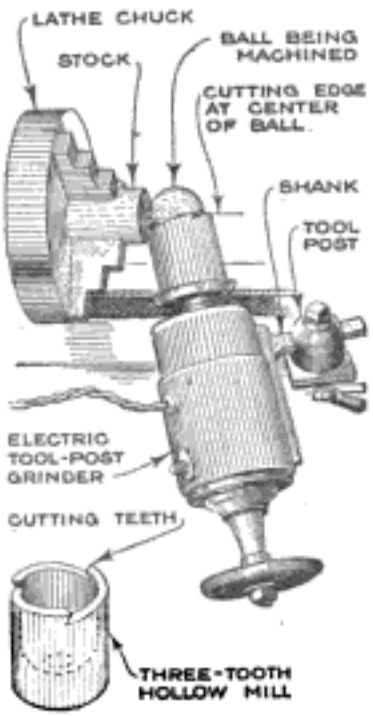
Safety in Handling Dynamite

From time to time one hears the observation that "dynamite won't explode from heat—one can burn it without its exploding." This is true in probably 95 per cent of cases, but in the other five dynamite does explode from heat or fire, and hence frozen dynamite should never be thawed in front of a fire, in the bake oven, or on a boiler. Another bad method of thawing is to place the dynamite directly in hot water; this causes the nitroglycerin in the dynamite to come out into the water. The strength of the explosive is lost, and an accident may occur from nitroglycerin sticking to the empty pail.

One of the simplest and safest methods of thawing frozen dynamite consists in burying the box in a manure pile and allowing it to remain over night. If this method is impracticable, a tub may be half filled with warm water, not so hot that the hand cannot bear it, and the dynamite placed in a dry pail, or deep pan, which is set in the water and covered with a piece of old carpet. Always remember that the rules given in the original container are based on a thorough investigation of all accidents. Dynamite is not "fool-proof," and the fact that someone else has taken some "fool" chance in handling this capricious explosive and got away with it, is no assurance that one can do the same thing without being blown to pieces.—Guy G. Means, New York, N. Y.

Machining Wooden Balls in a Lathe

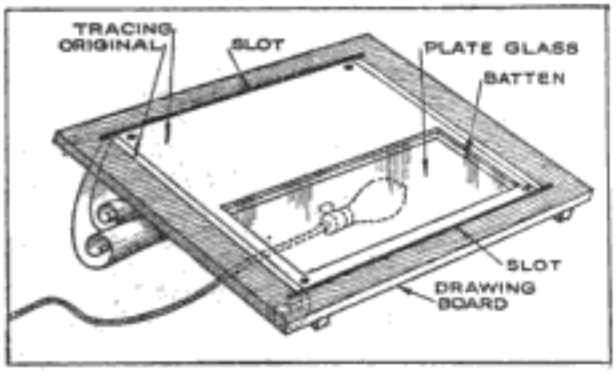
Machining wooden balls in a lathe is accomplished with precision and speed by using a hollow mill, fitted to an electric tool-post or center grinder. The hollow mill used has three keen-edged cutting teeth, and the inside diameter is slightly smaller than the diameter of the ball. The ball stock is chucked, and after placing the grinder, with the hollow mill attached, in the tool post at such an angle that the cutting edge of the mill will just pass over the center line of the lathe spindle, as shown in the drawing, the lathe and grinder are both started, and the mill is fed into the wood by the cross-



feed, on which a depth stop can be arranged if desired.—George A. Volz, Monroe, Mich.

Drawing Board with Tracing Glass

An ordinary drawing board can be specially adapted for making tracings where any amount of this work is done. Two ½-in. slots are cut through the board, about 2 in. from the front and back edges, as shown; the original drawing and the tracing cloth are run through these slots and thus prevented from curling up over the board and interfering with the work. If the board is of sufficient thickness, an opening of convenient size is made, with rabbeted edges, the depth of a piece of plate glass, which is usually about ¼ in. If the thickness of the board does not permit this arrangement, battens will have to be applied underneath the edge of the opening to support the glass, as indicated in the drawing. In use, an electric lamp is placed underneath the glass, and the light transmitted through



A Drawing Board That Eliminates the Uncertainty of the Draftsman, When Making Tracings from Lightly Penciled Drawings, Makes Use of Transmitted Light

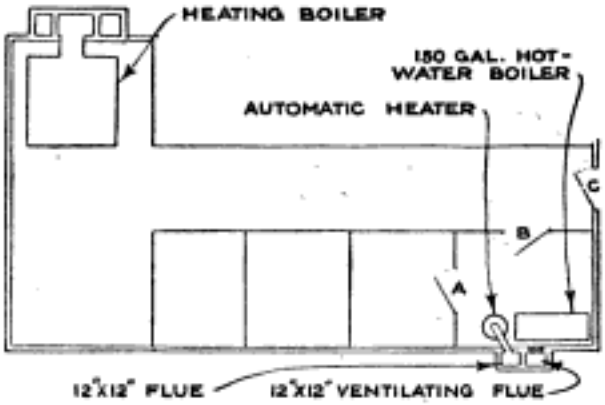
the paper shows distinctly the marks on the drawing to be traced, and there is no loss of time on account of uncertainty, which is particularly the case when a lightly penciled original is to be traced, or the tracing material is not sufficiently transparent.—H. E. Lloyd Owen, Port Arthur, Ont.

Castle Nut and Bolt Make Wire Cutter

In the absence of wire-cutting pliers, difficulty is sometimes experienced in cutting small wire smoothly, and at the right place. However, the wire can be neatly cut by turning a castellated nut onto a bolt which is drilled for a cotter pin. The wire is inserted into the pin hole through the castellations of the nut; then by turning the nut with a wrench the wire is sheared off smoothly.

Stopping Down Draft in Heater Flue

Being called to a large residence to adjust some defect in an automatic heater,

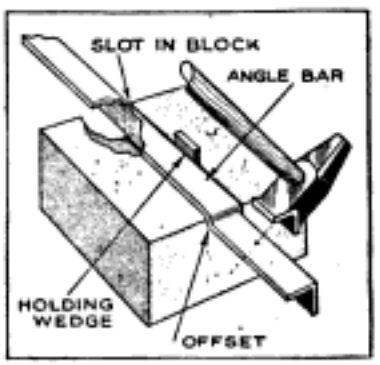


The Remedy for a Puzzling Heater Trouble was Found to Be Very Simple When the Case was Diagnosed Intelligently

I found a down draft in the flue strong enough to blow the gas flame out all around the sides of the heater whenever it was lighted. Upon investigation, I discovered that the draft was caused by the large heating boiler in the front of the basement. The powerful draft through this boiler had started the down draft in the smaller flue during the night, when it was cold, and had also started a draft down the ventilating flue. I remedied the trouble by opening the door C, to give the boiler a large supply of air, and by closing A and B. By keeping the gas flame in the heater low at first, and gradually increasing it, I warmed the flue, and the heater then worked perfectly. After closing the outer door C, and opening A and B, the down draft started in the ventilating flue, but did not affect the heater flue.—F. G. Hayes, Cleveland, Ohio.

Tool for Offsetting Angle Bars

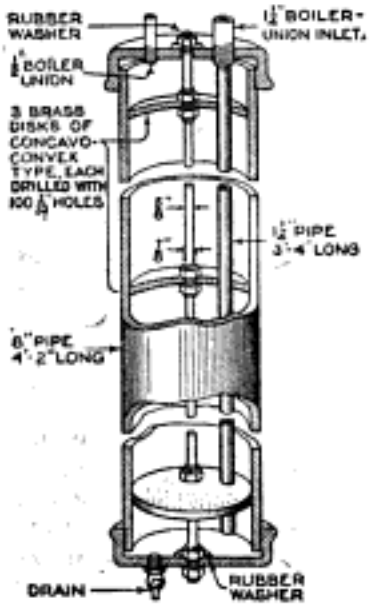
Considerable time is usually required to make an offset in angle iron by bending one flange at a time. But by using the tool shown in the drawing, work of this character may be done at a single heat. The tool proper consists simply of an iron block, into which a slot of convenient width and depth is milled. In use, the angle iron



to be bent is heated at the point of the bend, inserted into the slot, and secured by the wedge; then, by using an ordinary fuller on the work, a blow or two of the sledge suffices to produce quickly a very neat and clean offset.—Edward Snowdon, Bath, Me.

A Simple Compressed-Air Strainer

Among the various apparatus for extracting moisture from compressed air, the device shown in the drawing is one of the simplest and most efficient.



The strainer is made from a piece of 8-in. pipe, which forms the shell, two pipe caps, and three perforated brass disks, which are held in place by an iron rod and nuts; these disks are dished, as shown, and perforated. From the drawing it will be seen that the moisture-laden air enters the strainer at the top and is carried to the bottom, whence it ascends through the disks to the outlet pipe at the top.

A Hydraulic-Pump Repair

The packing in a hydraulic pump in a large shop was constantly giving out, requiring new packing several times a day. Upon investigation, it was found that the distance piece, or washer, between the two cup leathers was too small in diameter, and that the leathers always sheared, as shown in Fig. 1. A new washer was made, cupped on both sides to conform to the curve of the leather packing, and just a few thousandths of an inch smaller than the cylinder bore. No more trouble was experienced when this was installed as in Fig. 2, as the cup leathers were then properly supported.

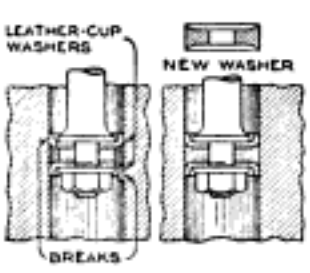


Fig. 1 Fig. 2

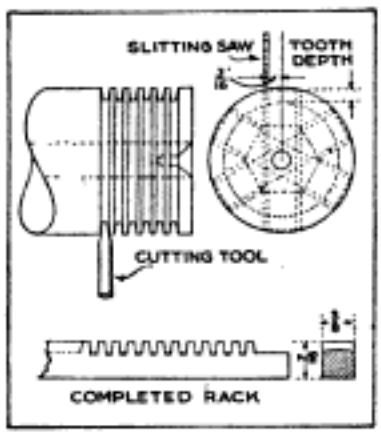
Lengthening a Short Belt

When erecting a small machine some time ago, I found that the drive belt sent with it was about ¾ in. too short. No leather was available at the moment, but the machine was urgently needed, so a way out of the difficulty was found. The belt was cut into three pieces, one long and two short ones, and then laced with a belt machine, of the type which uses wire staples sewn through the belt, joined by a rawhide pin.

As each lacing adds about ¼ in. to the length of the belt, the three joints made up the ¾ in. necessary.—J. V. Romig, Allentown, Pa.

Unusual Method of Cutting Racks

A number of 20-pitch steel racks were required for experimental purposes, the dimensions being those given in the drawing. A lathe and milling machine were at hand, but no gear cutters, so the following method of making the racks was adopted. A length of 1¾-in. cold-rolled steel was centered and set up in the lathe; a tool was ground to the shape of the tooth space of a 20-pitch rack. This tool had no top rake, and was set on a level with the lathe centers and at right angles to the work. An adjustable stop was attached to the lathe bed, and a flat block ground to a thickness of .157 in., the circular pitch of a 20-pitch gear; another stop was fitted to the cross slide. The tool was fed into the work at one end to the depth of the tooth, plus about 1/32 in., with the cross slide against its stop, and the right side of the carriage in contact with the stop on the bed.



The tool was then withdrawn; the carriage moved over until the .157-in. block just fitted between it and the stop; the carriage locked; the stop again moved up into contact with it, and another tooth space cut.

This operation was repeated until the required number of tooth spaces were cut, and then the teeth were finished with an accurately shaped tool, the first one

acting merely as a roughing tool. The bar was then set up between centers on the index head of the milling machine, and six equally spaced flats were milled on the circumference of the work, feeding the cutter down until the depth from the flat to the bottom of the tooth was correct. With the index head still in place, six cuts were made with a slitting saw, as shown, 5/16 in. from the center line; the cutter was then moved across the center 3/8 in., plus the thickness of the saw, and six more cuts made. By continuing these cuts through the work, the racks were separated from the core, and were then clamped, teeth down, on the milling-machine platen, and milled to the proper thickness. The hexagonal core of the bar was used to make small nuts, thus very little stock was wasted. While the tooth shape was not theoretically correct, all six racks were alike, and for the purpose for which they were intended, they served admirably.

A Scrub Broom of Birch Wood

The birch broom used on the New England fishing boats is a very handy article in places where a finer broom would not be stiff enough.

Select a good straight piece of white or yellow birch, about 4 ft. long and 3 in. in diameter, with at least 15 in. at one end free from knots, and peel the bark off. With a sharp knife, or drawknife, shave the piece, as shown, starting about the 15 in. point, and shaving to within 1 in. of the end, turning the shaving back, as in Fig. 1. Manipulate the knife to produce shavings of uniform thickness and about ½ in. wide. Continue this operation all the way around the stick until the section has been cut away to a diameter of about 1 in., as in Fig. 2; then wrap six turns of stout cord around the bundle of shavings, as shown in Fig. 3. The broom is completed by squaring off the end of the brush and dressing down the remainder of the piece to convenient dimensions. The wood should be green and unseasoned.

Fig. 1

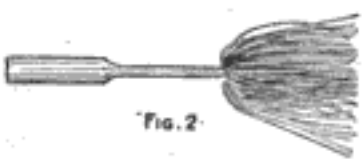


Fig. 2

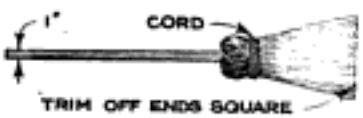
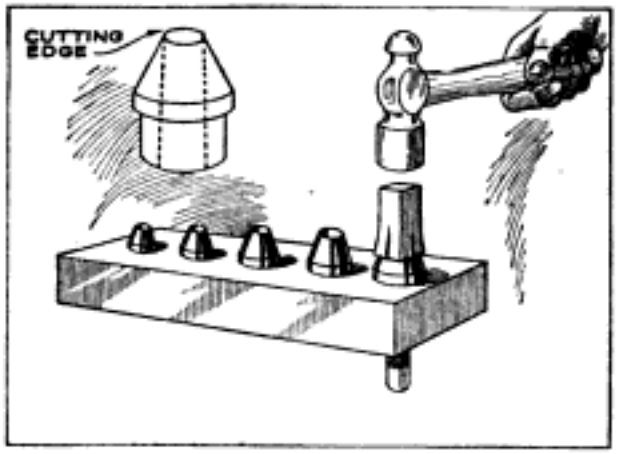


Fig. 3

An Improved Dowel Plate*

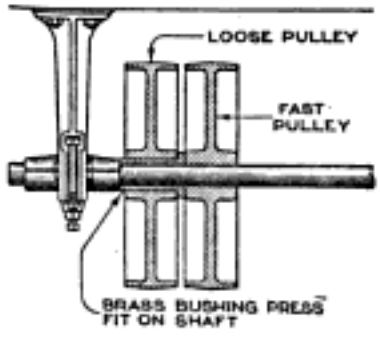
The device shown in the drawing is used to cut dowel pins of various sizes for toymaking. Holes are first drilled into a steel plate to accommodate bushings of various sizes; these are roughed out of tool steel, and after being hardened and tempered, the edges are beveled off to a sharp cutting edge, as shown. The holes may vary in size and must be slightly larger at the bottom, to prevent jamming. In use, the sticks are driven through the edged bushings. When the edges of the bushings become dulled, they can be resharpened.



A Departure from the Usual Dowel Plate Is One in Which Interchangeable Bushings are Used, Presenting Sharp Cutting Edges, Which are Easily Resharpened When Dulled

Sleeve Prevents Wear on Countershaft

It has been the experience of all machine-shop foremen that more or less difficulty is experienced with loose pulleys wearing down the shaft or the bore of the pulley to such an extent that new shafts, reboring, and bushings are necessary. The drawing shows how the evil effects of this wear can be reduced, if not entirely eliminated. The common practice is to bore out the pulley and insert a brass or bronze bushing or sleeve, but in this instance the sleeve is pressed onto the shaft, and the pulley is bored to make a running fit. Practically the entire wear is taken up by the bushing, instead of the shaft.



Making a Dividing Head

BY J. V. ROMIG

THE man in the small shop, working with his limited machinery and tools, is often handicapped by the need of attachments for quickly dividing into equal spaces the circumference of various machine components, such as gears or splines, and such tools as taps, reamers, counterbores, etc., which can only be accomplished, without a time-consuming layout, by means of a dividing head.

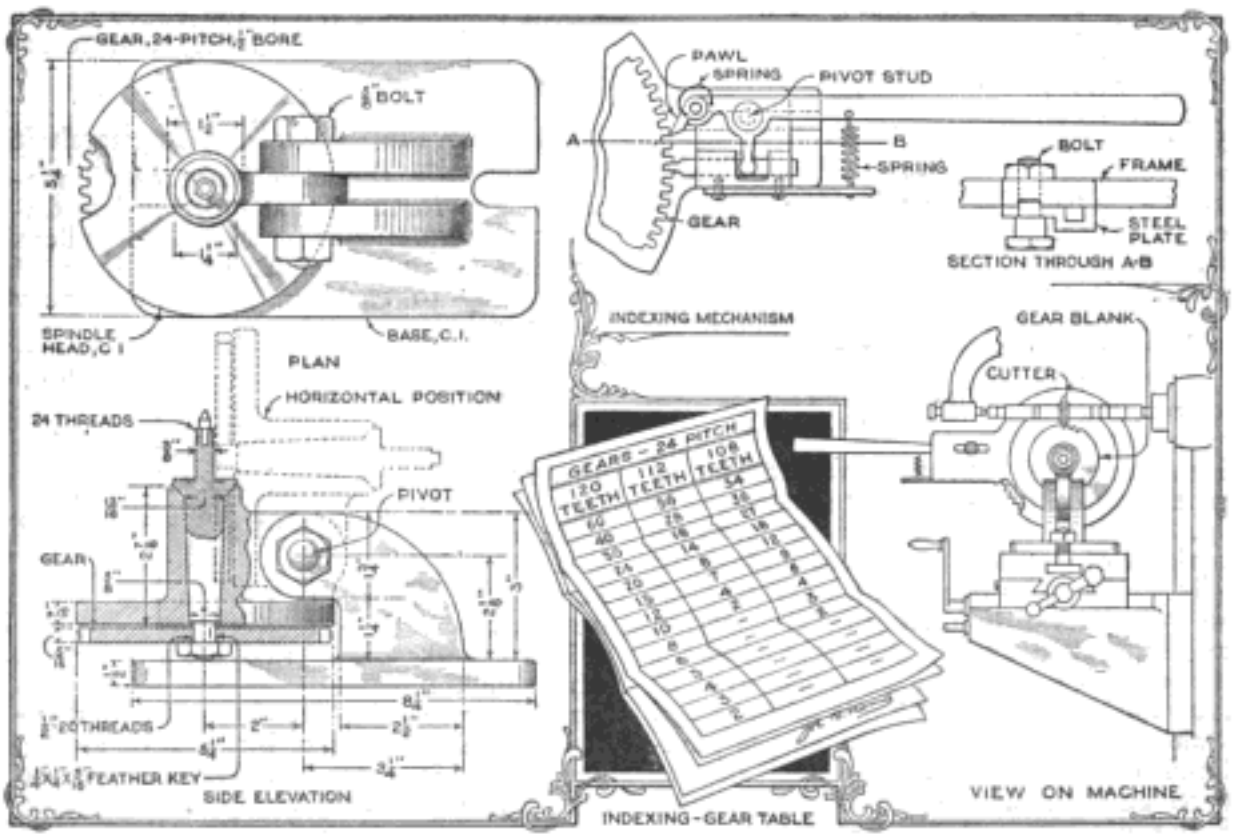
While the most accurate heads are those using a worm gear and worm, these heads are, to the very small shop, out of reach on account of their high cost. The simple dividing, or index, head, described in this article, was designed by the writer to fill this need, and will be found capable of handling any work within its range.

The parts are made of cast iron and steel, and all the necessary pattern work is simple. The main spindle, preferably of tool steel, is turned on the lathe, and the projecting end threaded with a fine thread, the work fitting over this end, or, if too large in bore, fitted centrally with bushings; this projecting end can also be fitted with a center if so desired, and be used with the tailstock of a small lathe, for the fluting of taps and reamers, or for any work which must be swung between centers.

Although the dividing head is used most frequently on the miller, it can also be used for a variety of work on the lathe and shaper, thus trebling its usefulness. On this dividing head, use is made of master gears as a means of dividing the work into equal spaces; three gears, 120, 112, and 108-teeth, will give nearly all the divisions required.

By referring to the accompanying table, each gear with its factors can be seen, and the proper gear selected for the required number of divisions. Working on the teeth of the master gear is the pawl and the indexing pin, both operated by the motion of the hand lever, as the detail drawing shows. This lever, with its pawl and pin, is mounted on a steel plate, which is fitted with a tongue, sliding in a groove in the extension of the cast-iron head member, as shown in the section taken through A-B.

A motion of the hand lever will pull out the indexing pin, and the pawl will push the gear around one tooth; allowing the lever to return will draw the pawl away, and bring the pin into the space between two teeth, holding it tightly and securely by the tension of the spring. The three indexing gears are interchangeable on the lower end of the main spindle, be-



A Dividing Head for the Small Shop, Which, While Not Aspiring to the Accuracy of the Commercial Head, will Be of Great Utility in the Shop Possessing but Limited Equipment, Being Very Simple and Easily Operated

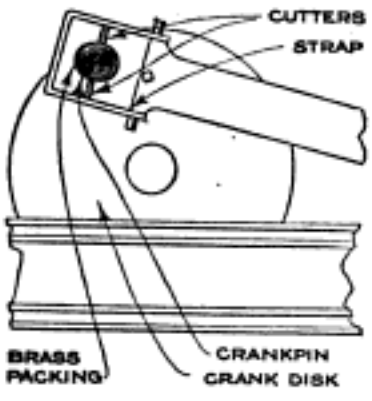
ing held in place by a feather key and nut. When a gear is to be cut, refer to the chart and see under which one of the three gears, the factor appears corresponding to the number of the teeth to be cut. For example: Take a gear of 36 teeth, this factor appears under the 108 gear. Dividing 36 into 108 we obtain the number 3, which is the number of times the handle must be operated with the 108-tooth gear in place to turn the work through one thirty-sixth of a revolution.

Although gears of 24-pitch are used in the dividing mechanism, any pitch can be cut on the main spindle, using the proper cutter.

The operation of this style of dividing head is very simple and quick, and when used on a hand-feed hand miller great speed can be made on duplicate-manufacturing work. Small gears and pinions, straight or bevel milling cutters, etc., can be manufactured accurately and cheaply on this type of head, as it can be used at any angle from the horizontal to the vertical.

Truing an Engine Crankpin

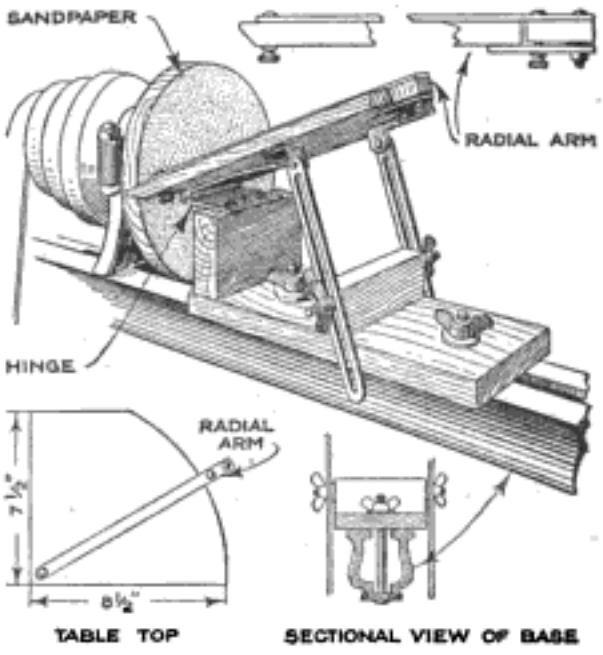
A sawmill engine was discovered to have been assembled so hastily that the crankpin was ⅛ in. out of true. As it would have meant a delay of several weeks to return the part to the factory, and as the engine was urgently needed, some means of truing up the crankpin had to be found. This was done by making two cutters, the width of the crankpin bearing on the connecting rod, with a rake on the cutting face like a lathe tool. Loosening the connecting-rod bearing, the flywheel was turned over until the crankpin was horizontally true. Placing one of the knives, edge to the pin, close against the crankpin on each side, the connecting-rod strap was drawn tight, so that the knives could not move. Brass packing pieces were inserted on each side of the crankpin, to prevent it from moving back and forth in the bearing. The flywheel was turned half over, and the crankpin turned down true enough to allow the engine to be used.



A Faceplate Sander for a Small Lathe

One of the most difficult operations in the small shop is the accurate finishing of small wooden blocks that are to be used for patterns, and of parts of models, especially when working on the end grain. The faceplate sanding arrangement shown in the drawing, while dimensioned to fit a well-known and popular make of small bench lathe, can be proportioned to fit a lathe of any size. It should be observed that the top of the table should come above the center of the spindle, so as to clear the idle center of the faceplate, and that the end of the table should project beyond the hinge, as shown, to permit the edge of the table to be brought up close to the faceplate.

While it is best to make the support and table of hardwood, a soft-wood faceplate affords the easiest means of attaching the sandpaper, which is simply cut to size and glued to the face of the disk.



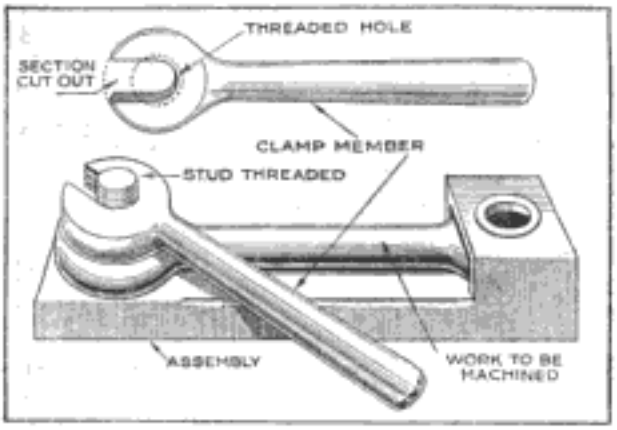
A Sanding Arrangement for the Lathe That Makes Possible Neat and Accurately Finished Wooden Parts for Patterns and Models: It can be Proportioned to Fit a Lathe of Any Size

Carrying a Long Ladder on an Auto

A long extension ladder can be carried from place to place on the smallest automobile without interfering with the driver or his operation of the car, and without danger of marring the finish or upholstery. The ladder is shoved underneath the car and is tied to both front and rear axles with four short lengths of rope, or chain; a ladder 15 or 20 ft. long can be easily transported in this way.

Quick-Acting Clamp for Jig Work

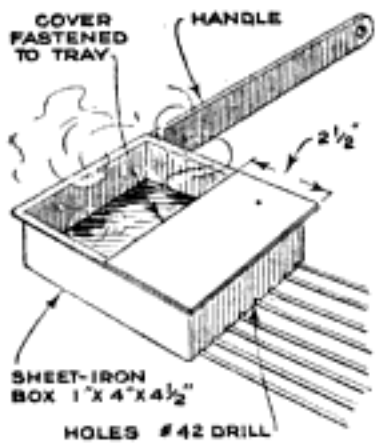
The loss of time resulting from the screwing and unscrewing of the conventional jig clamps can be greatly reduced by the application, wherever possible, of the clamp shown in the drawing. The clamp member consists of a threaded wrench, with a handle, to fit over the clamping bolt. One half of the threaded hole is cut away, allowing the clamp to be shoved on the stud, sidewise. A fraction of a turn and the wedging action of the thread causes the clamp wrench to come down solidly against the work, holding it firmly in the jig.



A Quick-Acting Clamp Wrench That Reduces the Amount of Time Required to Secure and Release Work Held in a Jig While being Machined

Making Wire Solder

Wire solder can be easily made of any desired thickness to suit the work. As shown in the drawing, this is accomplished by pouring the molten metal from a special ladle, made from No. 24 gauge sheet iron. The solder is melted and poured into the previously heated pouring ladle which is tilted toward the back. The strips of solder are formed by tilting the ladle in the direction of the holes and allowing the metal to run through onto a flat surface. With the device shown in the drawing, eight strips can be formed at one time. By drawing the ladle along slowly, heavy solder is produced, and the faster the ladle is moved, the thinner will be the solder. The metal should always be kept well heated.—Morris Tessler, New York, N. Y.

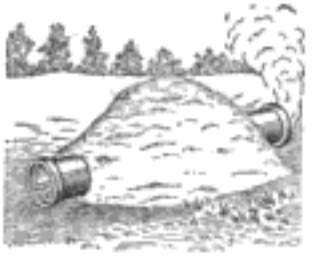


Tire Bead as Pump Packing

That the bead from old automobile tires makes an excellent packing for water-pump glands is the report of a man in charge of a group of deep-well irrigating pumps. It had always been difficult to obtain a packing that would last. In an emergency, when no commercial packing was available, the engineer carefully trimmed the bead from an old automobile tire and fitted a piece in the gland. The result was entirely satisfactory, and the improvised packing proved better and more durable than any previously used. Since then he has "standardized" on this kind of packing; however, no bead that contains metallic wire should be used.—Milo Hunt, Whittier, Calif.

To Keep Piles of Dirt from Freezing

Piles of dirt and building material can be prevented from freezing in cold weather, by the simple method of piling the material on top of old sheet-iron pipes of large diameter, such as furnace or ventilating ducts. The pipe should be elevated slightly at one end and a fire built at the windward end, so that the heat will flow the full length of the pipe.



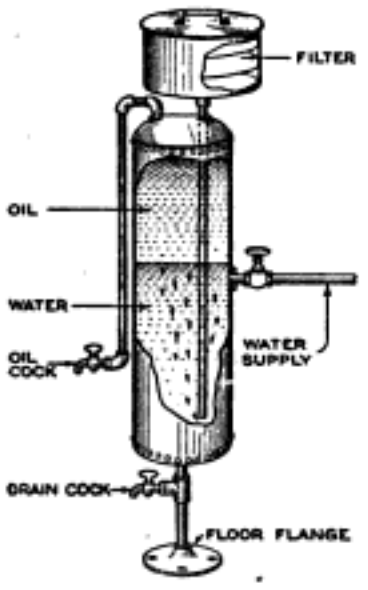
Measuring Rate of Discharge from a Pipe

It is sometimes necessary to measure the rate of flow of a liquid stream in gallons per minute, cubic feet per second, or barrels per hour. This can be done, of course, by determining how long it takes to fill a vessel of known capacity, but this is not necessary if the stream can be allowed to discharge through a horizontal pipe or trough; in that case, a foot rule suffices. In accordance with the laws of falling bodies, a drop of liquid emerging from the pipe will fall 4 ft. in the first half second. During this half second, the unchanging forward speed carries it some measurable distance, D. In a full second, the horizontal distance would be 2D, which corresponds to the horizontal speed per second. In

short, the speed, in feet per second, is measured by twice the distance in feet that the falling stream moves forward while falling 4 ft. The rate of discharge, in cubic feet per second, is obtained by multiplying the speed of the stream in feet per second by its cross section in square feet. Hence, if the stream moved forward 3 ft. while falling 4 ft. its speed would be 6 ft. per second. If the diameter of the pipe is 6 in. and the pipe is full, the cross section of the stream has an area of .196 sq. ft. The rate of discharge is therefore 6 multiplied by .196, which is equal to 1.176 cu. ft. per second, or 70 cu. ft. per minute; this is easily changed into gallons per minute, or barrels per hour.

Oil Dispenser Made from Old Boiler

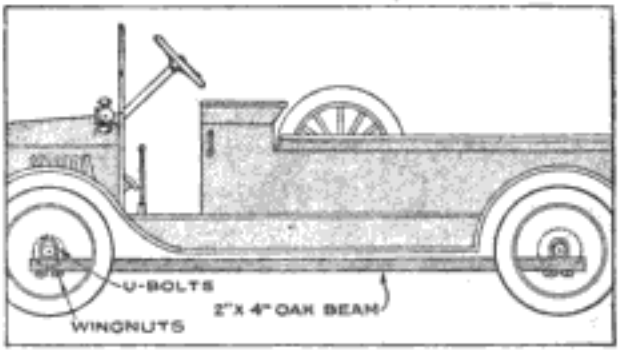
A discarded 30-gal. galvanized range boiler, with the leaks soldered over, forms the basis for a serviceable and efficient oil dispenser. A filter, into which the oil is poured, is made of sheet metal, and two strainer frames, covered with cheesecloth or felt, are arranged inside. The feed tube inside the boiler may be of tin or other sheet metal, soldered to the inside of the nipple to which the filter is screwed. The other pipe connections and fittings are ¾ in., although with the use of bushings ½-in. fittings may be used, the holes already in the boiler being used for the new connections.



In operation the dirty oil is poured into the filter, which removes the heavier impurities, and, as it filters through into the water, as indicated, any remaining foreign matter heavier than water is caught and precipitated to the bottom of the tank, from which it is removed through the drain cock; the pipe below the drain cock being, of course, plugged. The clean oil at the top of the tank is withdrawn by opening the oil cock, and turning on the water, which forces out the lubricant, cleaned and ready for use.

A Convenient Towing Bar

A towing bar which can be very easily carried on the car, and which, in use, will

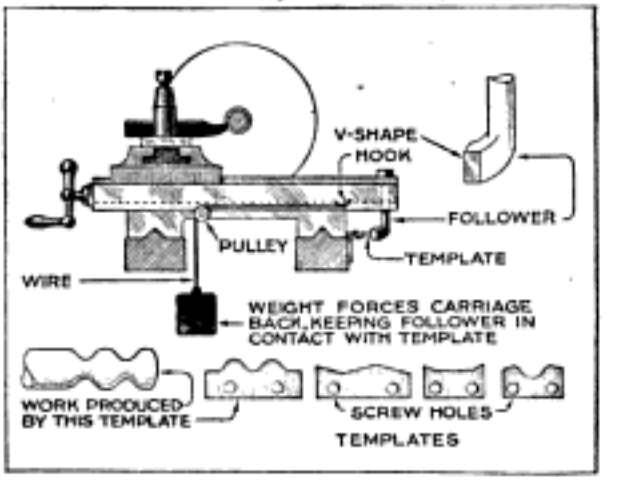


By Equipping the Service Car with a Towing Bar Instead of a Cable, the Car being Towed will Not Damage the Car in Front

prevent the rear car from running in at sharp stops, is shown in the drawing. It consists of a 2 by 4-in. oak beam which is provided with two U-bolts of such a size as to easily span a car axle. The U-bolts are spaced on the beam at a distance apart which will permit the bar to be carried slung underneath the service car in the position which is shown by the illustration.

Lathe Fixture for Form Turning

Where a number of identical pieces are to be turned to an irregular curve, outlined like the sample illustrated, it is possible to install, on an ordinary lathe, a simple apparatus which will guide the tool automatically to form the required outline. For this purpose the taper attachment of the lathe is called into service, and the template is fastened with screws to this part of the lathe, as illustrated. A follower remains in contact with the template, as the carriage is fed along, and

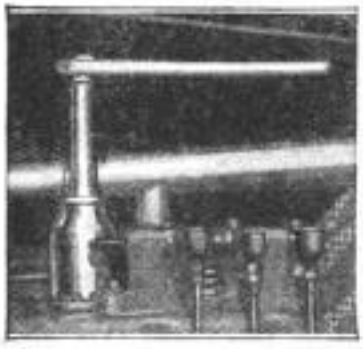


The Tool is Fed Back and Forth in a Radial Direction by a Template on the Taper Attachment, Thus Cutting the Required Outline

a weight hung over a pulley forces the carriage back, keeping the follower in contact with the template. It is not possible by this method to cut outlines any part of which has a true radial surface, but where the form to be cut is otherwise curved, the process is quite feasible.—J. F. Convery, Worcester, Mass.

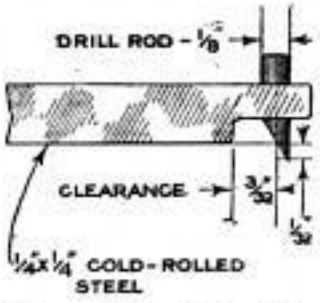
Socket Wrench for Valve Cages

Motorists who have occasion to remove valve cages, for scraping out carbon or other reasons, will find it convenient to have a special socket wrench for the purpose, made on the order of the one shown in the photograph. A piece of scrap iron, such as can be picked up in a junk shop, may serve as the body of the wrench, thus avoiding any lathe work. The large end should be filed to fit the valve cage, and the small one to fit an ordinary solid wrench; both ends may be casehardened, to advantage.



A Nonclogging Scratch Gauge

A woodworkers' marking gauge that will not clog around the marking pin, or underneath, between the bar and stock, and that will not mar the surface of the wood, is shown in the drawing. It makes a clear mark and cleans itself of the fine shavings that collect around the marking pin. The marking point, which is made from a piece of drill rod, is driven into a hole drilled in the end of the square bar, according to the dimensions given.—M. E. Duggan, Kenosha, Wis.

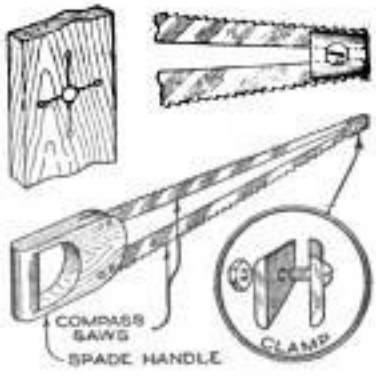


Adding Tenth Scales to Rules

In making drawings which bear decimal dimensions in addition to fractional ones, it is a great convenience to have a tenth or hundredth scale at hand besides the more common fractional one. By using cross-section paper, a decimal scale is quickly added to the conventional triangular scale, thus saving the trouble of hunting for a separate rule. A strip of the paper, ¼ in. wide, is cut parallel to the long lines on the paper. This should be done with a straightedge and a sharp knife, so that there will be no rough edges. Clean off the edge of the scale which is least used, and apply an even coat of paste; paste the back of the paper also, and apply quickly to the scale, rolling it down. This must be done quickly, as, if it is not, the water will expand the paper, making the scale untrue. When the paste has dried, number the inch divisions with drawing ink. These paper scales may be applied to any rule, and will be found as accurate as the ordinary scale graduations.—Curtis Ralston, Chicago, Ill.

A Double-Edged Compass Saw

In making ornamental cuts in porch posts, and for various other purposes, a handy saw can be made, as shown in the drawing, by fastening two compass-saw blades together at one end, so that the teeth of both will be on the outside edge. The blades are held apart at the rear by attaching them to an old spade handle. The advantage of such a saw is easily seen by reference to the sample of work illustrated.—C. A. Black, Jr., Hightstown, N. J.



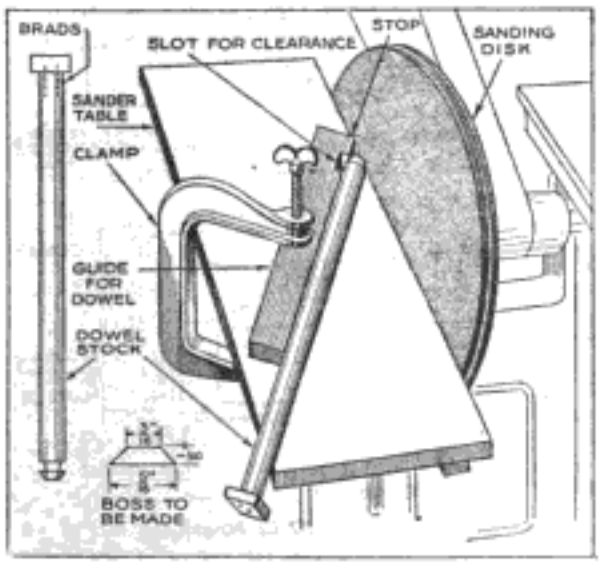
Repairing and Remolding Dictating-Machine Records

The wax records used on dictating machines are frequently cracked by forcing them onto the arbor of the machine, and then their period of usefulness is at an end. Such records, even though cracked from end to end, can be repaired and restored to use by heating a small soldering iron to the proper temperature, which can be determined by a little experimenting, and building up the crack with some added wax from scraps or shavings of old records. When doing this, it is advisable to heat the iron thoroughly and press it well into the crack, going as close

to the bore as possible, for it is necessary to weld deeply to prevent cracking again. Care is required to avoid making low spots or spongy portions, as they would necessitate excessive shaving down of the cylinder before using.

Making Small Bosses on Patterns

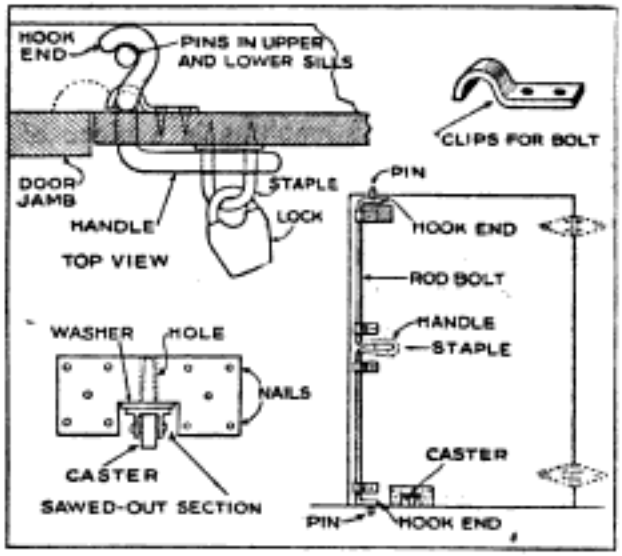
When filling an order for a certain pattern, it was necessary to make a large number of small bosses, which were to be glued onto the pattern. To turn so many on the lathe would have required a great deal of time, so the method illustrated was devised. A dowel pin, 5/16 in. in diameter, was squared off on both ends, and two brads were driven into each end, protruding somewhat less than the thickness of the bosses to be made. The heads of the brads were filed off, and the ends sharpened. A guide strip was clamped to the sander table at the required angle, with a stop at the end, near the grinding surface, to allow the bosses to be dressed down to just the proper diameter. The angle at which the guide strip is placed determines the amount of taper on the bosses. Each boss is made from a short wooden block, cut on the band saw, from a square strip of wood. One of the blocks is held on each end of the dowel rod; the latter is held with the left hand so that the block comes against the sander disk, and is revolved with the right hand. When one boss is finished, the holder is turned end for end, and the other one is made. It is not necessary to measure the diameter after the gauge has been set properly, and consequently a great deal of speed can be attained in making the bosses.



Instead of Turning Out a Large Number of Small Bosses on the Lathe, They were Formed More Quickly by the Use of a Sanding Disk

Double Bolt for Large Door

The drawing shows a double bolt for a garage door that simplifies the work of



A Double Bolt for Garage Doors, That Locks the Door at Top and Bottom, Simplifies Opening and Closing, and Makes the Fastening Doubly Secure

opening and closing the door and at the same time makes the fastening more secure.

At the edge of the door, a vertical iron rod, with hook-shaped ends at top and bottom, is arranged so that the hooks engage with pins set in the top and bottom of the door frame. At the center of the rod, a handle is formed to protrude through an opening cut in the door, and fit over a staple, in the manner shown; a padlock locks the handle to the staple. The bolt is attached to the inside of the door by means of clips made from flat iron, as shown in the drawing. When the padlock is removed, the handle is given a turn, and the hooks disengage from the pins, permitting the door to be opened. A small caster may be fitted to large doors, as shown, by sawing a section out of the corner of the door; this prevents the door from sagging.

Making Loose Studs Hold

When a stud becomes loose in a cylinder head, it may be made to hold tightly by sawing two slots at right angles across the bottom of the stem the full length of the lower thread, and countersinking the intersection of the two cuts. A small steel ball is then dropped into the hole and the stud screwed home. The ball enters the countersink and expands the stud, making it grip tightly. The ball should be selected to suit the countersink.

Milling Internal Threads in Wood

BY L. B. ROBBINS

BY utilizing parts of a carpenter's vise, a woodworker built the machine shown in Fig. 1, for milling internal threads in wooden vise blocks, such as are commonly used in the woodworking shop.

The base of the machine is a piece of hardwood, about half again as long as the vise screw, and its width is about half its own length. The head of the vise screw is attached to a block at one end of the

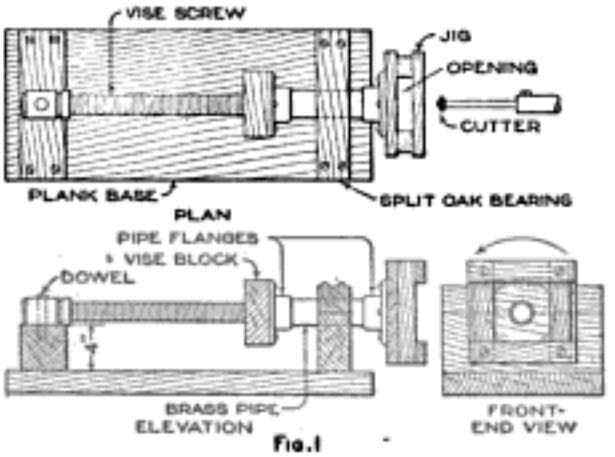


Fig. 1

A Simple, but Effective Homemade Machine for Milling Internal Threads in Wooden Vise Blocks: It can be Applied to a Variety of Other Thread-Milling Purposes

base with a dowel, as indicated. A piece of old, but perfect vise block, small enough to clear the base, was then turned upon the end of the screw for a distance of a dozen threads or so. Then a hollow shaft, about 10 in. long, was made by joining a piece of well-smoothed brass tubing to two pipe flanges, the inside of the pipe being sufficiently large to afford ample clearance for the vise screw. One of the flanges is attached to the vise block, the other flange being arranged so as to extend just over the end of the base. An oak bearing, built of two blocks, supports the outer end of the machine, and is arranged so as to line the screw and the attached shaft exactly parallel with the face and sides of the base. The shaft should turn freely but without looseness in the wooden bearing, which is lubricated with dry graphite.

A jig, or chuck, for holding the work, is attached to the outer pipe flange, as indicated in Figs. 1 and 2; the back of this jig consists of a square board. The two depth cleats on opposite sides are crossed at right angles by two similar strips, the latter serving as clamps for holding the stock to be threaded, which is inserted into the opening in the fixture, and the clamping strips tightened with a screwdriver. A hole is drilled through the back of the jig, as large as the inside diameter of the hollow shaft.

The thread cutter, detailed in Fig. 2, is made from the wheel cutter of an ordinary wheel-type pipe cutter; this wheel should be the same diameter as the thread root on the wooden screw. The wheel was slotted radially at eight equidistant points around its circumference; then a portion of the stock between the cuts was cut away, as shown, with a three-cornered file. Before undertaking to make the thread cutter, it is necessary to anneal it; afterward it should be rehardened and tempered to hold an edge.

In operation, the machine should be mounted upon a suitable support, so that the center of the jig will face the cutter, which has been previously set on an arbor, driven by a motor capable of fairly high speed.

The stock to be threaded is first drilled with a hole of the proper diameter at the required location and is inserted into the jig, so that the hole coincides with that in the back of the jig, which is then tightened to hold the work in place. The position of either the machine or the cutter arbor should then be altered so that the wheel will be off center just the depth of the thread to be cut, as indicated in Fig. 2, and fixture and motor are then clamped firmly in position.

The operation of the machine is simple;

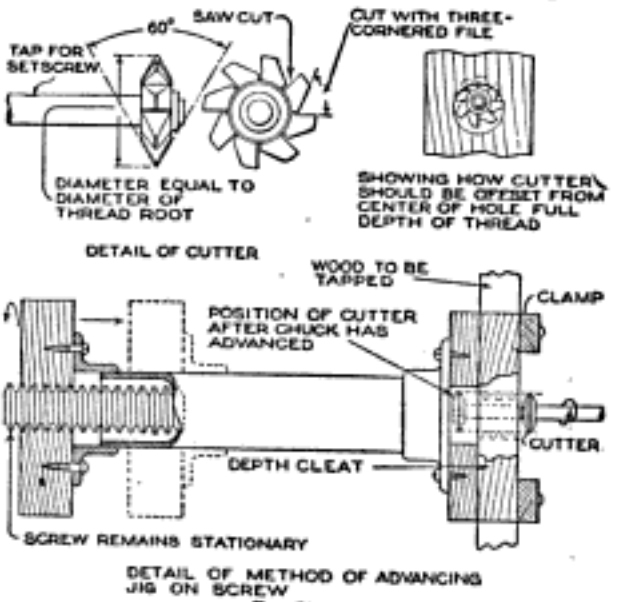


Fig. 2

The Constructional Details of the Thread-Milling Machine Are Comparatively Simple and Involve the Use of Easily Obtainable Materials without Machine Work

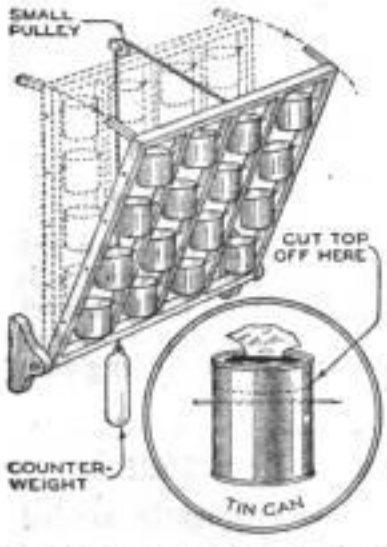
the cutter is started by throwing on the power, and the jig is slowly turned by hand, advancing the section of vise block along the screw toward the revolving cutter. Thus, when the cutter touches the side of the previously bored hole in the new piece, it cuts into the stock in precisely the same form as the threads of the screw, each turn of the jig advancing the work one thread.

Counting Number of Threads per Inch in Small Holes

To ascertain the number of threads per inch in a small hole where the insertion of a pitch gauge is impossible, a stick of soft wood can be used. The stick is whittled down to make a tight fit into the hole to be checked; it is then screwed into the hole and out again, when the tops of the threads will be found plainly marked in the wood so that it is then a simple matter to count the number of threads per inch.

A Neat Bolt and Nail Rack

The handy rack shown in the drawing affords a means of storing a variety of small parts in such a manner as to be instantly available at a convenient level.



The rack is made of 1-in. wooden strips with vertical crosspieces, spaced a little wider than the width of the containers used. The containers, which may be ordinary tin cans, are cut at the top to the desired size, and the rough edge is smoothed down; they are suspended between the uprights of the rack, by means of small wire rods, as shown. The rack is supported on brackets, at a suitable distance from the wall to provide clearance for the cans, the device being held upright by means of a counterweight. The rack may be pulled down to a horizontal position, giving access to all the cans at once, and when released it will resume its position against the wall.

¶Crown bottle caps, cut in half and nailed to a wooden block, make a satisfactory currycomb.

Adobe Cutter Keeps Mud from Clogging Motorcycle Wheel

The attachment shown in the illustration is an adobe cutter, and was used in a motorcycle endurance run, rendering excellent service in keeping the wheel free from mud. The trail was purposely laid over very heavy country, and many of the competitors were constantly obliged to halt for the purpose of removing the mud which had clogged their wheels to such a degree that they would no longer turn. The attachment is a U-shaped piece of wrought iron, fastened to the lower main-fork studs, and braced to the bolts of the fork spring. Its lower edge is sharpened where it passes around the tire, so that all caked mud is removed as the wheel revolves.

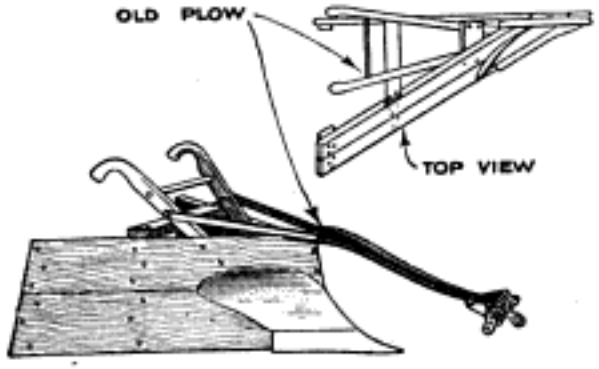
Ground Glass Aids Draftsmen

Strips of fine and coarse ground glass can be bought from almost any glazier. They are useful to draftsmen for sharpening and dressing drawing instruments, for putting a fine point on pencils, cleaning erasers, and for various uses which will occur to the draftsman.

Farm Plow Converted into Snowplow

An unexpected blizzard with deep-piled snowdrifts generally taxes the resources and ingenuity of the community to clear its walks and streets, and it was in just such an emergency the hybrid snowplow shown in the drawing was brought forth. It combines the familiar wedge-shaped snowplow with the efficiency of the conventional two-horse farm plow. The V-

shaped wooden form is built of substantial material and fits behind the plow-

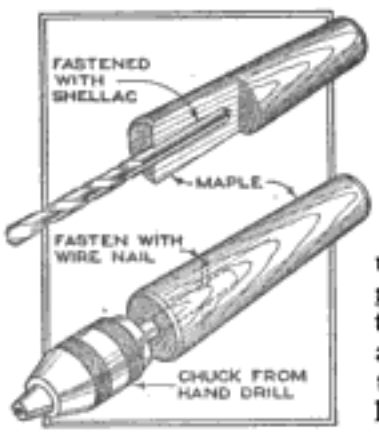


A Common Two-Horse Farm Plow Converted into a Snowplow Removes Snowdrifts with Slight Trouble

shares as indicated. An opening is cut in the end of the wooden wedge for the plow beam, on which it rests, no other front fastening being required. A crosspiece is screwed to the handles at the rear, and to it the wooden wedge is solidly attached. Drawn by one or two horses the deepest drifts are easily removed.

Handy Drill Chucks for the Woodworker

Homemade drill chucks that will be found very convenient for use on the wood-turning lathe are made as shown in the drawing. Tapered wooden "centers" are turned from maple; these are used with equal facility in either head or tailstock spindles of the machine. The upper drawing shows the simplest form, in which a hole two numbers smaller than the drill to be used is drilled in the center. The inside of the drill hole is coated with shellac, which is allowed to dry; then the shank of the drill is "roughed up" with a file, given a coat of thick shellac, and forced into the hole. The lower drawing shows how the chuck of a hand drill is mounted in the same way, with the exception that the chuck shank is a hand-press fit instead of the force fit set in shellac. The chuck is held in place and prevented from turning by a pin or wire nail which is driven through the shank.

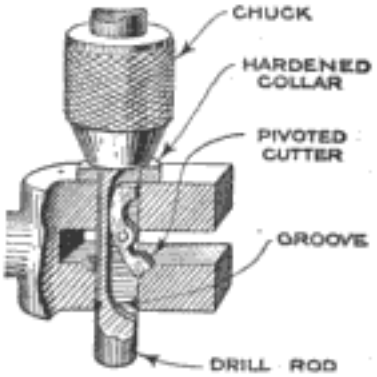


Making Holes in Glass

Around the shop it is often necessary to make holes in glass; this is more or less difficult with a drill, but there is a simpler method that nearly always gives satisfaction. A putty or clay dam with an opening in the center the size of the hole desired, is made on the glass; then the opening is filled with melted lead and if the glass is not too thick the piece will immediately drop out.

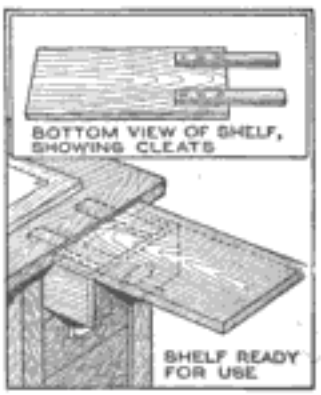
A Tool for Internal Countersinking

The tool shown in the drawing has been successfully used to countersink a hole where it breaks into a slot at right angles, and suggests a principle that could be satisfactorily applied to a variety of internal work. The shank is made from cold-rolled steel, case-hardened, and is slotted to take the pivoted steel cutter. On entering the hole in the work the upper projecting end of the cutter is forced back. This brings the lower end out into the slot and the countersinking operation is done as shown. A hardened collar serves as a stop, to regulate the depth of cut and prevent the cutter from digging into the work.



An Extension Desk Shelf

Additional space is frequently needed on the desk, and the difficulty may be overcome, in the case of desks not equipped with extension slides, by the detachable shelf shown in the drawing. A board, the width of the drawer and as long as desired, has two cleats screwed to the underside to support the shelf inside the drawer opening, while the board itself rests upon the edge of the drawer.

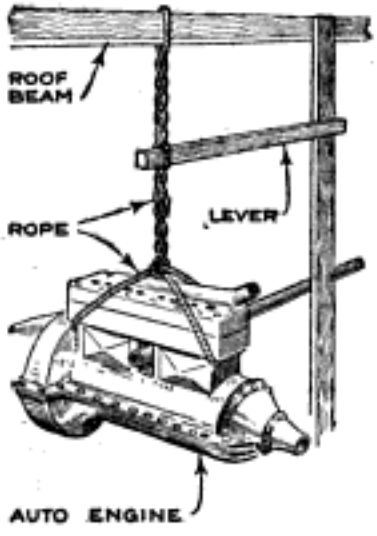


Reducing Wear on Wooden Bridges

Much damage to wooden-floored bridges, and considerable discomfort to those who ride over them come from the vibration caused by loose and uneven floor planks. The combined actions of sun and rain often loosen the planks from the stringers, causing them to rattle as a car or load is driven over them, and the longer the bridge, the worse the effect. All this can be avoided by placing tracks, made of two 2 by 12-in. planks, on top of the flooring, parallel with the stringers and at right angles to the flooring, for the vehicles. In this manner the floor is strengthened at the point of greatest wear, and when the surface track is worn out it is easily replaced, in contrast with the difficulty and expense of relaying the entire floor, which must be completely renewed when the track becomes thin, notwithstanding that only a part of each plank is worn. Much of the strain and vibration, as well as most of the noise, can be eliminated by the application of this idea, as the vehicles roll over the bridge as smoothly as on a paved street.—M. W. Lowry, Athens, Ga.

Pulling an Auto Engine Single-Handed

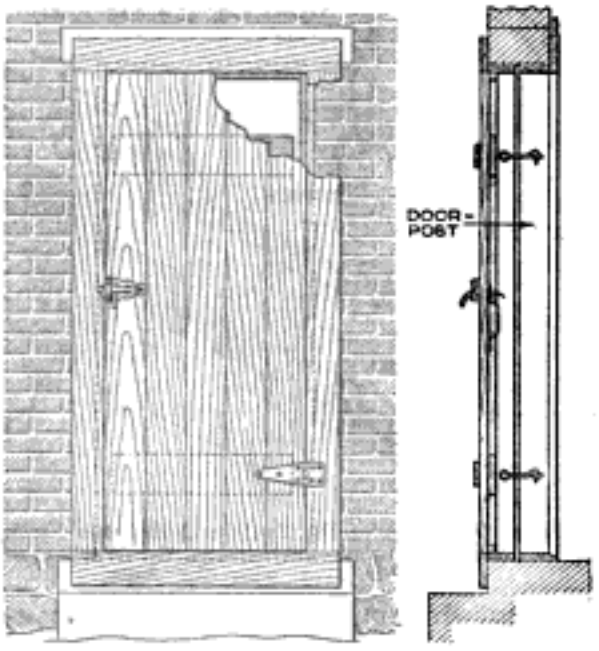
One of the problems the mechanic frequently encounters is the removal of a motor from the chassis without a hoist, and in most cases, without able assistance. However, if a piece of rope and an overhead beam are available, as they usually are around most garages, the engine can be raised by means of the "Spanish windlass" shown in the drawing. The rope is passed over the overhead beam and through the sling. A piece of plank or pipe is inserted between the two parts of the rope and these are twisted until the engine is raised from the frame.



¶To dry boots in a short time, insert a lighted electric lamp, and the heat from it will rapidly evaporate the moisture.

Detachable Storm Door

There is a distinct advantage in having a storm door which can be put in position without carpentering, fixing of hinges, etc. Such a door is shown in the sketch. It is permanently attached to its own frame, and this is fastened to the door-posts by four hooks which fit into eyes, two on each side. It can be set up or taken down in five minutes, so that its owner has nothing to fear from sudden changes of weather.—A. R. Anderson, Hamilton, Ont.



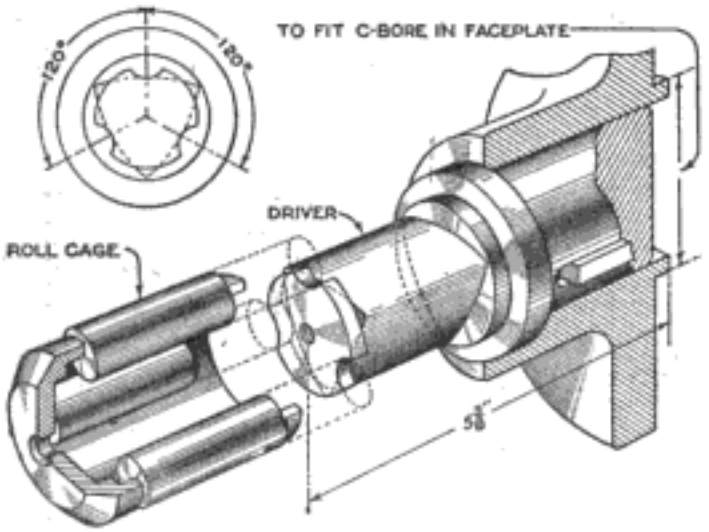
The First Blizzard Has No Terrors for a Household Provided with a Storm Door Which can be Set Up in a Moment by Means of Four Hooks

Shaft Bearing Made from Brass Pipe Bushing

Sometimes the length of propeller shaft of a motorboat, between clutch and shaft log, is so great that the shaft tends to "whip" when in operation. This can be prevented by supporting it, at the center, by a bearing made from a brass pipe bushing. The bushing should be selected so as to fit the shaft, with the removal of as little metal as possible after the internal threads have been turned off. This bearing is screwed into one end of a piece of iron bar, or angle, the lower end of which is bolted to one of the floor timbers of the boat. The bearing should be drilled for an oil hole or grease cup. This bearing may be applied in almost any case where it can act as a support without the direct weight of the shaft falling on it.

An Internal Driver for Lathe Use

For turning parts of which the circumference must be true with the bore, an excellent driver is illustrated. The construction of the various parts is clearly shown in the drawing, in which, for simplicity's sake, the roll cage is shown away from the body of the tool.



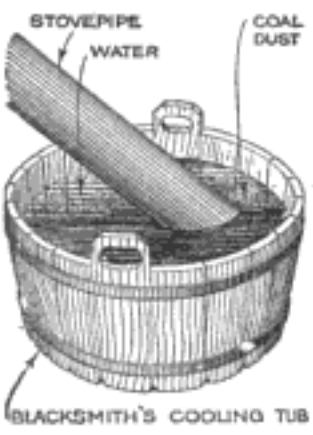
A Driver Which Grips Positively and Releases Easily is Used Where the Circumference of the Work must Be True with the Bore

The body is turned from tool steel, the eccentric driving surfaces being milled, and then hardened and tempered; the circular endpiece which fits into the counterbore on the roll cage may be either solid with the body or made of a separate piece of machine steel and screwed on. The rolls are of hardened tool steel, while the roll cage, being merely intended to keep the rolls in place, may be of brass or machine steel; it is held to the body by a screw, which should not clamp the cage tightly to the body, but should allow it to rotate and thus drive the rolls in or out, as their position on the driving surfaces may determine.

The body is keyed into an iron casting, as shown, which is bolted to the lathe faceplate, into the counterbore of which a boss on the casting is fitted. This driver will be found very quick in operation, tightening immediately the lathe is started, while allowing the work to be loosened by hand. Of course, a different size is necessary for each diameter of bore.

Marking Stovepipe to be Cut at an Angle

A resourceful blacksmith, confronted with a job of cutting a section of stovepipe at an even angle, scattered a handful of coal dust over the surface of the water in the "slack," or cooling tub. He then cleaned the outside surface of the pipe of all grease and immersed the clean end into the water, holding the stovepipe at the desired angle. When the pipe was withdrawn from the water an even line of coal dust marked the point of contact with the surface of the water.



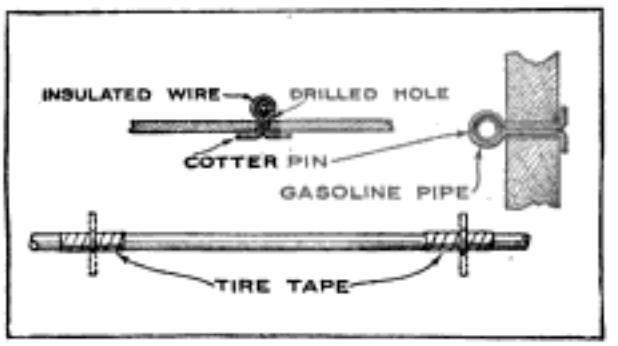
A Simple Insulated Platform

While working on some high-voltage wiring an insulated platform was needed to stand upon. Having none on the job, one was made by laying a board over two quart bottles, keeping the bottles from rolling with pieces of wood.

Cotter Pins as Wire Fastenings

Ordinary heavy cotter pins form convenient fasteners for wires and small pipes on cars, trucks, tractors, and the like.

A hole is drilled in the part to which it is desired to attach the wire or pipe, and a cotter pin is pushed through the hole, the ends being flattened over to lock the pin. The wire or pipe, having been first wrapped with tape, is then put through the eye of the cotter pin, and the job is finished. The length of pin used will, of course, depend upon the thickness of the part it is used on.



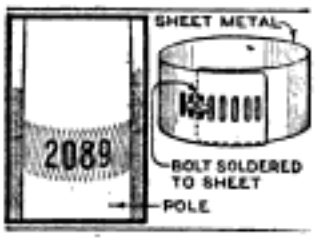
For Running Wires around the Frame of the Car, Cotter Pins Make an Ideal Fastening, being Easily Applied and Removed, Besides Being Inconspicuous. They may be Used on Either Steel or Wood

Glass Cutter Dresses Emery Wheels

For dressing a small emery, or other abrasive, wheel, the steel cutting wheels of old glass cutters can be put to good use. If the wheel to be trued is a very small one, the glass cutter can be used without alteration in the same manner as any other tool for the purpose. Two or more of the wheels may be mounted on a horizontal shaft and mounted in a holder for use on larger wheels.—L. E. Brundage, Norwood, Colo.

A Guide for Painting Posts

Along state highways, it is customary to whitewash the telegraph and telephone poles at the base, leaving a blank space on which the company's pole numbers are painted. The guide shown in the drawing was devised for the purpose of making these blank spaces uniform.



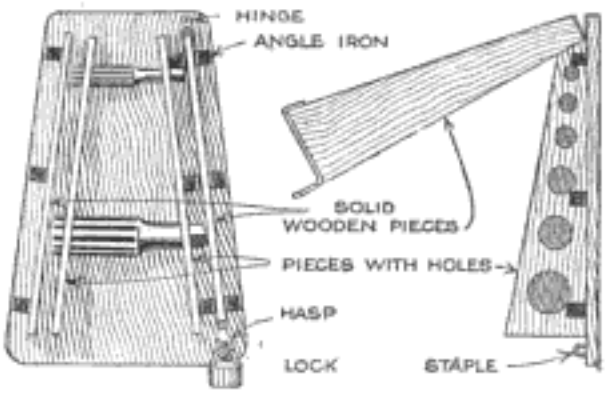
It consists of a strip of sheet metal of the desired width with a bolt soldered, or preferably, brazed to one end, the opposite end of the strip being provided with a number of slots a trifle larger than the bolt. In use, the guide is placed around the pole to be painted, and the bolt is slipped through the proper slot, where it is held in place by a wingnut.

A Substitute for Grafting Wax

A liquid mixture, such as that used for protecting trees from the attacks of crawling insects, and widely used on sticky flypaper, can be used in place of the orthodox grafting wax for preventing the graft from drying out, and protecting the cut until the scion is well started. This preparation is easily made by melting 2 lb. of resin and 1 lb. of castor oil together; it is applied to the graft with a small stick.

Rack for Reamers Prevents Misuse

Where valuable reamers are kept without proper storage facilities, their efficiency quickly deteriorates, and if they are taken without the knowledge of the storekeeper, much time is lost in hunting for them. A rack, such as the one shown in the drawing, in which the reamers can be locked, will save much of this annoyance. As shown, it consists simply of a piece of board of suitable size, upon which are attached the two pieces that hold the

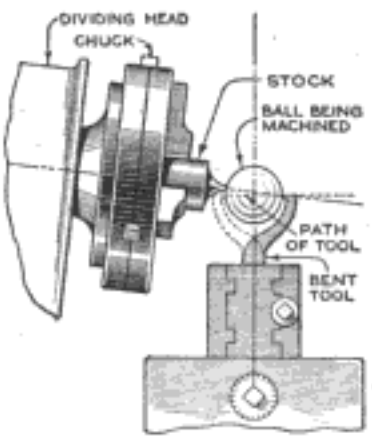


Unauthorized Use of Reamers is Prevented by This Rack, in Which the Tools may be Locked

reamers. One solid piece of wood of the same size as that used for the racks, is attached rigidly in such a position that the reamers abut against it when put into place. A similar piece on the opposite side is hinged to the upper part of the base, so that it may be lifted for withdrawing the reamers, or locked in place. —John G. Pope, Worcester, Mass.

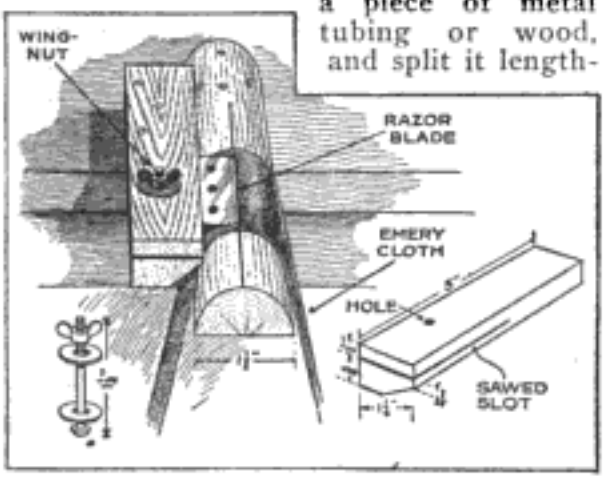
Machining a Ball on a Milling Machine

Machining a ball is not usually thought of as a job for a milling machine, but it may easily be done. The stock is cut somewhat longer than needed, to provide a good grip in the chuck. The ball is then roughed out on a lathe, after which the stub end of the stock is placed in the dividing-head chuck. A cutting tool, such as shown in the drawing, is forged and ground, and this is clamped in the eccentric, or boring, chuck. The table of the milling machine is thrown over to such an angle that the edge of the tool will just pass over the center line of the ball, and at the same time just clear the neck behind, as indicated in the drawing. If the table does not swivel, the tongues of the dividing head are removed, and it is set at an angle to the table. The milling machine is started, and while the tool is rotated, the work is turned through the gears of the dividing head.



Razor Honing with Emery Cloth

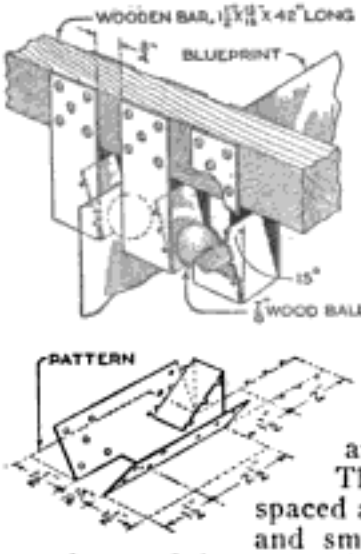
A simple way to sharpen razors and surgical instruments is as follows: Get a piece of metal tubing or wood, and split it lengthwise; fasten one half of it to a table or shelf with a screw, so that it projects, and draw a line along the exact top of the projecting portion, as a guide for the blade. A strip of fine emery cloth, wider than the length of the blade, is placed over the round piece, emery side out. Clamp the blade level, with the edge tangent to the round at the guide mark, and pull the cloth back and forth until the metal has been ground, and the fresh-ground surface reaches the edge on each side. Finish the edge with a few light strokes on crocus cloth.—H. M. Decker, Tampa, Fla.



Using a Simple Clamping Device, the Edge of a Razor can be Honed with Emery Cloth as an Abrasive

Rack for Drying Blueprints or Photos

A drying rack for large blueprints, or photographic prints, that requires no pins or tacks for suspending them, is shown in the drawing. Three or four wooden bars, of the length desired, are arranged about 1 ft. apart; each strip has attached to it a series of metal boxes, preferably of zinc, to avoid corrosion. These boxes are spaced about ¾ in. apart and small wooden balls are inserted between the boxes so that each ball bears against the back of the box in front, as indicated. The print to be dried is slipped up between the ball and the solid back of the box, where it is held securely. Pressure of the finger against the ball releases the print. —D. A. Price, Chicago Heights, Ill.

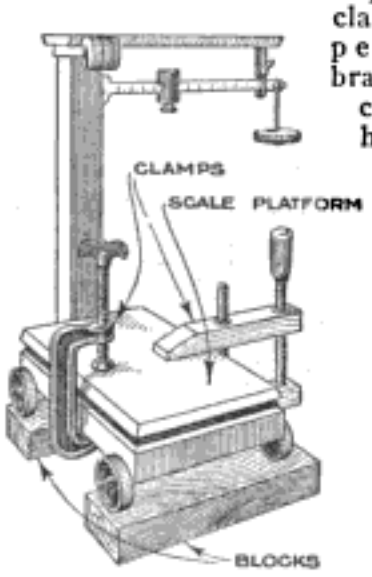


Retarding the Setting of Plaster of Paris

Citric acid may be used to prevent plaster of Paris from setting too rapidly. If the plaster is to be used in large quantities, add 1 oz. of citric acid to enough water for 100 lb. of plaster; for smaller quantities use the same proportion. Setting will be retarded from one to two hours.

Testing Screw Clamps

It is not an uncommon experience in the pattern or cabinet shop to have the work ready to be glued up and clamped with the hand-screw clamps required. The clamping is started, perhaps with a brand-new set of clamps, only to have several give way at one or both jaws; this is a particularly unpleasant experience when the room in which the gluing is being done is cold, and the nearest clamps are some distance away. With an ordinary platform scale available it is a simple matter to determine which is the weaker jaw of a wooden clamp and what pressure can be exerted through wood or iron clamps, as shown in the drawing, the pressure being indicated on the scale beam, the required amount of pressure being obtained either by adding or removing weights.



Making a Guy Wire Safe

In order to prevent employes from running into the guy wire of a telegraph pole in the shop yard, a wooden box, about 4 in. square, was built around it. The box was painted red, white, and blue, in 2-in. bands, to increase its visibility.—J. R. Minter, Washington, Ind.

Making Molded High-Tension Condensers

BY F. L. BRITTIN

MOLDED condensers have always been held in high favor by radio amateurs. Owing to its portability and absence of brush discharge, a well-made molded condenser will stand a considerable overload without break-down, and is not messy or greasy like the oil-immersed variety, which is often used, owing to the high price of the molded article. By carefully following the directions given in this article, the amateur can make for himself, at a fraction of the cost of the manufactured one, a molded condenser that will equal the results of the factory product.

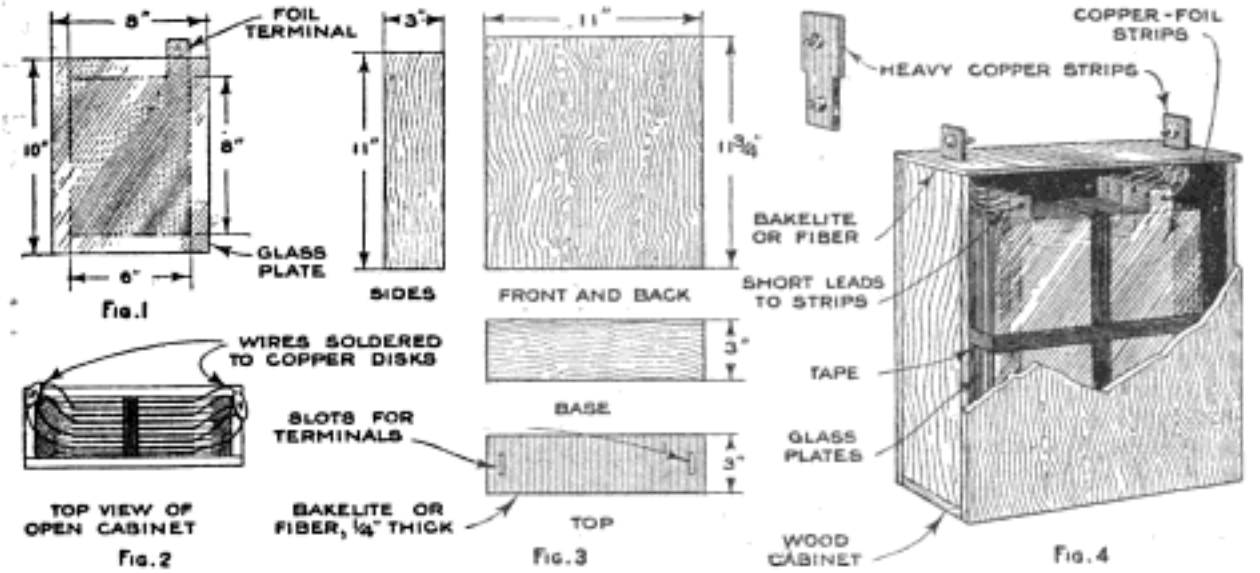
Molded Condensers are So Easily Made That Their Use should Be Universal among Amateurs

Ten 8 by 10-in. photograph plates can be obtained from any photographer, at little or no expense, from his pile of discarded negatives; these plates are glass of good quality and make a good dielectric. The gelatin emulsion on the negatives can be soaked off with hot water, and the glass thoroughly cleaned and dried.

Cut nine sheets of thin sheet copper, or if this is unobtainable, florists' foil, into pieces 6 by 10 in., allowing 2 in. at the upper end for the formation of the terminals, as shown in Fig. 1; or these terminals may be small strips of sheet copper, or brass, drilled with a small hole for connecting to the heavy copper strips. The cabinet can be made of any wood at hand, and is 3 by 10 by 11 in., inside measurement, coated inside and out with black asphaltum insulating paint; the top end should be made from fiber or bakelite, with small slots in each end, as in Fig. 3, to accommodate the terminals. The cabinet is joined together and laid flat, leaving the top cover off and with an extra piece of glass in the bottom, cut to fit exactly inside the cabinet. Then, make up the condenser unit, as shown in Fig. 4. The nine sheets of foil or copper, cut as in Fig. 1, are placed alternating with the glass plates, every other sheet of foil being reversed so that the leads, or tabs, are on opposite sides. The metallic sheets should be placed exactly in the center of the glass plates, so that there will be a 1-in. margin of glass on all sides, as in Fig. 1. If using thin foil, put small cardboard strips between the plates, at top and bottom, to allow for a free circulation of the insulating wax. Tape the unit together, as shown in Fig. 4, and place it inside the cabinet. Connect the leads to the terminals, using either the heavy copper strips shown in Fig. 4, or large binding posts. After all connections have been well soldered, the instrument is ready for the insulating compound, which is a wax obtainable from any electrical-supply house; its melting point is around 212° F., and it is the kind generally used in transformers. The wax is melted and made ready to pour on. See that the cabinet is free from all moisture, and that the unit is in its proper position in the cabinet, with a 1-in. space around the edges on the sides, and a ½-in. space at the bottom. Pour in the insulating wax and completely cover the condenser unit to within ⅛ in. of the

top; when cold and hard, place an extra piece of glass over the wax to completely cover it, and screw on the front of the cabinet.

Such a condenser is a very good size for use with a ½-kw. transformer and, if more condenser capacity is needed for higher potentials, two or more such condenser units can be made and connected in parallel-series.



Discarded Photographic Negatives, Thin Sheet Copper, or Tin Foil, Together with Other Easily Obtained Materials, are Transformed into the Condensers Necessary for the Radio Experimenter

Nonfreezing Poultry Fountain

A drinking fountain for poultry that keeps the water cool in summer and prevents freezing in winter, and also prevents pollution of the water, is shown in the drawing. A glass, or earthenware crock or jar is set into a wooden box, into the bottom of which several inches of sawdust have been placed; the space between the sides of the box and the vessel is similarly filled with sawdust. A wooden float, having a series of 1-in. holes drilled in it, is waterproofed with shellac and placed inside the water vessel, as shown.

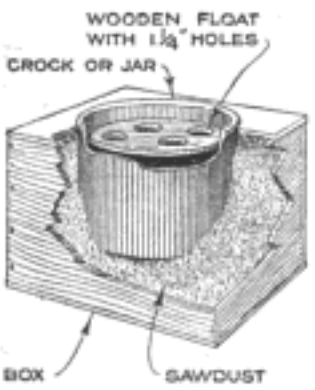
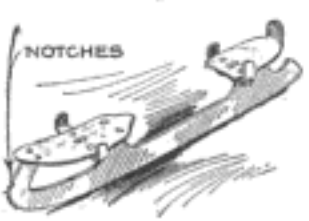


Table Mats Made of Braided Rags

Braided rag rugs are rather common and the same method can be applied in making table mats for hot dishes. Tear the rags into narrow strips and as long as possible. Then take three strips and braid them together exactly as hair is braided. The strips are braided into a continuous strip several yards long, the ends of separate strips being sewed together. Starting at the center, the edges of the braided strip are sewed together to form a circle or oval; strong thread should be used, and the braid should be sewed so that the completed mat will lie perfectly flat. Such mats may be made of any color, or combination of colors, but one of the simplest, and consequently most effective, ideas is to make the body of the mat from white rags with an outside band of some color that harmonizes with the china, or other table decorations. —Mrs. Jessie S. Hawthorne, Maywood, Illinois.

Notches on Skates an Aid to the Skater

A skater has found that by notching the point of his skates, as indicated in the drawing, he is able to make a quicker start. Several notches are made in each skate, about ½ in. above the edge of the runner, which make it a very simple matter for the skater to control his maneuvers.—Dale R. Van Horn, Lincoln, Neb.



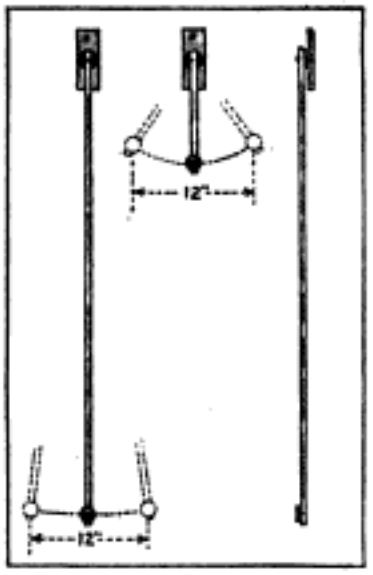
"Davy Jones' Locker" Window Display

A representation of what "Davy Jones' locker" is supposed to look like can be produced in a show window for display purposes.

A glass aquarium has about an inch of sand spread over the bottom, and a toy tin boat, about 1 ft. long, is arranged on the bottom, to present the appearance of having been sunk; then the tank is filled with a solution composed of 9 parts water and 1 of water glass, or sodium silicate. About ¼ lb. each of copper sulphate, ferrous sulphate, nickel sulphate, and cobalt nitrate are mixed and scattered into the tank. Immediately there will begin a beautiful crystalline growth that gives the appearance of a sunken boat lying in a marine garden of plants of different shapes and colors.

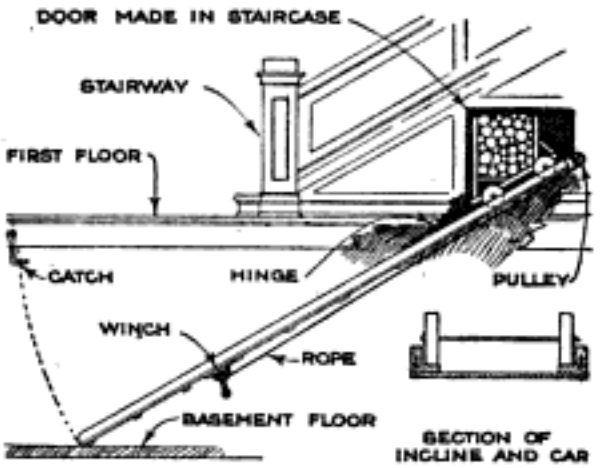
Simple Timing Pendulums

The speed at which a hand-operated cream separator is run is an important factor in its efficiency. In most separators, the crank should make 60 turns a minute, but, as the operator usually times the speed by guesswork, modified by his mood, there can be no assurance that the correct speed is being used. For counting the number of revolutions per minute a simple pendulum will be found sufficiently accurate for practical purposes and will eliminate the uncertainty. The pendulum is made by attaching a 2-oz. weight to one end of a thin strip of wood, 48 in. long. Forty-six inches from the center of the weight bore a hole large enough to permit the pendulum to swing freely on a nail, as in the drawing. Start the pendulum with a swing of about 12 in., and it will swing from side to side 60 times per minute. With the same weight, but with the hole 10 in. from the center of the weight and the pendulum started with a 12-in. swing, the rate will be 120 per minute.



An Inclined-Track Wood Lift

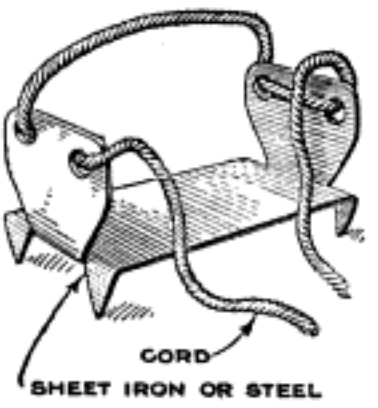
Carrying wood from the basement to the fireplace on the first floor, besides being hard work, usually results in more or less dirt being scattered over the house. The drawing shows an arrangement by which the firewood is loaded onto a truck in the basement and hauled up an incline underneath the stairway. When the car is loaded at the wood pile, it is pushed to the incline and hooked to a rope. Winding up the rope on the winch elevates the car to the upper floor, and, should it be desired, the inclined track can be raised out of the way and held against the basement ceiling with a spring catch. Opening a paneled door in the staircase gives access to the fuel.—Edward R. Smith, Walla Walla, Wash.



An Inclined Railway underneath the Staircase Provides an Easy Means of Bringing Firewood to the Upper Floor

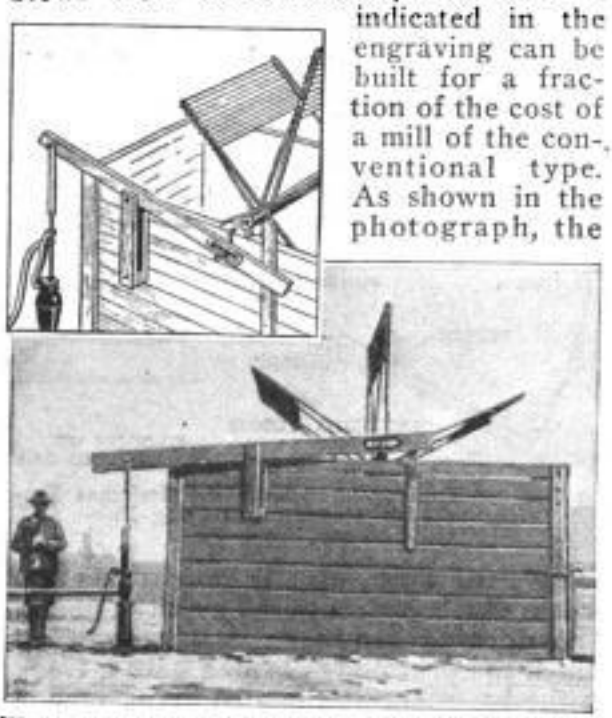
Homemade Ice Creepers

A pair of creepers that will prevent slipping and sliding of the wearer on ice-coated walks, and add to his comfort and safety, can be easily made from two pieces of No. 18 gauge sheet iron or steel, preferably the latter. The pieces are laid out and formed as shown in the drawing. The finished creepers are to be worn underneath the insteps, a suitable fastening being provided on each, to hold it securely in place.



A Cheap and Serviceable Windmill

In localities where the prevailing wind blows from one direction, the windmill indicated in the engraving can be built for a fraction of the cost of a mill of the conventional type. As shown in the photograph, the

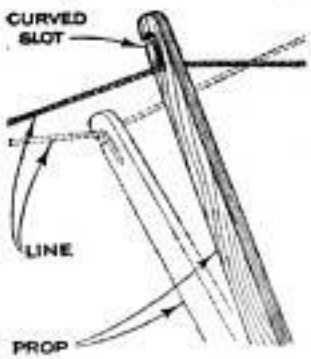


Where the Prevailing Winds Blow from the Same Direction for Most of the Year, This Simple Windmill can be Built and Operated at Practically No Expense

vanes are made of corrugated iron held in flat-iron frames which are bolted to the hexagonal axle, made by shaving down a log. The power of the windmill is conveyed to the pump, as illustrated in the detail drawing, by means of a crank in the end of the axle, which operates the wooden beam connected to it and the top of the pump rod.—Leland Perry, Cedar City, Utah.

Improved Clothesline Prop

On washday, when the wash has been hung on the line to dry, it often occurs that the clothes prop will slip from the line, particularly when the weather is windy. No matter how carefully the loaded clothesline is propped up, the swaying of the line will allow it to slip out of the usual V-notch in the end of the pole, and the freshly washed clothes are allowed to dangle on the ground. The prop shown in the drawing, unlike the usual style, will not slip from the line in the windiest weather. A curved slot, which is slightly wider than the diameter of the line and about 4 in. long, is sawed into the end of the pole, as shown; the curved end of the slot prevents the line from becoming disengaged. —Chas. Homewood, Ontario, Calif.

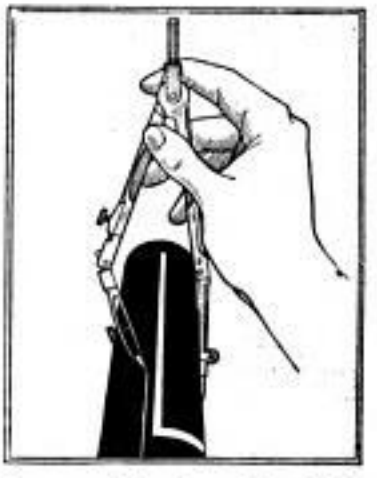


Using the Bathtub as a Print Drier

A piece of cheesecloth, about 3 ft. long and from 6 to 8 in. wider than the bathtub, eliminates the necessity of stretching the cheesecloth over frames for drying prints in the amateur's dark room, which is generally the bathroom. The cheesecloth is secured underneath the roll rim of the tub with spring clothespins, and makes a satisfactory surface for drying the prints, which are placed, face down, on it and allowed to remain until dry.—Clayton H. Smart, Hartford, Conn.

Refinishing the Bicycle

The winter is a good time to renovate the bicycle, as most owners use their machines but little during that season. The frame and rims should first be sandpapered, then the enamel to be used is thinned with a little turpentine, and a thin coat applied to the frame. When this coat has dried hard, it is rubbed down smooth with fine sandpaper. Wipe off all dust, and apply a second coat of enamel, using a camel's-hair brush.



To line the frame and give the job a finished appearance, it is not necessary to have the skill required for handling a striping brush, as a double-jointed compass with a pen point may be used. Dust with French chalk the work already enameled, and fill the pen with any color of waterproof India ink, obtainable at almost any stationery or art-goods store. Draw the lines lightly and evenly, keeping the compass point against the frame, as shown in the drawing. When the ink has dried, dust off the chalk, and apply a coat of the best carriage varnish.—Leslie S. Gillett, New York, N. Y.

Toy Balloons for Scarecrows

Fruit growers lose thousands of dollars yearly through the depredations of fruit-eating birds. In orange groves, sparrows and linnets peck out every vestige of orange flesh, and the empty orange "shell" dries on the stem. Figs and other soft fruits are worthless when even slightly damaged.

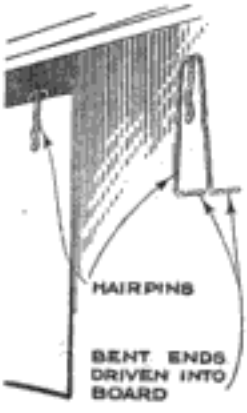
Numerous devices to scare away the feathered thieves, such as bells, clappers, and the like, have been more or less ineffective. It has been found that if hydrogen-filled toy balloons are anchored in the grove, their swaying in the breeze will keep the birds away, although they have no fear of scarecrows and noise-making devices.

Potted Plant as Flower Holder

To make a little potted plant seem like a bowl of cut flowers, plant four or five ordinary glass test tubes in the earth around the roots of the plant; they are placed in a leaning position, partly for ease in arranging the cut flowers, and partly to make it possible to change the water without completely inverting the pot. The tubes are buried in the earth so that only about ½ in. of the tops protrudes above the surface. As occasion may require, the test tubes are filled with water for the stems of the cut flowers, which are placed in them. If the plant is a flowering one, the cut flowers should, of course, be selected so as to preserve a harmonious color scheme.

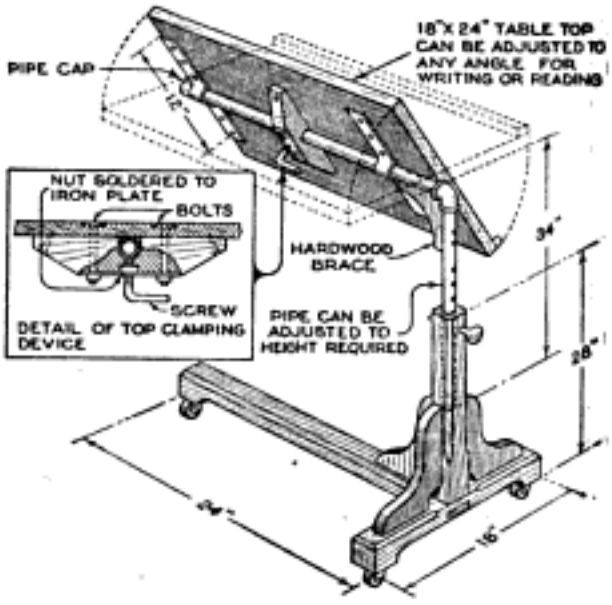
A Hairpin Clip for Bulletin Boards

A bulletin board, on which notices such as telephone calls, or other memoranda can be posted, and which may be made at small cost is shown in the drawing. A bulletin board of the conventional type and size is made from some soft wood and painted black. The board is provided with the requisite number of clips made from hairpins of the hump-back type. The ends of these are bent at right angles with a pair of pliers. The bent ends are driven into the wood with the remainder of the hairpin extending parallel with the board, as shown in the drawing.



Invalids' Bedside Table

An easily made invalids' table, such as the one shown in the drawing, will be



For a Convalescent, or for Bedridden Persons, This Bedside Table will Prove to Be a Decided Convenience

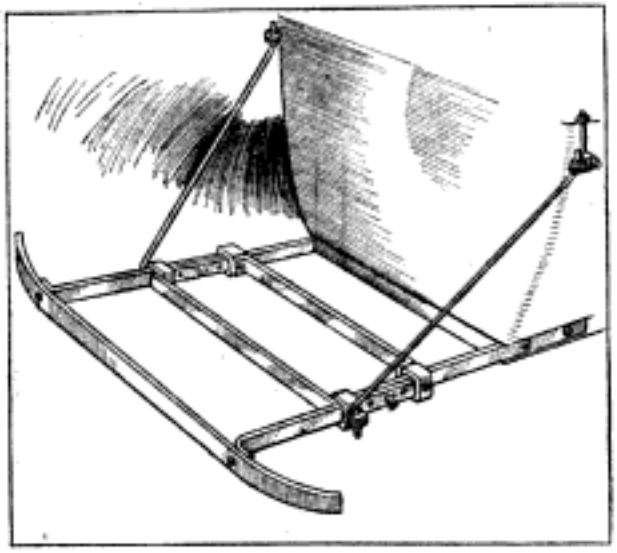
found a great convenience to the bedridden unfortunate, as he may read, play cards, and eat his food without having to juggle a tray on his body, with the ever attendant danger of spilling the contents on the bedclothing and creating an unpleasant situation.

Such a table may be made almost entirely of wood, pipe and fittings being used to support the table; the underside of the angle formed by the junction of the pipes is reinforced by a hardwood brace attached with rivets. The table top is held to the pipe with iron straps, as shown, and is clamped in any position by a turn of a screw. This clamping arrangement is merely a nut soldered to an iron plate and fitted with a screw. This is bolted to the underside of the table, in the manner shown in the drawing, so that a turn of the screw applies or releases pressure on the pipe and permits the table top to be adjusted. Holes are drilled through the vertical pipe and the standard into which it slides, and a peg is provided for adjusting the height of the table as desired. Easy-running casters are provided for the wooden standard, which is run underneath the bed, so that the patient can easily push the table out of the way.—Harry B. Mowery, Charleston, S. C.

¶Rusted bolts, etc., can be loosened by soaking in ordinary vinegar for a few hours.

Combination Bumper and Luggage Carrier

A combined luggage carrier and rear bumper, which makes a desirable addi-

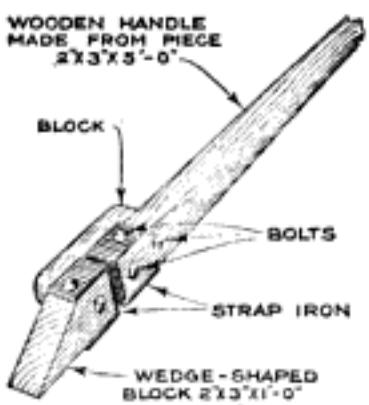


A Combined Rear Bumper and Luggage Carrier That does Not Detract from the Appearance of the Car Is of Special Convenience When Touring

tion to the automobile, is shown in the drawing. As indicated, the entire assembly is made of flat steel stock, and is arranged so that the bumper is easily adjusted by loosening a few pins. The parts are riveted together, and the luggage carrier is bolted to the chassis side rails, without drilling, by using U-bolts. Steel braces from the top brackets to the luggage carrier are used, as indicated, to strengthen the carrier. This attachment is particularly designed for cars with either cantilever or transverse rear springs.—G. A. Luers, Washington, D. C.

A Simple Wire Stretcher

For tightening the individual strands of a plain wire fence, the stretcher shown in the drawing is one of the simplest and most effective devised. The iron-shod wooden handle and wedge-shaped block are attached to a block with bolts, as indicated, so that they will be about ¼ in. apart. In use, the end of the wire is inserted in the opening between the handle and the wedge-shaped block, which is placed against the fence post. As soon as the stretcher is put in place, force is applied to the handle, and the wire is squeezed between the iron faces of the parts; continued pressure against the handle draws the wire to the desired degree of tension.—Chas. A. Black, Jr., Hightstown, N. J.



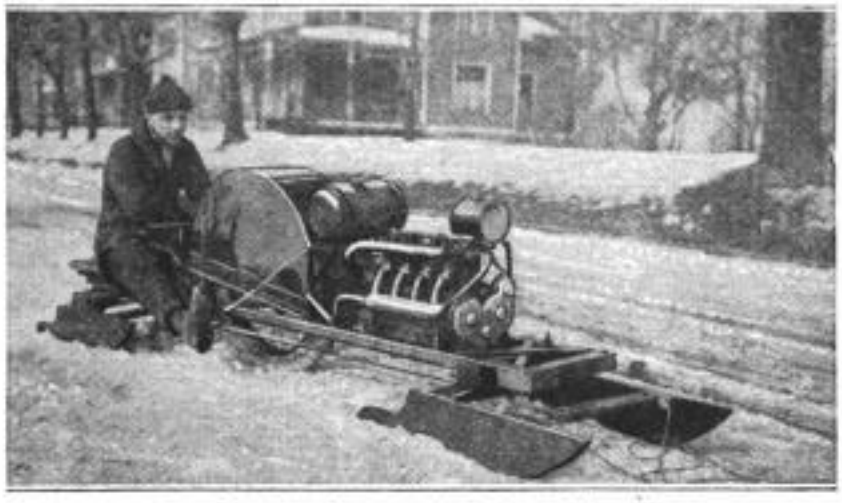
Preserving Croquet Balls and Mallets

To help preserve croquet balls and mallets, take an old felt hat and cut from it circular pieces slightly larger than the face of the mallets; these felt disks are attached to the ends of the mallets with glue and small brads. It will be found that while the felt-covered mallets are as effective in the play, they save the wood and minimize the noise produced when the balls are hit.—Mrs. Virginia B. Musgrove, Pasadena, Calif.

Prolonging Life of Dry Cells

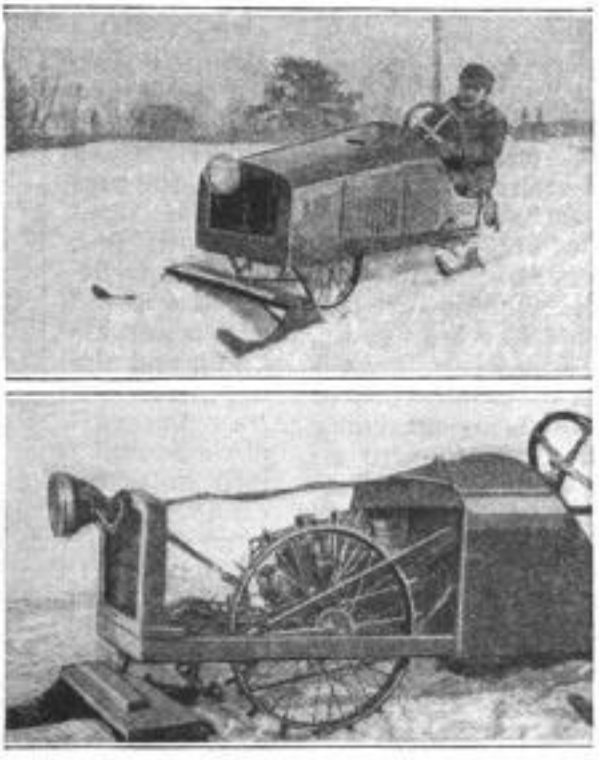
When dry cells are used for doorbells and other intermittent service, they usually dry out before their full energy has been utilized; this is prevented by furnishing moisture, as shown in the drawing. Large glass bottles are cut at the point indicated, either by pouring oil into the bottle to the correct height and plunging a hot poker into it, or by wrapping a string, soaked with alcohol, around the bottle, and igniting it; when the alcohol has burned out, the bottle is plunged into cold water. The lead wires are inserted through the neck of the bottle and separated by a cork, as shown, enough wire being left below for connecting to the cell. The cardboard carton is removed from the cell and several holes are punched through the bottom of the zinc container. The lower half of the bottle is partly filled with water, the battery is connected to the wires and placed inside the bottle which is secured together, at the cut, with a strip of tape or gummed paper.—Thos. W. Benson, Philadelphia, Pa.

FOR those who wish to build a motor-driven sled, but do not want to go to the trouble and expense of making or buying an aerial propeller, and adapting the engine to this form of drive, the illustrations of wheel-driven sleds in this article will be of value.



Driven by a Four-Cylinder Motorcycle Engine, This Sled Is Capable of Making Fast Time over Any Surface. The Frame is Made of Light Steel, and the Front Runners are Steered by Tiller Ropes from a Conveniently Located Steering Wheel

The machine which is shown in the first photograph has a light steel frame supported on oak runners, shod with round steel. The sled is driven by a four-cylinder motorcycle engine, geared to the driving wheel in the same manner as in the motorcycle. The driving wheel, which is a standard motorcycle wheel, is mounted in a U-shaped angle-iron yoke, the ends of which are attached to a crosspiece on the steel frame by means of stout hinges. A stiff spring is provided on each side of the yoke for holding the wheel to the surface, while at the same time permitting free vertical movement, thus there is no loss of traction and the sled is enabled to travel over uneven ground. The wheel is covered by a sheet-steel hood, forward of which, a little above the top of the engine, the gasoline tank is mounted on a frame made of flat iron. The sled is steered by means of the front runners, which are controlled through sash-cord steering ropes running to the steering wheel, located immediately behind the wheel hood, on the right-hand side of the sled. Foot-rests are provided on each side of the machine, and on the right-hand side, the brake lever is within easy reach of the driver's hand. The brake is simply a pointed steel lever, which digs into the ice when the hand lever is pulled back; the clutch-control lever is at the left of the driver's seat. The small tank seen on top of the engine, at the front, is a two-quart oilcan.



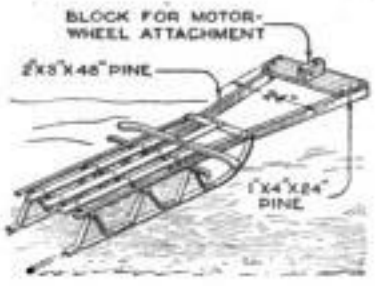
Built along the Lines of a Light Automobile or Cyclecar. This Machine is Driven by a Twin-Cylinder Motor. A Toothed Wheel, Which Adjusts Itself to the Surface Irregularities, Is the Propeller in This Type

A somewhat similar sled, though less ambitious in design, is shown in the second photograph. This machine is

driven by a twin-cylinder motorcycle engine, and is designed along the lines of a light automobile or cyclecar. The builder

A Light and Easily Constructed Auto Sled Which Consists of Nothing More Complicated than a Motor Wheel Attached to an Ordinary Coaster

has used it on both snow and ice, and found it to be an excellent hill climber. The machine is 9½ ft. long over all, and the frame is made of light angle iron, with front and rear runners of wood. The chain-driven drivewheel, which is mounted as described in the first type, has short sections of 2-in. angle iron riveted around its circumference. The sled is guided by the front runners, through a regulation automobile steering post and drag link, which is connected to a steering knuckle fastened to the runners. The spark and throttle control are regulated from the levers on the steering wheel.



The simplest type of such sleds consists merely of an ordinary "coaster," to which is attached a motor wheel. The small drawing shows the framework to which the motor wheel is fastened; for this frame two pieces of pine, 2 by 3 by 48 in., and a crosspiece, 1 by 4 by 24 in., are required, in addition to a block attached to the crosspiece, and drilled for attaching the motor wheel, which is mounted so as to permit steering. This sled has attained a speed of 20 miles an hour on a level surface.

These illustrations and brief descriptions may stimulate interest in the fascinating winter sport of motor sleighing, and will also serve to crystallize the ideas of those who wish to build such a sled, and are hesitating as to the type to select. All of these designs have been tried out and found to be successful, and it is merely a matter of the builder's choice which one to select.

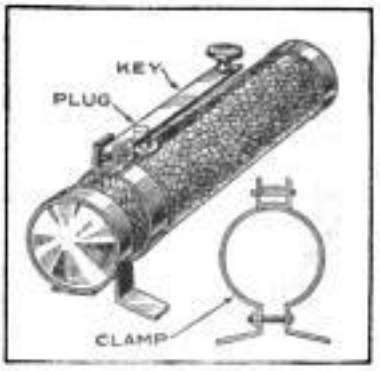
Transferring Pictures to Wood

Pictures from magazines may be transferred to wood, or other smooth surfaces, and so used in the decoration of boxes and similar objects. The surface should be given three coats of varnish and the transfer made just before the last coat has dried. Cut out the picture, trimming the edges closely. Place it, face downward, on blotting paper and dampen the back, and then on the wood, also face down. The paper backing is rubbed off in little rolls with the fingers; this is continued until the picture stands out with fair clearness; then permit the surface to dry. The picture will not be so clear, owing to the thin film of paper that covers it, and to bring out the design distinctly it is necessary to give the surface one or two coats of varnish. By this process the picture is, of course, shown reversed.

Signal Key for Flashlights

A flashlight offers a convenient means of night communication, by flashing the dots and dashes of the International or Morse codes. Certain types of flashlight, particularly those operated by a push button, can be fitted with a key which converts them into portable blinker sets.

The key may be made of any flat metal, and is secured to the flashlight by means of a clamp, as shown in the drawing, the ends of the clamp being formed into feet to keep the light in place, and prevent it from rolling. The key bar is fitted at one end with a suitable knob, and the opposite end has a small pin soldered to it, the ends of which fit into holes in the U-shaped part of the clamp. A short distance from the clamp, a small metal plug is soldered to the under side of the key bar, for depressing the flashlight button. No auxiliary spring is needed, as the spring of the button is sufficiently strong to raise the key.—George E. Perkins, South Bound Brook, New Jersey.



¶By nailing discarded bottle caps to a board of the required size, a cheap and efficient foot scraper is easily made.

A Windshield-Cleaning Cloth

To prevent the accumulation of moisture on automobile windshields, the glass is rubbed with a tar-coated cloth. This cloth is made from a piece of cheesecloth, a yard square, which is coated with melted tar, applied with a brush. After the tar has cooled, fold the cloth until it measures about 4 by 6 in. To use, wet the glass and rub briskly with the cloth that part of the windshield it is desired to keep clear. This will prevent moisture from accumulating and keep the treated part of the glass clear. Do not wash the glass after the cloth has been applied and the water on it has dried.—F. C. Davis, St. Joseph, Mo.

A Coal Truck for the Furnace Room

A truck, consisting of a sheet-metal box mounted on casters, and with one side hinged so that it can be dropped parallel with the bottom, as shown in the drawing, provides an efficient and cleanly method of transporting coal from the pile to the furnace door. The side is raised when the truck is being filled at the coal pile, but when the truck is wheeled up to the furnace door this side is released and drops down, so that the coal may be easily shoveled from the truck into the furnace.

Substitute for Prepared Canvas

An artist, who was painting in the country, exhausted his supply of prepared canvas, and not wishing to wait for more from his base of supplies, cast about for a substitute. Thus he discovered that cream-colored window-shade cloth, which he obtained from the upper ends of some discarded blinds, answered the purpose admirably. The fabric was cut to the size desired, and the corners fastened to a drawing board with thumbtacks. It took the oil colors in good shape, and aside from lacking the characteristic canvas texture, the results were as good as though canvas had been used.

Celery Grown in Drain Tiles

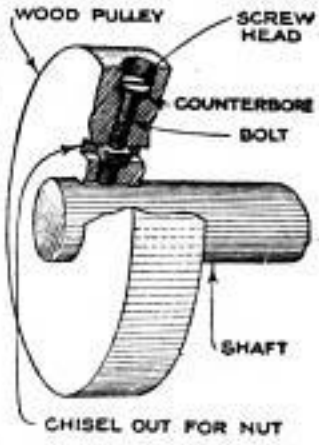
During last summer, an Ohio gardener placed on the market celery of such a crisp and delicious nature that immediate sale was found for his entire crop. This superior celery was obtained by blanching it in ordinary drain tiles.

By Blanching Celery in Drain Tiles the Time and Labor Costs are Reduced

This method of culture calls for a slightly different plan of planting than the usual, the sets being placed in wider rows, which, however, may be several stalks wide. The plants are set about 6 or 8 in. apart, so that the tiles may be placed over them when they reach the proper height.—C. M. Baker, Wooster, Ohio.

Fastening Wooden Pulleys to Shaft

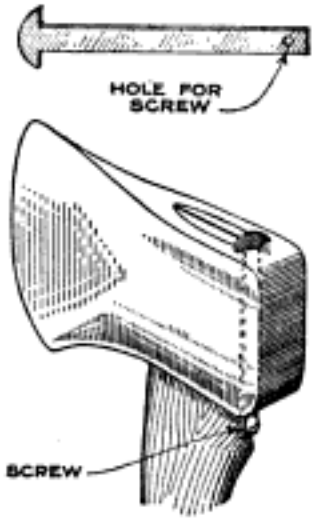
Wood pulleys for experimental purposes can be attached to shafts without injury, and can be moved along to any point almost instantly, by means of the setscrew arrangement shown in the drawing.



The center hole of the pulley should be made a close sliding fit on the shaft used. A machine screw and nut will be required, the former being inserted into a hole which is counterbored to accommodate the head, as shown. The nut is inserted into a slot cut with a sharp knife, or chisel. In use, the pulley is slid onto the shaft, the nut inserted, and the bolt turned with a screwdriver until it picks up the nut and tightens the pulley on the shaft.—Curtis Ralston, Chicago, Ill.

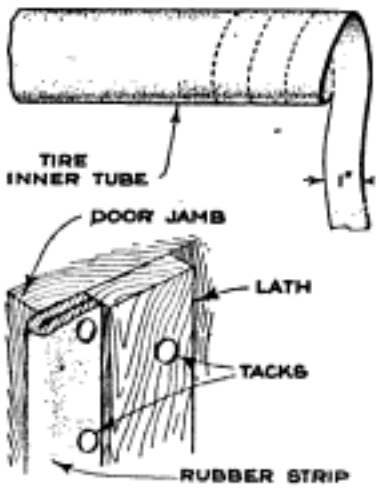
Holding Ax Heads in Place

It is not always possible to tell when an ax head is fastened securely enough to prevent the possibility of accident, especially when using a heavy ax in winter; but by using the simple method shown in the drawing, the ax may be made permanently safe. A pin is made of 1/16-in. sheet iron to the pattern shown, and after the head has been wedged in place, the pin is driven in until the shoulder bears against the head. A screw is then driven into the handle through the hole in the pin; this will keep the head from flying off, even if the wedges loosen and drop out.



Weather Strip Made from Inner Tubes

Old inner tubes may be cut into lengths and used as weather strips around doors and windows to prevent the entrance of cold air into the house, thus conserving high-priced coal. The tubes are cut into spiral strips, about 1 in. wide, with a pair of scissors. These strips are then folded lengthwise and tacked to the door jamb; they may be reinforced by tacking ordinary lath behind them, as shown in the drawing.—W. S. Hutton, Fornfelt, Mo.

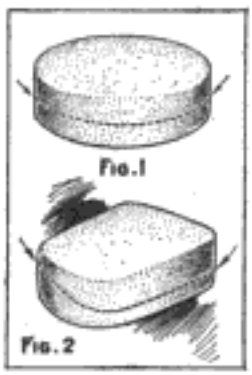


Vases from Orange Rinds

Charming vases that are peculiarly suitable for short-stemmed blossoms, such as pansies and violets, are easily made from orange rinds. The oranges are cut in halves and the pulp scooped out, without breaking the skin. The hollowed-out rinds are buried in a box of dry sand, in such a way that the shape is retained. Place the box of sand in a warm place and allow it to stand for several days, or until the rinds have dried thoroughly. To make these novel vases stand upright, the bottoms are rubbed flat with sandpaper. The naturally fine, deep color of the vases is considerably enhanced by a single coat of varnish.

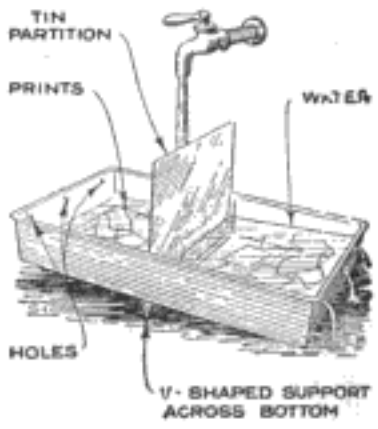
An Inexpensive Arch Support

Many persons suffer discomfort when changing from ordinary shoes to heelless, rubber-soled shoes. An inexpensive device that will allay this can be made from a porous rubber sponge. The sponge is divided as shown by the dotted line in Fig. 1, and one piece is adjusted underneath the arch of each foot. The sponge will keep its position without attachment to the sole of the shoe, and can thus be used in several pairs of shoes. For those who are inclined to run over the heels on the side, a rectangular sponge is cut diagonally, as shown in Fig. 2. The cellular structure of the rubber sponge provides ventilation and gives a gentle springing lightness to every step.



Easily Made Print Washer

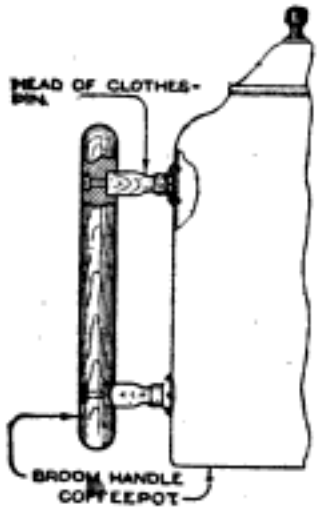
Amateur photographers will find the print washer shown in the drawing quite effective for removing hypo from their prints, after fixing. The washer is made from an oblong tin tray, with a vertical tin partition in the center. A V-shaped piece of tin is soldered at the center of the underside, so that the washer can rock back and forth, and holes are made, near the upper edge, in each end of the tray, as shown. In use, the washer is set in the sink so that the vertical partition



will be under the center of the faucet, the unwashed prints are placed in the tray, and the water is turned on. As one compartment becomes filled the weight of the water causes it to fall and elevate the opposite end; at the same time the position of the partition is changed and the water is diverted into the empty part. As soon as a part of the water has run through the holes in the compartment first filled the washer tips over again, the operation being repeated as long as the water is allowed to run.—Wm. Underwood, Tunnel Hill, Ill.

Repairing the Coffeepot Handle

To save the price of a new coffeepot, the household handyman replaced a burnt handle by a new one in a few minutes. The new handle was made from a piece of broom handle, and holes were drilled at the proper locations to take the bolts; these were counterbored for the bolt head and for the clothespins which were used as spacers. The heads were cut from two clothespins, and they were drilled through the center, as shown, to slip over the bolts. After all the parts had been sanded and smoothed off, the handle was assembled as indicated in the drawing.—Chester Disque, Covington, Ky.



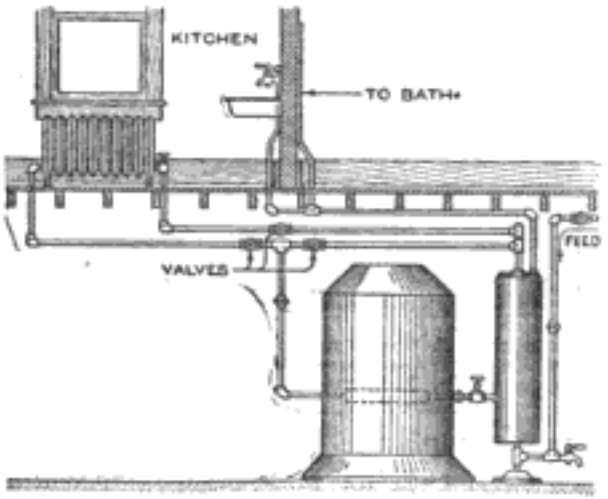
Avoiding Pump-Rod Breakage

To avoid the breakage of windmill pump rods in frosty weather, attach the rod to the windmill mechanism with a piece of chain a trifle longer than the stroke of the pump, if the rod with its fixed attachments is heavy enough to drop of its own weight, and fast enough to prevent the chain from slackening on the downstroke; if it drops too slowly, the mill will jerk on it when the chain tightens on the next upstroke.

With the rod heavy enough to keep the chain tight, as is generally the case, the pump will operate in normal weather. In frosty weather, when the rod begins to stick, it will finally stop at the top of the stroke, and the mill can run on without bending or breaking the rod.

An Auxiliary to the Heating Furnace

In order to reduce the consumption of coal required to keep his kitchen range going, a householder disposed of the range and installed a gas range in its place, the kitchen being kept at an even temperature by a hot-water radiator, which was connected to the furnace and hot-water supply system, as shown in the drawing.—J. A. Pearce, Camden, N. J.



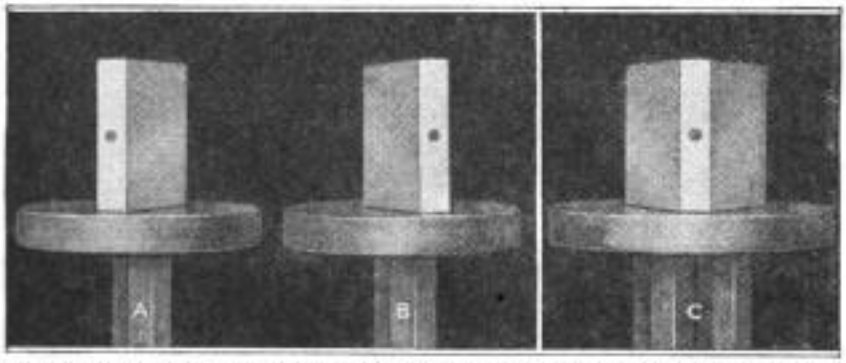
By Removing a Coal Range in the Kitchen and Substituting a Hot-Water Radiator, Several Tons of Coal were Saved by a Householder

A Convenient Lunch-Counter Sign

Instead of repeatedly answering the question as to what kinds of pie are available, the lunch-counter attendants may go on serving their customers without having to stop and give the customer a verbal pie list, if a sign like the one shown in the drawing is used. The name of each item is painted on a hinged panel, the lower part of which is firmly attached to the back; a button holds the upper part in position so long as that particular article is on hand. When the supply of any of the items is exhausted, the button is turned, and the upper half of the panel allowed to drop and cover the lower half, as shown, thus keeping the list up to the minute.

If Our Eyes Were Six Feet Apart

Does one's right eye see what the left eye sees? Certainly not, since it is not at the same place. The eyes are approximately 2½ in. apart, and so have different viewpoints of the same object. Let an object be photographed with the camera in a certain position and let a second photograph be taken from a point 2½ in. to the right of the first position. These two views will correspond to the views as seen by the left and right eyes, respectively. A close comparison will show the difference. The mechanism of vision is such that the two impressions merge into a single effect, and the object is seen in perspective as a solid body in a depth of space.



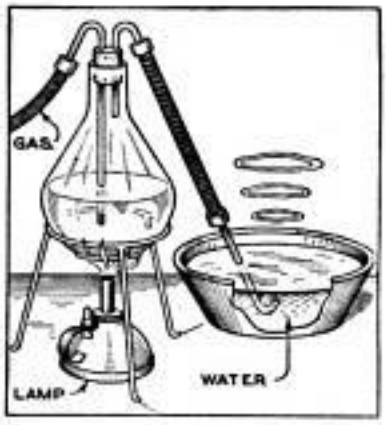
Photograph A Shows a Wooden Block as It would be Seen by the Right Eye Alone, If Our Eyes Were Six Feet Apart; B Is the Block as It would Appear to the Left Eye Only, While C Shows How It would Look could Both Eyes, Six Feet Apart, be Used Simultaneously

Individual views of a block of wood as it would be seen by separate eyes 6 ft. apart, are given in photographs A and B. The former was taken from a point 3 ft. to the right of a point 6 ft. in front of the object, and the other from a similar point to the left of the object. These two photographs accentuate the difference in the views as seen by the two eyes of an individual. To merge these two photographs into one, so as to give an effect of depth and solidity is simple. Select two large spools, holding them close against the eyes and looking through the holes of the spools so that the right eye sees only photograph A, and the left only B, as shown in the drawing. In a moment the objects will appear to move toward each other and there will appear to be but one object standing out in space in a rather startling way. The effect will be somewhat as indicated in photograph C, which is a print made from the superposition of the negatives from which prints A and B were made, except that C lacks the appearance of solidity and depth. Such would be the appearance of the block of wood if one's eyes were 6 ft. apart.

In the absence of a stereoscope one may regard the usual type of stereoscopic view through a pair of spools as described, provided the card upon which the pictures are mounted is cut in two and the two photographs interchanged so as to place on the right side the photograph that was originally on the left side of the card, and vice versa. The picture as thus seen in perspective will, however, be reduced to apparently miniature dimensions, whereas when viewed through the common type of stereoscope it is magnified.—L. Pyle, St. Louis, Mo.

A Self-Igniting Gas

One of the most interesting of simple chemical experiments is the making of a gas which ignites spontaneously on exposure to the air. A glass flask is fitted with a cork bored to take two bent pieces of glass tubing, one piece being long enough to reach within a short distance of the bottom of the flask, the other one coming just below the cork. The flask is about half filled with a strong solution of sodium or potassium hydroxide, and a piece of yellow phosphorus, about the size of a pea, is added. These materials must be prevented from coming in contact with the skin, as, owing to their caustic character, burns would result. The longest glass tube is connected to the house supply of gas, and the other is joined to a length of rubber tubing at the opposite end of which is inserted a second piece of glass tubing, as indicated; this is submerged in a basin of water. The flask is supported on a stand, and a



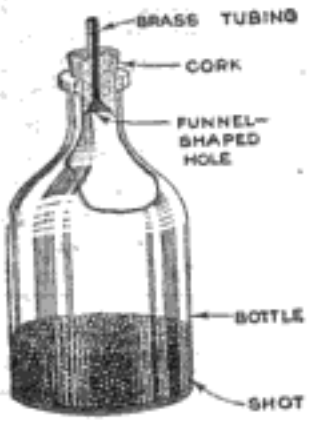
lighted alcohol lamp is placed underneath. The gas is turned on, and, as the solution in the flask begins to boil, the resulting mixture of gas and vapor is forced through the tube submerged in the basin. As soon as the bubbles reach the surface of the water they burst, and appear as rings which ignite as they come into contact with the air.

Corrugated Cardboard for Insulation

Corrugated cardboard of the kind used for packing cases can be used for insulating buildings against the cold, such insulation being particularly desirable in barns and poultry houses. The boxes are opened along the joints and flattened out, the material being applied with short nails and tin washers, such as used for the application of roofing paper.

Bottle for Loading Air Rifle

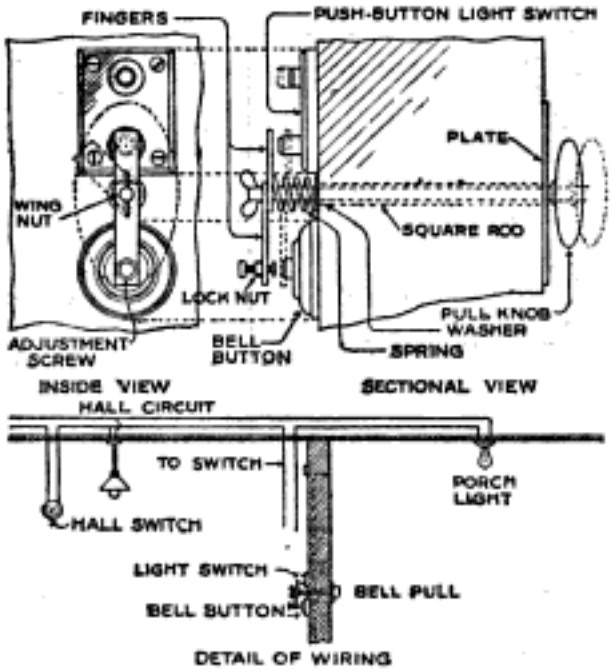
A loader for magazine air rifles, which drops the shot, one at a time, into the magazine, is made from a bottle, for holding the shot, and a short length of metal tubing, just large enough for a shot to pass through. A hole is made through the center of the cork to permit the insertion of the tube. This is pushed through to within ¼ in. of the bottom of the cork, which is scooped out to make a small funnel, as shown in the drawing. The stopper is inserted in the neck of the bottle containing the shot, and the rifle is loaded by placing the outer end of the metal tube in the magazine opening and inverting the bottle.



Ringing the Doorbell Switches On the Porch Light

A doorbell button that switches on the porch light and rings the bell simultaneously, makes it possible to identify nighttime callers before the door is opened.

A hole is drilled through the wall, and if an old fashioned bell pull is unobtainable, a door knob may be attached to the end of a piece of square rod, which should extend through the wall and about an inch on the inside when the knob is against the outside of the wall. A small hole is drilled and tapped in the inside end of the rod. A flush push-



Pulling the Knob Rings the Doorbell and Turns On the Porch Light, Making It Possible to Identify Night Callers before Opening the Door

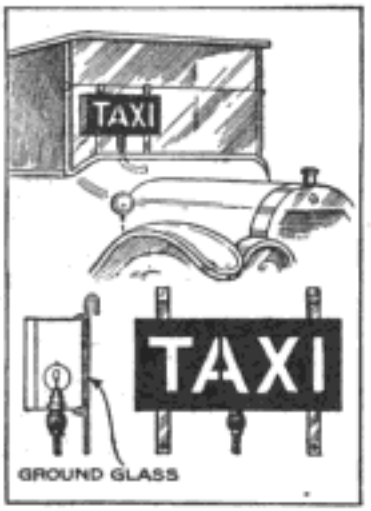
button switch is set into the wall about 1 in. above and in line with the hole; the bell button about the same distance below. The switch should be arranged so the lower button turns on the light.

Measure from the threaded hole in the end of the square rod to the switch and bell buttons. Make two iron fingers to conform to these measurements and drill a hole at one end of each for attachment to the rod with a wing-headed screw. A smaller hole is drilled in the lower end of the bell-button finger, to take an adjusting screw and locknut. A washer, or plate, having a square hole in the center, should be attached inside the wall to prevent the shaft from being turned and making the device inoperative. Before attaching the fingers, a light spiral spring is slipped over the rod between them and the wall for returning the knob to its original position for the next caller.

When the knob is pulled outward, the push button is depressed, ringing the bell; the switch button is pressed in, and the porch light is turned on, both at the same time. When the knob is released, the bell ceases to ring, but the light continues to burn. When the call is answered, the top button of the switch is pushed and the light turned off. During the day, the switch finger is turned to one side, permitting the bell to be rung without operating the switch.

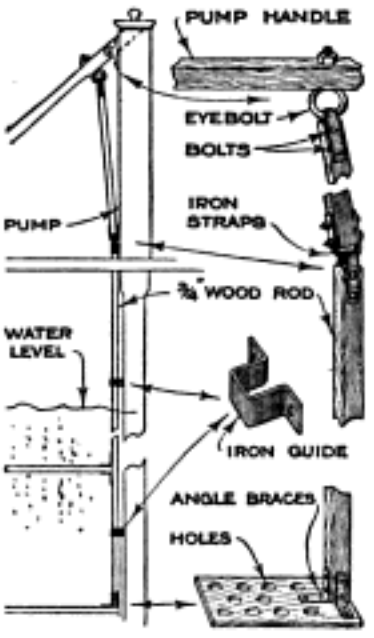
Illuminated Windshield Sign

An enterprising taxicab owner rigged up the electrically illuminated sign shown in the drawing, to indicate the fact that his car was available for public use. A tin case contains an electric globe which is connected to the battery by a dash socket. The word "taxi" is cut out of the metal front of the box, and a piece of ground glass behind the letters makes the word conspicuous at night when the lamp is lighted. Hooks are provided at the top of the sign, by which it is hung inside the windshield, as shown in the drawing.



Agitator Aerates Well Water

On account of its lack of motion, and being shut off from light and air, the water in some wells becomes stagnant, this condition being apparent by an objectionable taste and odor that are imparted to the water. By equipping the pump with the agitating device shown in the drawing, the water is stirred up and mixed with air at each motion of the pump handle, and stagnation is prevented.



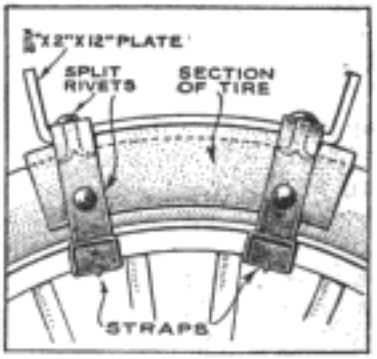
An eyebolt is inserted into the pump handle 3 or 4 in. from the pump, and a short length of wooden rod is secured to the eye with a closely fitting iron strap; this short length of rod is attached to a longer rod by means of iron straps, in the manner indicated. The lower rod should extend about 2 ft. below the high-water level of the well, and have a wood, or metal agitator attached to its lower extremity by angle braces; a similar agitator is placed 4 or 5 in. below the water level. Both agitators are drilled with holes to permit freer circulation of the water. At each movement of the pump handle, the agitators are worked up and down from 3 to 5 in., agitating and aerating the water.

Pillows of Pine and Balsam Needles

Pillows filled with the needles of evergreen trees provide a fresh and agreeable perfume. The needles are stripped from the branches while green, or if this is not desired, the branches are laid away until the needles can be shaken off on a sheet.

A Traction Shoe for the Auto

To make a sand or mud shoe, for pulling the automobile from a hole or ditch, cut a 12-in. section from an old wagon tire, or similar piece of iron, and after bending it to the shape shown, drill and rivet it to a section of old casing. Two straps added to the device provide a means for holding it onto the wheel, as shown in the drawing. Two or more of these shoes can be carried on the car, and can be applied even though the wheels are hub-deep in mud.



Second-Sight "Mystery"

Popularly, it is only the seventh son of a seventh son who is gifted with second sight, but by resorting to one of the tricks of the magician's trade, anyone can tell with absolute certainty the name of an article held before his blindfolded eyes.

Behind the curtain, the magician's assistant is equipped with an ordinary telegraph key, or push button, which is connected in series with a battery to the primary of an induction coil. Concealed wires run from the secondary winding to inconspicuous metal plates, 3 or 4 in. in diameter, on the stage floor. The magician must have metal heels on his shoes

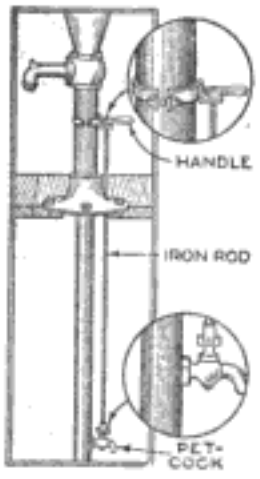
and stand with one heel on each plate. The assistant behind the screen may be equipped with a pair of field glasses, and then, when an object is held up to be identified by the blindfolded magician, its identity is conveyed to him by a series of shocks, in the form of dots and dashes, from the man behind the curtain, who is manipulating the key, or button, as a telegrapher.—L. H. Farinholt, Baltimore, Maryland.

Mandolin and Drum Effects on Piano

Passable imitations of a mandolin and snare drum are easily obtained on the average piano. The mandolin effect is obtained by placing a thumbtack on that part of each hammer which hits the string. The drum imitation is obtained by placing a sheet of paper, about 8 by 12 in. in size, between the hammers and strings of the first octave. By placing a thumbtack on alternate hammers in combination with the paper, the sounds of the piano, mandolin, and drum are produced simultaneously.—John J. Bormida, Jersey City, New Jersey.

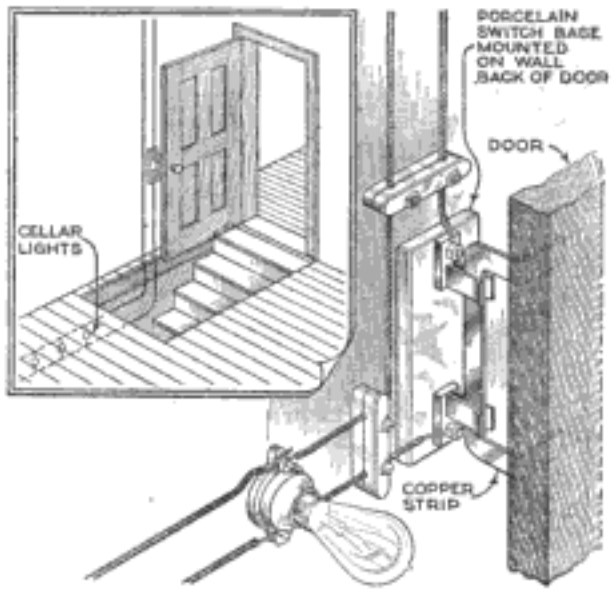
A Handy Pump-Vent Attachment

To prevent pumps from freezing, by draining out the water that remains inside the cylinder, it is usually necessary to pull up the pump. The drawing shows a simple and most effective arrangement for draining the pump by merely turning an exposed handle. A hole is drilled and tapped near the bottom of the pump to take an ordinary petcock, which is operated from the surface by means of an iron rod, the forked end of which is fastened to the petcock handle with a rivet, or pin; a small hole must also be drilled in the pump base to accommodate the rod, as indicated. A simple clamp, fastened around the pump with stove bolts, is provided with a bracket through which the upper end of the rod passes; this end of the rod is filed square to take the operating handle, which may be removed as desired. When it is desired to protect the pump against freezing, the petcock is opened, and the water in the cylinder is permitted to run out.



Cellar Door Operates Light Switch

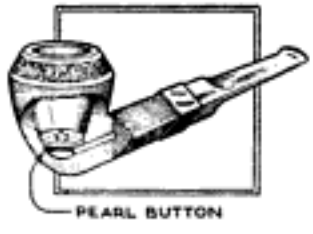
To prevent the cellar lights from burning all night through the oversight of some one who forgets to turn off the switch, the cellar door can be made to switch the lights on and off, since one rarely, if ever, forgets to shut it. A single-pole, porcelain-base switch is used for the purpose by removing the switch lever, and attaching an extra clip, as shown. This altered switch is mounted on the wall of the stairway, at the rear of the door, where it will be out of the way, and is connected to the circuit as indicated. A stationary switch bar is formed from a strip of stiff sheet copper or brass, and mounted to the back of the door directly in line with the switch clips, with which it engages and completes the circuit when the door is opened.



A Simple Switch for Cellar Lights, Which Prevents Any Possibility of Lights Burning When the Cellar Is Not in Use

Button Prevents Sucking Tobacco through Pipe

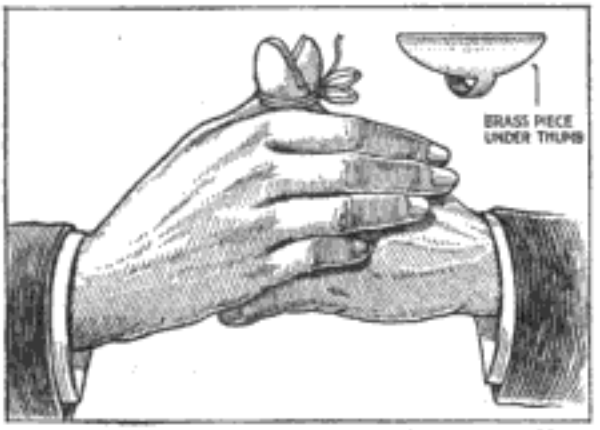
Frequently the opening in the bottom of a pipe bowl becomes so enlarged through careless cleaning, that small shreds of tobacco are sucked through the stem; the same thing happens when the tobacco runs to "shorts," that is when the longer shreds of the mixture in the pouch have been used. In order to overcome this fault, it is only necessary to insert a



perforated button snugly into the bottom of the bowl, as shown in the drawing. Such an arrangement permits the shortest kind of tobacco to be smoked without "slugs" being drawn into the mouth. If the pipe is of the bulldog, or curved, variety, the application of the button converts it into a reservoir pipe.—R. F. Hamil, Elkins, W. Va.

The Magic Thumb Tie

The prestidigitator crosses his thumbs and requests some one from the audience



"There Are Tricks in All Trades;" Catching a Hoop on the Arm, with the Thumbs Tied Together, Is One of the Magician's Tricks

to tie them together with a piece of tape, as shown in the drawing. A hoop is then thrown at the performer and, to the surprise of the audience, it is seen hanging upon one of his arms, although his thumbs are still securely tied.

The explanation of this, like most other tricks of legerdemain, is simple. A piece of sheet brass, or heavy tin, is made into the ring shown in the small drawing, to fit over the right thumb, the broad portion being next to the ball of the thumb; the tape is tied around this ring, the thumbs being crossed, so that the ring is on the underside of the thumb and quite without the knowledge of the person tying the knot. To minimize the possibility of detection, the ring is painted a flesh color. When the hoop is thrown, the performer quickly removes his thumb from the ring, catches the hoop on his arm and slips his thumb back into the ring too rapidly to be detected.—George N. Sleight, Saugatuck, Mich.

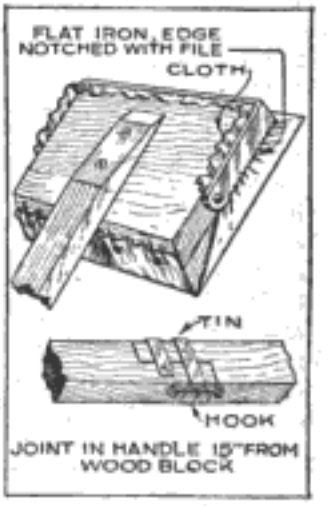
Enameled and Plated Traps

An Adirondack trapper has had several of his traps nickelplated, for setting in the snow, the outside surfaces being polished. It is his theory that plain iron traps, in spite of all treatment, still retain a slight iron odor. Also, the iron trap shows dark against the snow and is more likely to cast shadows, even in moonlight.

A similar experiment, which gave good results, consists in enameling otter traps brown. Otter traps are set under water, and the brown traps are more nearly the color of the stones and débris in which they are set, and no particular care is necessary in setting them, while black-enameled traps must be carefully concealed.—R. S. Spears, Little Falls, N. Y.

Cleaning Windows from Inside

By means of the simple device shown in the drawing, the outside of windows can be cleaned easily. Two blocks, one of which is slightly larger than the other and is beveled on three sides, are nailed together. One edge of the smaller block is provided with several sharpened hooks, and a light iron "latch" serves to fasten the wiping cloth tightly over the beveled edges, as indicated. The block is attached to a two-piece handle which is prevented from coming apart in use by a small hook and eye. The device is used from inside the room, the projecting beveled edges of the lower block making it possible to reach into the corners easily.—Frank E. Leitch, Brooklyn, N. Y.



Moisture on Spark Plugs Forms Short Circuit

Sometimes, on a hot summer day, the motorist is unable to get his engine going after prolonged effort, and just as he is about to give up and call the trouble man, the engine starts up. This is caused by the condensation of moisture around greasy spark plugs, when the car is kept in a place that is at a lower temperature than prevails outside. This moisture will cause a short circuit and make it next to impossible to start the engine. The remedy is to wipe the spark plugs clean and dry, and prevent the accumulation of grease on the engine.—L. A. Engel, W. Concord, N. H.

OPPORTUNE ANNOUNCEMENTS

Whenever prize competitions mentioned on this page are conducted by a public institution, the name and address will appear with the announcement. Industrial addresses will not be published, but may be obtained from our Bureau of Information by request, mentioning the title of the article and date of publication.—Editor.

RESUME BELGIAN PRIZE CONTEST ON ELECTRICAL SUBJECTS

Resumption of the international triennial prize contest, inaugurated by the Fondation George Montefiore, Liége, Belgium, and interrupted during the war, is now announced for the present year. The prize, this time of 20,000 francs (at normal exchange about $4,000), is to be awarded for the best original work on the scientific advancement and technical application of electricity. Mere compilations or popular versions of the subject will not be acceptable. Manuscripts, typewritten in English or French, may bear the author's signature, or may be accompanied by an envelope containing his name and address, and must be in the hands of the institution's secretary before April 30, 1921. The decision will be made by a jury of 10 electrical engineers, five Belgian and five from other countries. The competing essays will be published in the engineering bulletin of the Montefiore Institute.

CADETS AND ENGINEERS NEEDED FOR COAST-GUARD SERVICE

Beginning January 3 at a number of points throughout the country, examinations will be held by the U. S. Coast Guard for cadets and cadet engineers. Successful cadet candidates, between the ages of 18 and 24 years, will be appointed at $780 a year plus one daily ration, given three years' training at the Coast Guard Academy at New London, Conn., including extended practice cruises, and graduated as ensigns. The three-day examination covers subjects requiring the equivalent of a high-school education. Cadet engineers, 20 to 25 years old, require an additional half-day examination in mechanics, electricity, and steam engineering. They are appointed at $75 a month and one daily ration, and become engineering ensigns after one year at the academy. There are many vacancies in both ranks, and appointments will be made about six weeks after the examinations.

STUDIES ON EFFECTS OF MUSIC ARE ELIGIBLE FOR PRIZE

The effect of musical stimuli on the mental, moral, and physical processes of human beings is the facinating subject for the best treatise on which a prize of $500 is offered by the American Psychological Association. The closing date of the contest is May 31, 1921, but researches completed during 1919 are eligible. Although certain specialized topics are suggested by the association, wide latitude is permitted the writers, the only requirement being that the research bear directly on the nature of music, and its influence, a subject upon which little authoritative information has been collected. One interesting phase of the discussion is the experimental study of music as an aid in synchronizing factory routine. W. V. Bingham, at the Carnegie Institution of Technology, Pittsburgh, will receive manuscripts without the authors' names, and forward them to the committee of award.

BALLOON-OBSERVER STUDENTS GET SALARY IN SCHOOL

Even in these days of opportunity, it is not often that young men are paid a good salary while being taught a brand-new technical profession. The present need of the U. S. Army for balloon observers, however, offers just such a chance, without requiring army affiliation, to 250 unmarried young men, from 20 to 27 years old, who have a high-school education and the variety of courage needed for aerial work. Accepted candidates will get their board and lodging, clothing, equipment, and medical and dental attention free, and receive $75 a month while pursuing a course of about 10 months. A new class starts every four months. The studies are interesting and quite technical, including balloon fabrics and cordage, operation and repair, gasoline engines, electricity, telephone and radio, manufacture and use of hydrogen and other gases, aerostatics, map reading, aerial photography, drawing, and the use of arms and artillery. Graduates will be commissioned as second lieutenants, put on the inactive list, and discharged as cadets. Returning to civil life, they will be qualified for good places in the coming development of dirigibles, and if called into service at any time, become second lieutenants in the Air Service.

Advance Students in Practice Work, Bringing Down an Observation Balloon to Escape an Airplane

FRENCH FOREIGN-TRADE BUREAU HAS AMBITIOUS PLANS

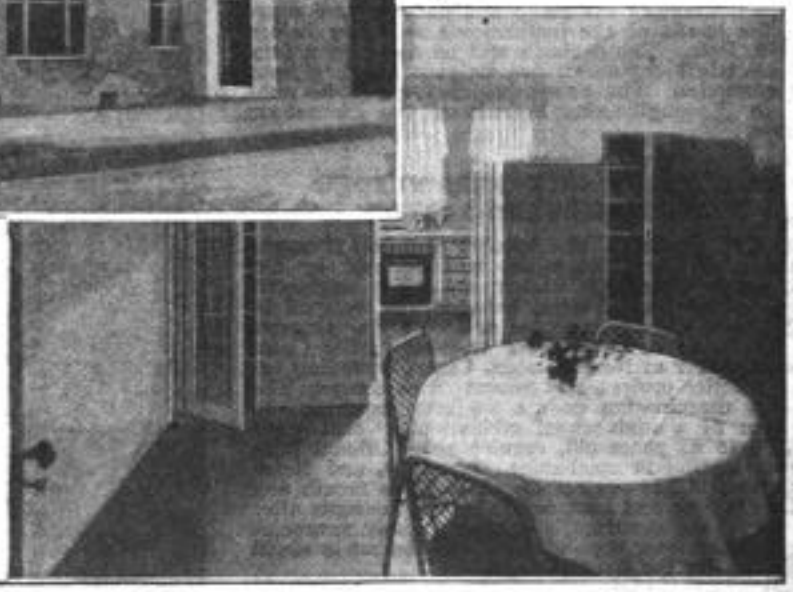
Still operating under the old name of "Office du Commerce Exterieur," the recently reorganized foreign-trade bureau of France is already undertaking a number of new activities of a most ambitious and interesting nature. Besides an inter-allied exhibition, planned to be held in Paris in 1925, and a colonial exhibition at Marseilles in 1922, a touring fair is being prepared for Canada, and permanent displays are being arranged for branch offices in all important foreign countries, many of which are already open. A periodical organ is to be published, and trade information is being supplied both in loose-leaf pamphlets and by informal correspondence. The bureau controls the service of French commercial agents, and has the financial backing of a new foreign-commerce bank.

RAILROAD MAINTENANCE WORKERS DRAW LARGE CASH PRIZES

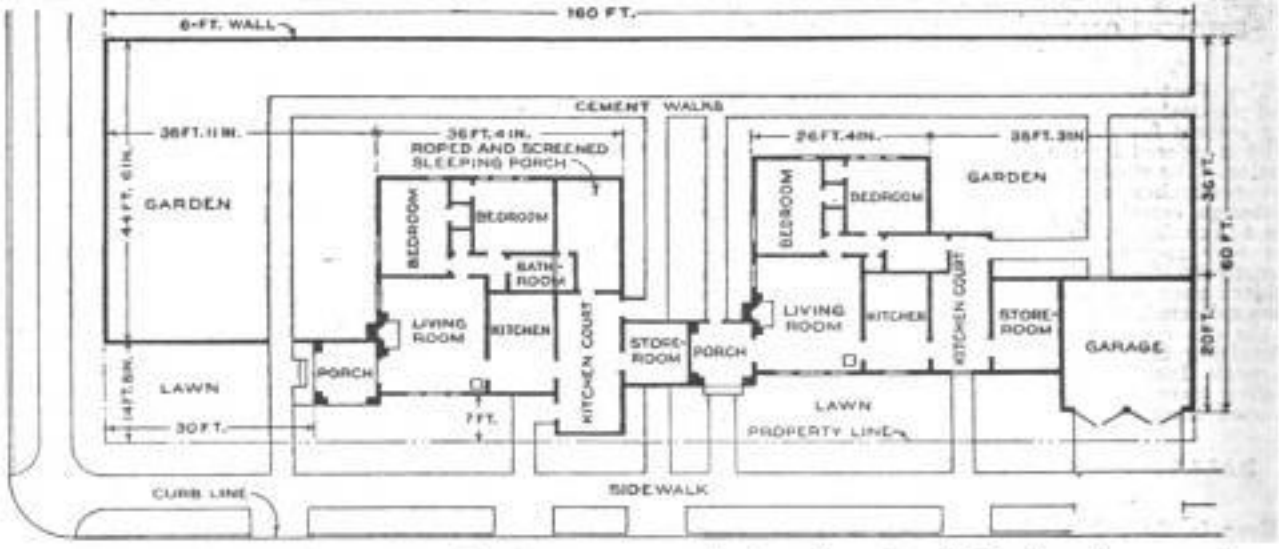
Maintenance workers on the Pennsylvania railroad system recently participated in an interesting distribution of cash prizes, of sufficient value to make working for them well worth while. For maintaining the best section of track through the year, the section supervisor received $800, and his assistant, $400. For the greatest improvement in line and surface in a section, the prizes that went respectively to the supervisor and the assistant were $700 and $300. Three other split prizes, of $600 and $200, were given to supervisors and assistants for the best line and surface in certain specified divisions. To check this maintenance work, the lines are inspected once a month.

PUEBLO-TYPE COTTAGES ARE CEMENT THROUGHOUT

ALL the quaint charm of the old pueblo style of architecture is preserved in concrete in a series of little cottages now under construction in Monrovia, Calif. The one-story buildings are most remarkable for their complete use of cement, woodwork being practically eliminated. Even the roofs are concrete, and the doors are made of magnesite. The poured walls, 5 in. thick, inclose a web of waterproofing material, while the cement floors are stained in Spanish-leather effect, waxed, and polished. The little structures are wholly fireproof, and easy cleaning is assured by the absence of moldings, casings, and baseboards. Inclosed courts off the kitchen and sleeping chambers, partly roofed and partly screened, provide outdoor protection and privacy. The tiny dwellings, usually of four or five rooms, are designed to be built in pairs, semi-attached, if desired, one fair-sized lot accommodating both of them, with a concrete garden wall inclosing the whole in Spanish style.



Above: A Corner View of One of the New Concrete Pueblo-Type Cottages, in Which Cement of One Form or Another is Used Throughout. Right: An Interior, Looking from the Breakfast Room into the Kitchen, Showing the Stained-Cement Floor and the Absence of Baseboards and Moldings. Below: Typical Floor Plan of a Pair of Semiattached Houses, with a Common Garden Wall in Spanish Style, and a Common Garage at the Right. The "Kitchen Courts" are Partly Screened and Partly Roofed to Give Outdoor Advantages with Privacy and Protection



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