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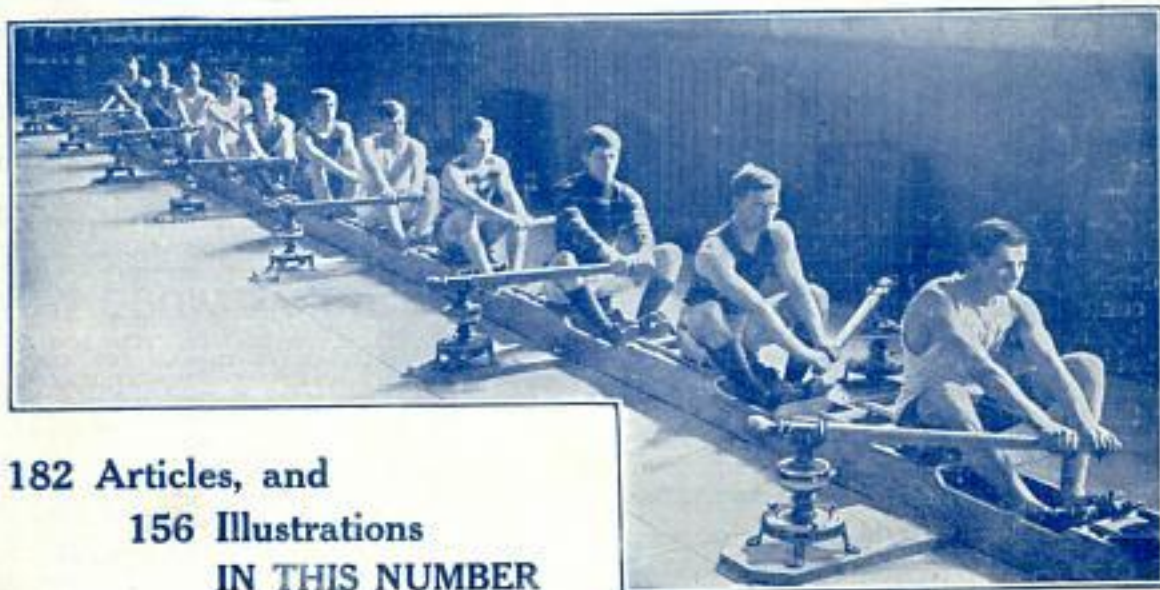
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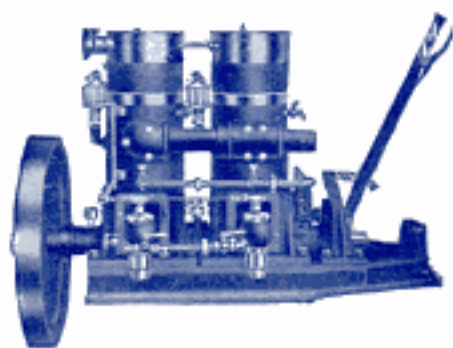
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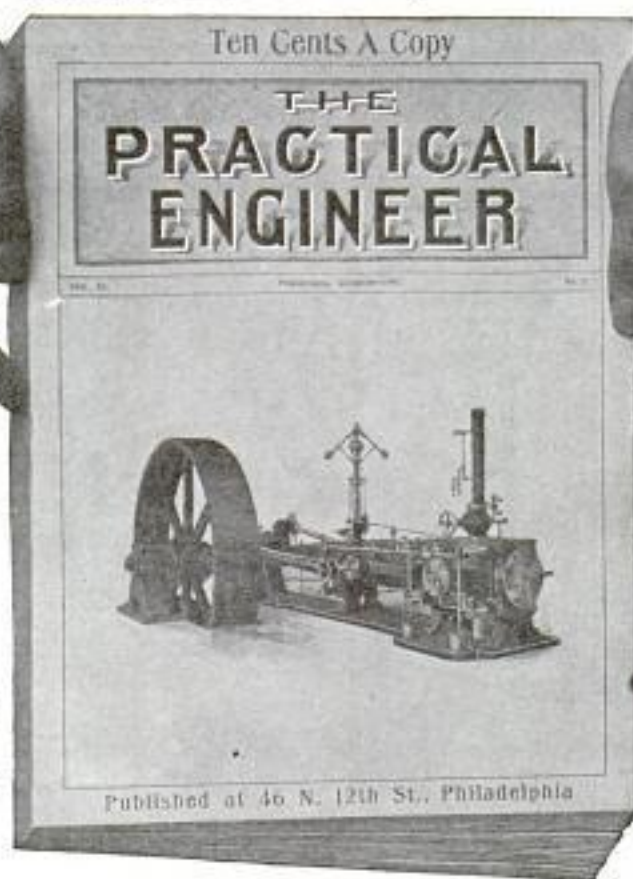
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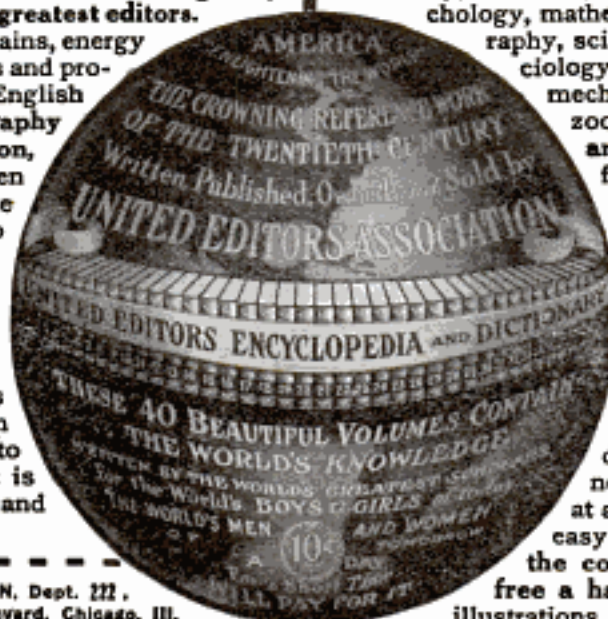
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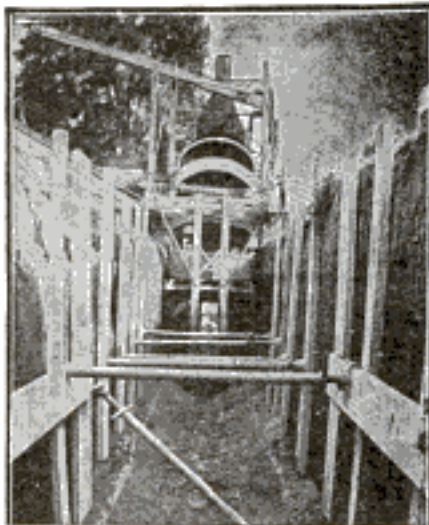
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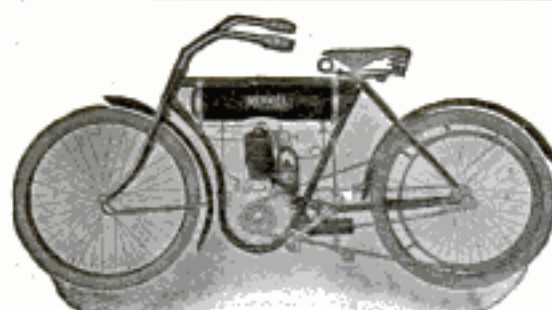
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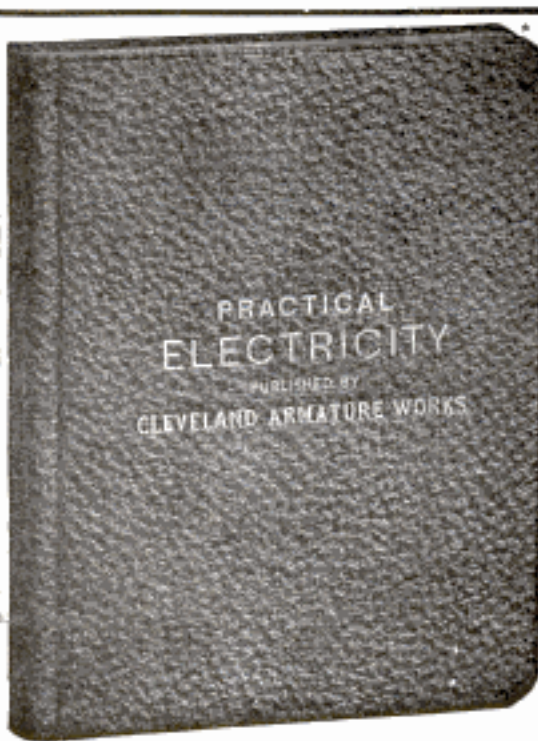
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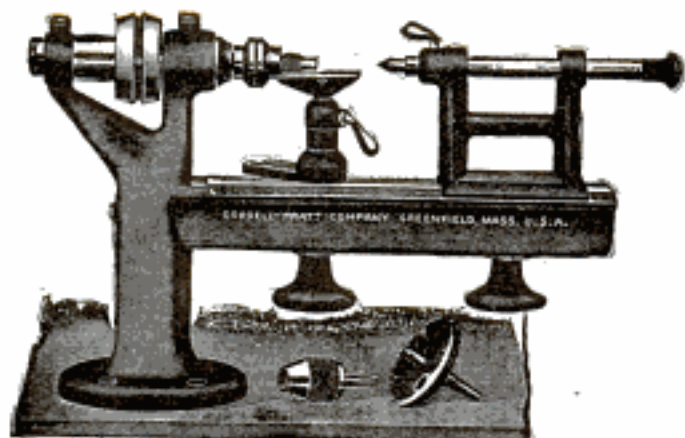
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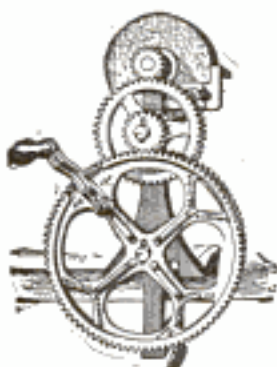
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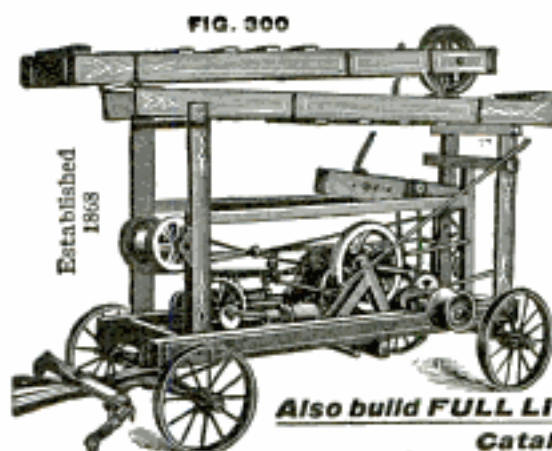
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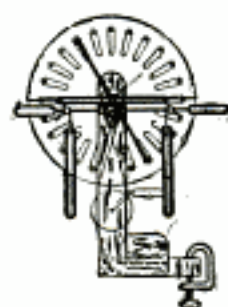
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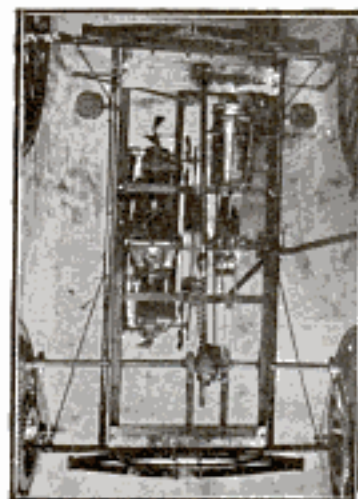
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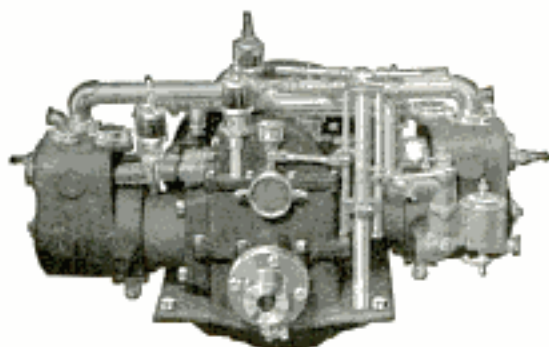
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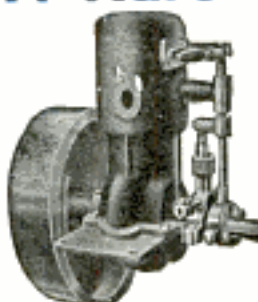
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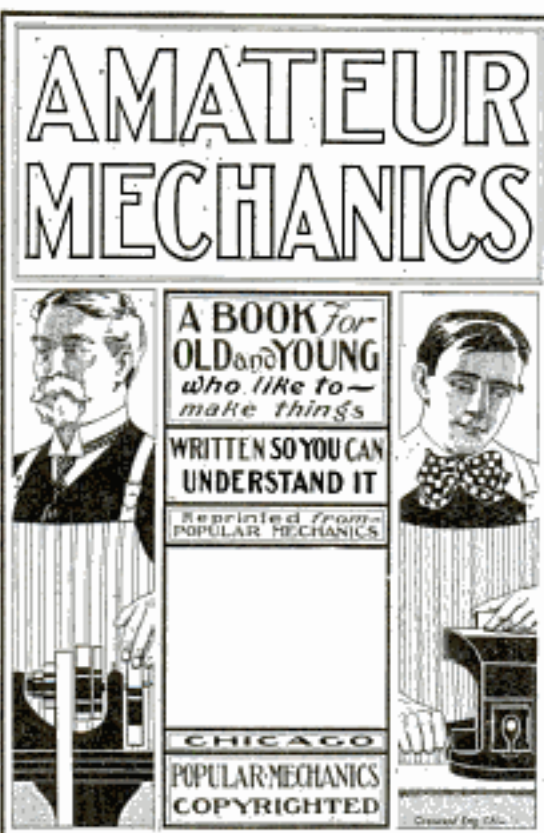
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POPULAR MECHANICS

Vol. 10.

APRIL, 1908.

No. 4.

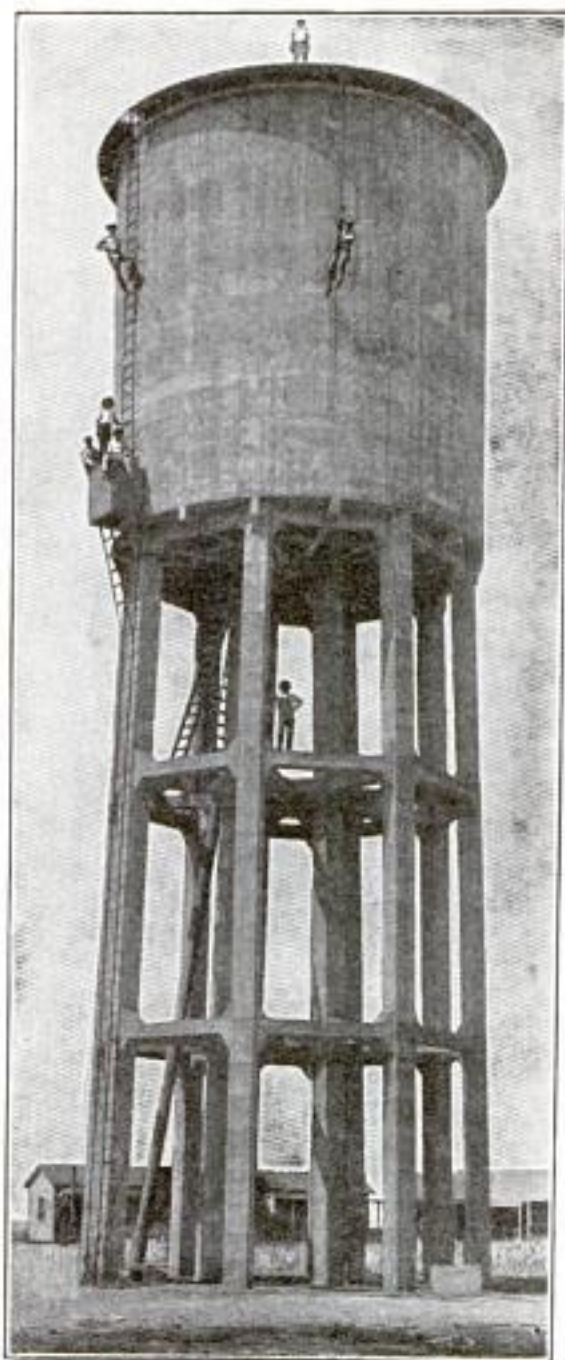
BIG CONCRETE WATER TANK SUPPORTED ON CONCRETE STRUCTURE

First Structure of the Kind is Completed at Anaheim, Cal.—Height, 112 Feet—Capacity, 200,000 Gallons

The latest daring innovation in reinforced concrete construction is represented by an elevated water tank just completed at Anaheim, Cal. This tank, the first of its kind ever attempted, is 32 ft. in diameter and 38 ft. high, supported on concrete posts 70 ft. high above ground. Its capacity is 200,000 gal. It is made of concrete throughout, reinforced with rings and vertical members of twisted steel. The walls of the tank are but 3 in. thick at the top and 5 in. at the bottom, and absolutely tight. The floor is supported by concrete beams radiating from the center, and the 12 posts, each 16 in. square, are stiffened by two lines of horizontal struts at equal intervals above the base. The foundation of the tower consists of a heavy slab of reinforced concrete extending 4 ft. into the ground. The tank has a conical-shaped roof 2 in. thick, with a cornice, slightly raised to give ventilation for the water within. From the lowest foundation to the extreme top, the height is 112 ft. The cost was \$11,400, or 75 per cent of the lowest estimate on a steel tower and tank of same dimensions.

TO DRAIN THE ZUYDER ZEE

Dutch engineers have begun the tremendous task which will result in turning the Zuyder Zee into 1,400 square miles of dry land, protected from the inroads of the sea by great dykes. When this is accomplished, Holland, with its



5,000,000 people living a life of continual strife and watchfulness lest the very land underneath their feet disappear beneath the waves, will have fought and won another battle with its greatest enemy, and justified the motto of the Netherlands, "We Struggle and Emerge."

The task is truly a tremendous one and will cost \$76,000,000, but when it is completed there will be enough additional homes and farms for 50,000 Dutchmen. The Zuyder Zee has occupied a prominent position in Dutch history. On its shores are the ancient towns under whose walls the Dutch fleets used to lie at anchor in the days when Holland disputed the supremacy of the seas with England.



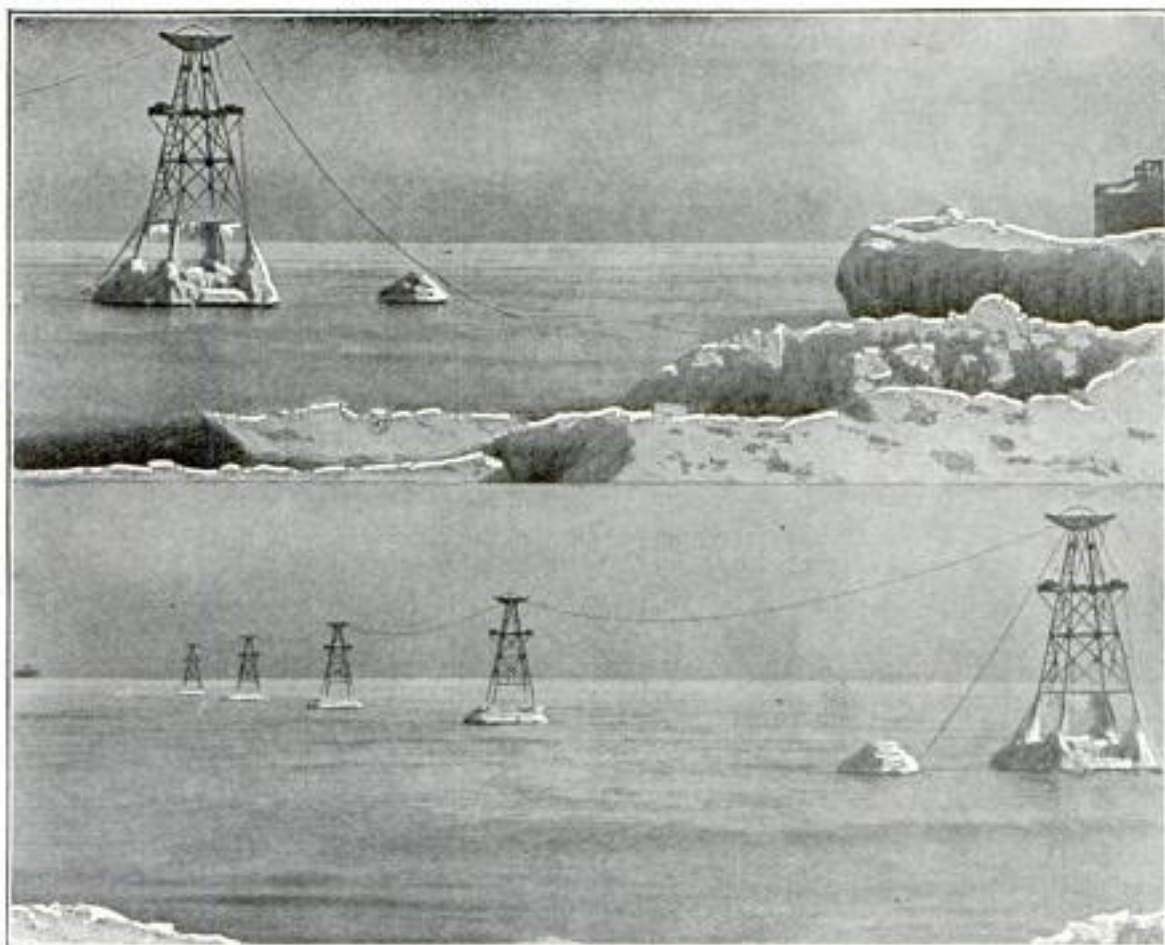
Remaining Towers of the Wrecked Aerial Railway

TEMPERING ARMOR PLATE BY ELECTRICITY

A revolution in tempering armor plate is expected to result from the invention of an American naval officer, which consists of a method of face-hardening by electricity. Carbon is distributed in powdered form over the face of the plate and then electrodes are applied. The carbon works down through the plate to the depth required, or as far as it is heated. Its highest efficiency is on the face of the plate, gradually decreasing toward the center, leaving the inner side of the plate tough and pliable. The old method is the Krupp or Harvey system of annealing.

AERIAL TRAMWAY DESTROYED BY ICE

During one of the heavy January storms, the long aerial tramway over Lake Michigan, described in the December issue of this magazine, was partially destroyed by the floes of ice during a furious storm. The tramway extended nearly two miles out into the lake at Seventy-third street, and was being used in the construction of the new Chicago water works tunnel. Of the 27 steel piers that supported the tramway, 19 were torn away. The work of repair was almost immediately commenced at a cost of \$20,000.



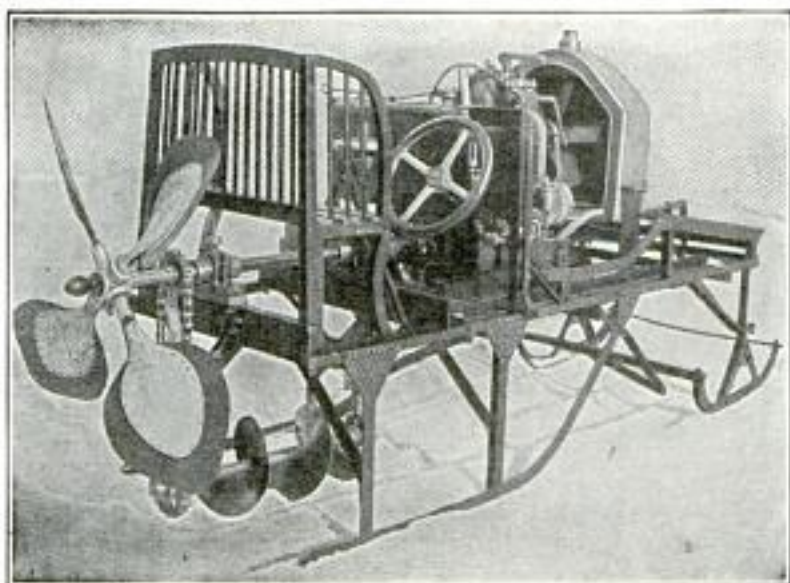
What the Storm Did—Two-Mile Crib at Extreme Left

AN AUTOMOBILE SLEIGH

An engineer of Augsburg, Germany, named Holzhauser, has constructed an automobile sleigh which, under favorable circumstances of roads and wind, attained a speed of 35 miles an hour. The vehicle is built almost entirely of light metal, and for power has a 24-hp. gas engine of the usual type.

The propelling medium consists of a 4-bladed aerial screw made of aluminum, the blades being tipped with steel bands, and an Archimedes screw which helps out on hill-climbing. The aerial blades are made spoon-shaped "the better to seize the air," as the inventor says. Steering

is accomplished by guiding the forward runners with an ordinary steering wheel and gear. The machine is adapted to operate on roads which are in pretty fair condition.



Steel Sleigh with Aerial Screw



Remarkable Photograph of a Cyclone

CYCLONE PHOTOGRAPH

Nothing is more demoralizing to the nerve of a community than the rapid approach of a big cyclone. The huge funnel, swirling onward like an avenging spirit bent on a mission of destruction, the uncanny blue whiteness of everything, and the absolute cessation of movement in the final lull before the outburst, are calculated to make the most phlegmatic native of a cyclone state scurry like a rabbit to a cyclone cellar or other place of refuge.

This remarkable photograph was taken at Scribner, Neb., in 1902, by E. H. Klemke. The negative is in the collection of George L. Morse, professor of electrical engineering at the University of Nebraska, to whose courtesy we are indebted for the picture.

MAKING INDELIBLE INK FROM TYPEWRITER RIBBON

Old and worn typewriter ribbons can be used to a good advantage by making writing ink from them. Remove the ribbon from the spool and place it in a tumbler three-quarters full of water and let soak for 24 hours. Remove the

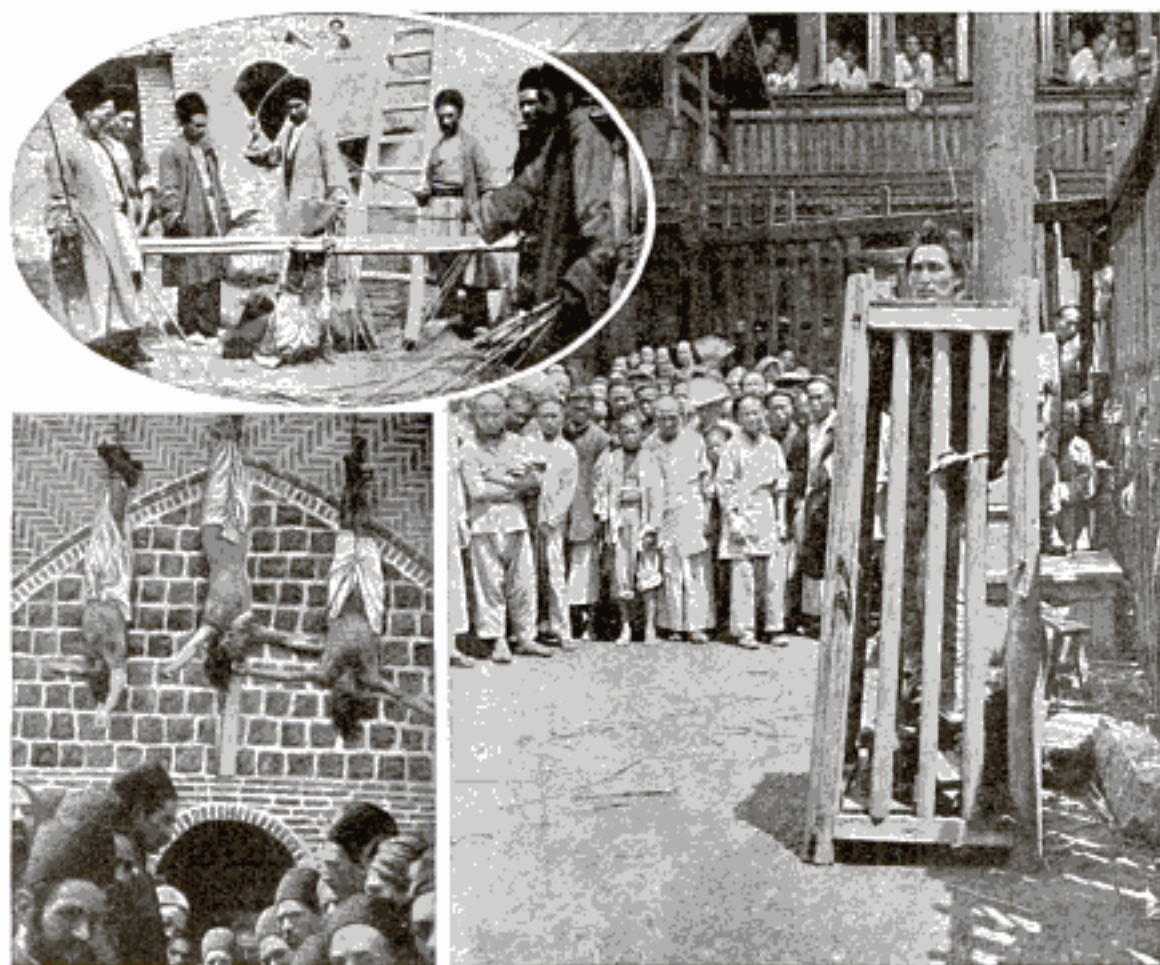
ribbon and pour the fluid into a bottle. This ink will be as good as any indelible ink that may be purchased.

TO TUNNEL CASCADE MOUNTAINS

Reports from the west state that the Great Northern Railway Company is preparing to bore a low-grade tunnel 12 miles long through the Cascades, and that two camps of men are already engaged near Leavenworth, Wash., getting material together to build three large dams in the Wenatchee river to develop power with which drills and machinery are to be operated for the boring of the hole. It is also understood that the Great Northern has arranged for the development of electric power from Chelan Falls for the operation of trains through the present tunnel, and later through the 12-mile bore.

The tunnel project has been openly considered by the Great Northern company for some time and engineers have investigated and approved it. Such a tunnel would give the road the shortest line to Puget Sound and solve the tremendous mountain climb now necessary.

FIENDISH PUNISHMENT OF CRIMINALS



Copyright Underwood & Underwood, N. Y.

Three Methods of Oriental Punishment

These illustrations present three ways of punishing criminals in Persia and China, a great contrast to the means adopted for punishment of the same crimes in Christian countries. Two of the photographs are Persian, one showing three robbers suspended by their feet from a wall, and the other the bastinado, a torture inflicted by striking the soles of the feet with whips.

Of China's many death punishments, torture in the cage is the most fiendish. It is reserved for those committing the most atrocious crimes. The criminal is fastened in a cage with planks fitting snugly around his neck and several flat stones are placed under his feet. For six days he has to stand erect on the stones or strangle, while the population view him. If still alive at the end

of that time he is placed in an open square and one stone is removed each day until he dies of strangulation.

ELECTRICITY STILL IN PRIMARY STAGE

At a banquet given Feb. 12 by the heads of the departments of the Edison workshops in honor of Thomas A. Edison's 61st birthday, the electrical wizard in a short address made the statement that electricity had not yet been developed beyond its primary stage.

"The possibilities of the development of this great agency are so boundless that we cannot now even comprehend them. I have done little in comparison with what the future holds. Two hundred years from today the

inhabitants of this planet will regard the achievements of the present day in electricity as the mere beginning of a master science."

SHIPS MAY BE GUIDED INTO HARBORS ON PATH OF LIGHT

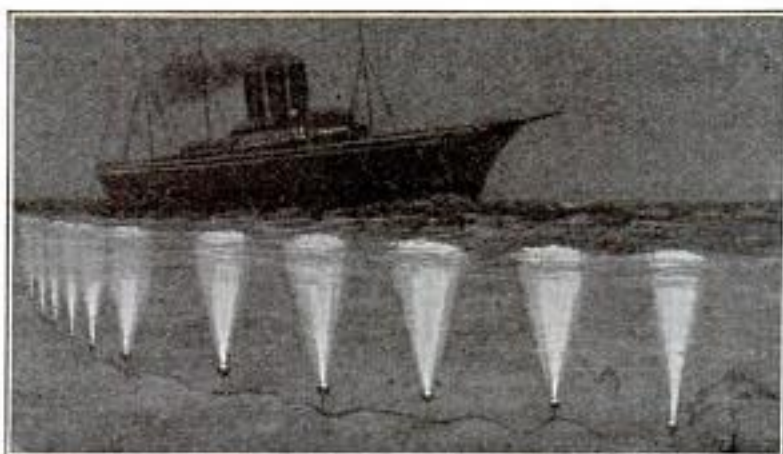
By the use of a system of electric lights beneath the water, recently patented by an American inventor, the navigation of dangerous harbors and waterways may be even safer at night than in the daytime. During the day pilots and charts are necessary; at night, if the system proves all that is claimed for it, pilots, charts and light-houses can be relegated to the rear and vessels steered in and out over a ribbon-way of illuminated water.

The system consists of a waterproof submarine cable with numerous floating branches connected at suitable intervals, to which are attached incandescent electric lamps fitted with reflectors to concentrate the light into parallel beams. The whole system is designed to withstand the pressure and corrosive action of sea water, and the lamp reflectors are made sufficiently buoyant to maintain an upright position. The cable thus equipped is laid in position in the waterway to be lighted up and connected with a source of electric supply on shore.

The channel can in this way be marked out by brilliantly lighted spots on the surface, and, as of great importance should a city be besieged in time of war, the entire system can be extinguished by the simple movement of a switch on shore. Hostile battle-ships would then be left with no clear channel marked between the nests of submarine mines that, with such a lighting system in operation, could be banked on each side of the illuminated

path. Zigzag the path of light, and destruction would be unavoidable, if the electric current were switched off. As a means of naval ambush, the enemy's ships could be allowed to run part way in, the lights switched off, and they left helpless to advance or retreat.

The system offers equally as good guidance in the densest fog as in perfectly clear weather. Fog and wind practically never occur together, and the



A Shining Path in Water

beam of light would therefore project from the level surface of the water straight up through the fog. By the use of a water telescope, which is a tube equipped with an observation glass that can be dropped beneath the surface of the water, or by the provision of a bull's-eye inserted in the hull of the vessel below the water line, it would be possible to guide the ship without reference to the surface light.

THE DRUDGERY OF DRY-LAND ROWING

With the coach holding a watch and counting the time, groups of grinning students as an audience, and a place in the 'varsity boat as their only incentive, aspiring oarsmen are now sweating away in the gymnasiums of the various universities. When the long, narrow racing shells flash through the water in the late spring, the river banks lined with admirers and the course alive with craft, the sight is inspiring



Rowing Practice in Winter

and pretty, but behind it all is the torture the students have to live through before they are even permitted to take their places in the boats.

Every afternoon the aspirants man the make-believe oars of the rowing machines in the gymnasiums and bend their backs in the most monotonous and uninteresting form of training imaginable. There is some incentive in propelling a boat swiftly through the water, in feeling the craft leap to the motion of the waves; but to sit for an hour or two, tugging at oars that simply strain the muscles without any visible result, is almost heart-breaking. It must be gone through with, however, for from the oars in the gymnasium the men step to those that propel the racing craft, and instead of having to become hardened to the toil at the beginning of the season, they tackle the job already broken in and trained.

CABLES ZIGZAG ACROSS OCEAN

The cable lines that look as straight as a transcontinental railway on the map are anything but straight as they lie on the ocean bed. The great Pacific cable, 8,000 miles long, between Vancouver and New Zealand, was time and again deflected from a straight line in order to avoid towering submarine mountains, craters and ground that was otherwise undesirable as a resting place for the cable.

As in building a railway, engineers are first sent out to make a careful survey of the proposed route. With piano wire for sounding lines they determine



the level of the ocean bottom, note all obstacles, and secure samples of the solid formations for dissection.

MONUMENTS MARK U. S. BOUNDARY LINE

The United States government has placed granite monuments at intervals along the Mexican frontier to mark the imaginary line that divides the two countries. The steel fence is to protect the monuments from souvenir hunters who even persist in chopping granite to pieces. The tourists shown in the illus-



Standing in Two Countries



Standard Type of English Freight Houses Permitting of Largest Possible Number of Switch Tracks into the Building

tration are standing with one foot in the United States and one in Mexico, a favorite pose at Tia Junia, where the photograph was taken.

SCHOOL IN THE OPEN AIR

A fresh air school, unique among educational institutions in this country, has been opened at Providence, R. I. The only likeness it has in common with an indoor school is that it is in a building, but great swinging windows on three sides of each room,

extending the length and width of each, afford an atmosphere of cold, pure air.

Old-fashioned fireplaces have been set in the walls of each room, and in one a large oven has been constructed for the purpose of heating soapstones, which are to be furnished to children with cold feet. The usual custom of removing the outer garments will not be allowed except when the weather compels the closing of the windows. The idea was suggested by the Rhode Island League for the Suppression of Tuberculosis.

REINFORCED CONCRETE HOTEL

This big hotel at San Diego, Cal., is constructed entirely of cast concrete, reinforced in the usual way, and finished with a thin surface coating of cement. The concrete cornice overhangs at least 4 ft. The building will cost \$500,000. The architecture is unusually artistic. The structure is of course absolutely fireproof, and is a notable example of the expensive types of construction which are now being erected of concrete.



Hotel of Concrete to Cost \$500,000

UNITED STATES SECOND IN SHIPBUILDING

The shipbuilding summary of the world for 1907 shows that the United States ranks second for the year in total tonnage and ships constructed, the figure being 488,059 tons. England comes first with 1,673,121 tons, nearly four times as much. Germany is third with 292,073 tons. Japan is fourth and France fifth, the former having to its credit 122,095 tons.

SUBMARINES ON WAY TO PACIFIC

The United States submarine boats "Porpoise" and "Shark" are on their way to the Pacific coast snugly packed away in a collier. They weigh not more than 60 tons each, and no serious difficulty is expected in transporting them around South America. The little war machines will be stationed at San Francisco.

LONGEST OCEAN BREAKWATER IN AMERICA

In the construction of the new harbor at San Pedro, Cal., the government is building a breakwater that extends two miles out into the open sea. Piling was first driven, on which a railway trestle was built, and immense quantities of rock are being dumped on both sides of it. The foreground is government land and will probably be the site of a fort before many years.

TRENCH FOR WATERWORKS DAM



The Trench is 150 Ft. Deep

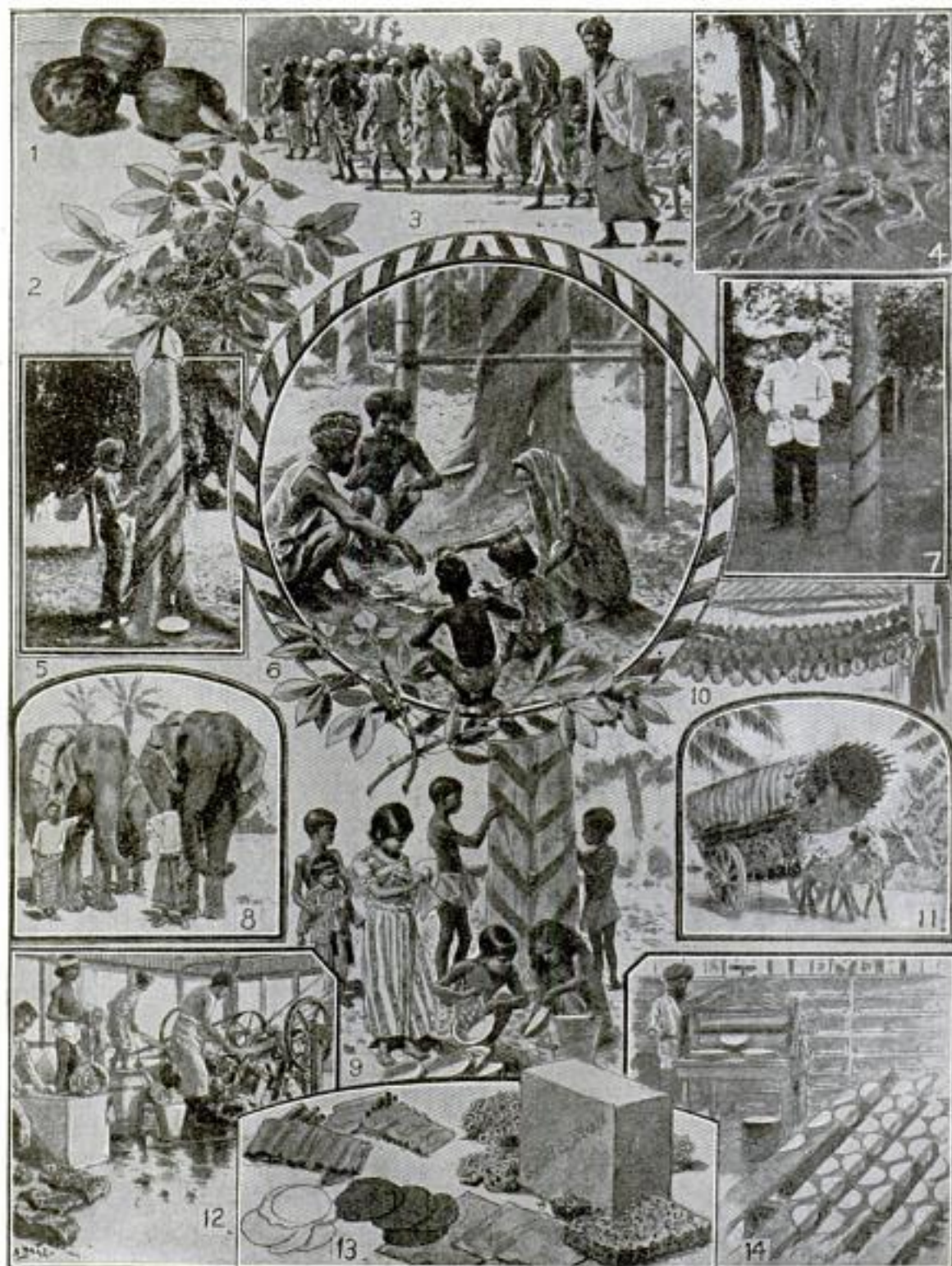
This immense trench is being excavated across the valley at Angram, England, for the construction of a dam to collect the water that comes down from the mountains and convert it into a supply for Bradford. The main trench is 400 ft. wide and 150 ft. deep. The work will take 8 years; cost, \$2,500,000.



This Breakwater Extends Two Miles Out Into the Sea

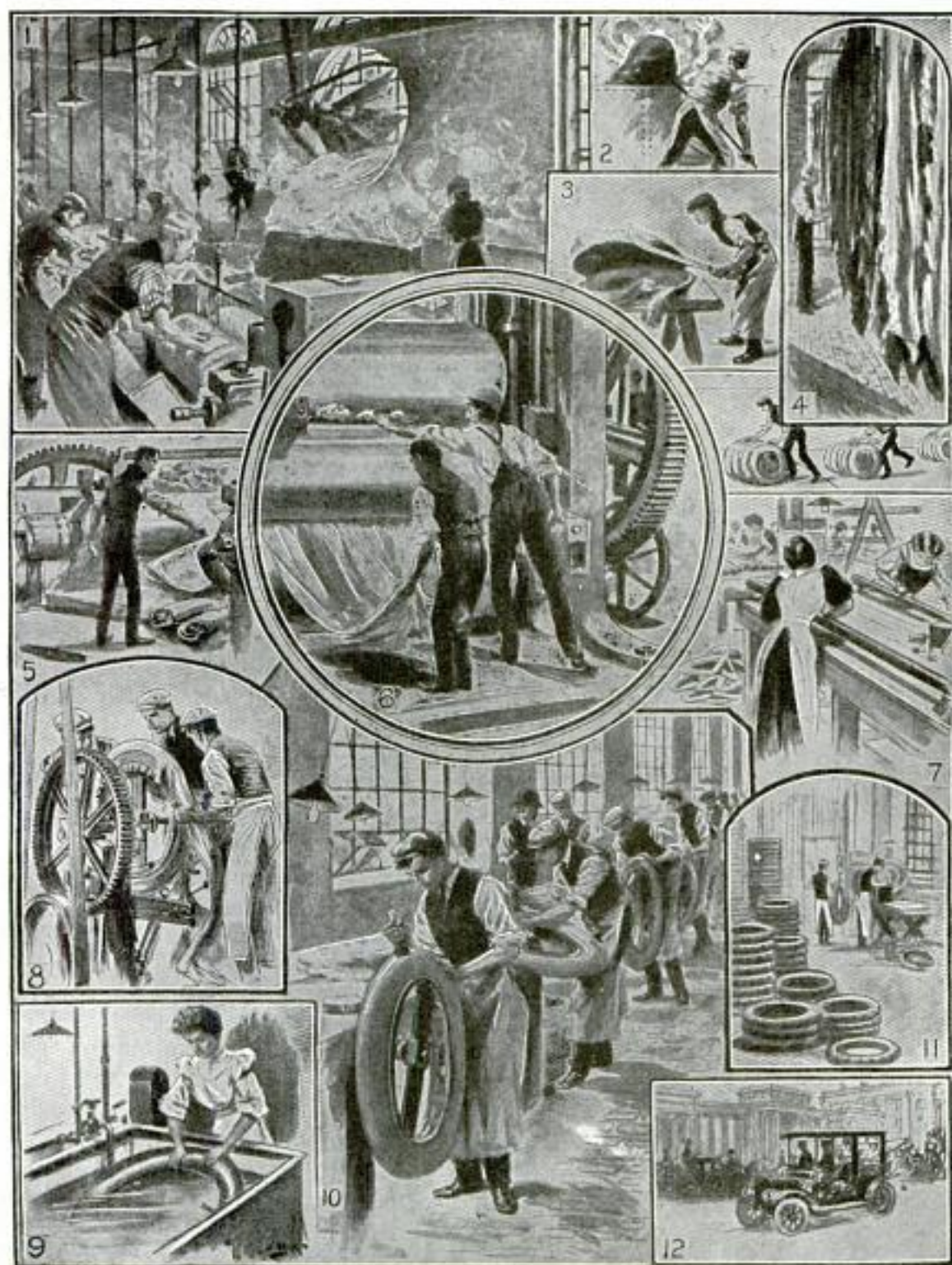
EVOLUTION OF RUBBER FROM SEED TO AUTO TIRES

These two sets of illustrations form a picture story of a piece of rubber from the moment of its inception in the seed until it is turned out at an automobile factory in the form of tires. The first group shows the method of harvesting



1—Seeds of rubber; 2—Rubber blossom; 3—Tamil coolies and foreman on way to work; 4—Rubber tree in Colombo; 5—How the bark is cut; 6—Serving rice on a palm leaf at dinner time; 7—Spiral cuts on tree; 8—Elephants used for transporting rubber on one plantation; 9—Children at work; 10—Rubber biscuit drying; 11—The usual mode of transportation; 12—Machine for making crape rubber; 13—Different forms of rubber ready for shipment; 14—Rubber biscuits ready for drying

rubber in Ceylon. The trees are tapped and drip-tins are placed below the cuts to catch the sap as it exudes. When it has sufficiently thickened it is rolled into cakes, and then cast into blocks for market. The second group shows how the raw rubber is worked into form and finally turned out as tires. Illustrations used by courtesy of London Illustrated News.



1—Washing raw rubber; 2—An unusually large lump; 3—Carving a rubber joint; 4—Pure rubber drying in sheets; 5—Mixing or compounding machine; 6—Calendering machine; 7—Rubber-tube making for auto tires; 8—Making canvas casing for auto tires; 9—Testing tubes for leakage; 10—Rubbering auto tire casings; 11—Finished tires weighed and checked into stores; 12—The finished article

AUTOMOBILES EQUIPPED WITH WIRELESS TELEGRAPH

An automobile equipped with a wireless telegraph apparatus was recently



Army Wireless Auto

shown at a Brussels exhibition, and although the tall mast fitted on top of the limousine would doubtless be an unsurmountable inconvenience to touring, such an equipment is now being used in army operations and is found to be satisfactory.

A number of armored automobiles, thus equipped, and placed with the different divisions of a warring army, would make the transmission of orders vastly superior to the ordinary field telegraph service, providing, of course, that the opposing army could not catch the orders with a similar apparatus.

FIRST AMERICAN TAXIMETER

This illustration shows a cab taximeter recently invented in America.



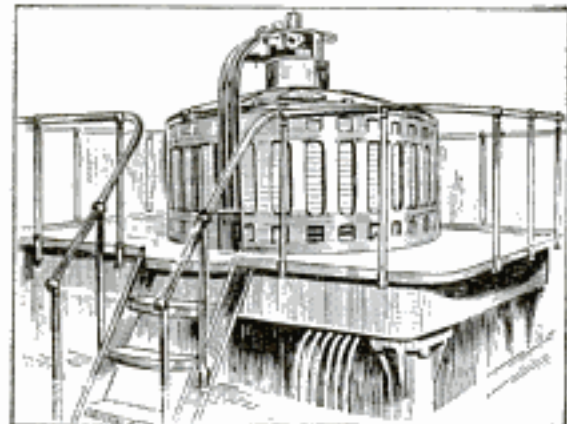
It has a circular dial 7 in. in diameter and 4 in. thick. Three sets of indicators are made on the dial, the first giving the number of persons riding, the second auto-

matically marking up the charges as the ride continues, and the third making note of the extra charges for trunks, etc., which is also included in the second, or "total fare," indicator. The "vacant" sign is turned down when the trip starts.

25,000,000-GALLON ELECTRIC PUMP

An electrically-driven centrifugal pump, operated by power from Niagara Falls, is in active service in the municipal pumping plant at Buffalo, N. Y. The pump is of vertical shaft construction and is direct coupled to a 1,500-hp. induction motor, operating at a speed of 500 revolutions per minute. The pump's capacity is 25,000,000 gal. of water a day.

The illustration shows the design of



Niagara Pumps Buffalo Water

the vertical electric motor mounted on a platform above the pump. It has one step-bearing and two guide bearings, the former consisting of two plates between which the oil is forced. The weight of the motor is partially carried by the incoming water acting on the suction side of the pump, and the remainder by a film of oil, so that the friction losses are minimized. Forced lubrication is also used for the guide bearings.

A London physician has recently operated with the knife for consumption. An opening was made in the patient's back and the diseased part of the lung removed.

SMALLEST AND MOST DEADLY MACHINE GUN

Maxim's latest invention is a machine gun so powerful that from its small muzzle bursts a hailstorm of 8,000 shot every 15 minutes, and so small and delicate that it can be easily carried on the backs of three soldiers. Rocky passes can be climbed, and the awful new instruments of death set up in a sheltered position from which the ranks of the enemy could be mowed down like grain before a reaping machine. The power of 3,000 men armed with 1,000 of these machines can hardly be estimated. Disarmament is not the only way to insure peace.

The machine is of wonderful design and lightness. The three soldiers to which it is apportioned are provided with a special harness of leather straps and pads for the pieces to rest upon. The first soldier carries the barrel and chamber, the second the tripod or stand, and the third the ammunition case, containing bands of cartridges. A few moments suffices to put the parts together. By the pressure of a lever the firing commences and either grape shot or bullets are discharged at a speed of between 500 and 600 shots a minute.

GREATEST WATER THOROUGH- FARE IN THE WORLD

The St. Clair river, connecting Lake Huron and Lake St. Clair, is the greatest water thoroughfare in the world, according to the figures compiled at the close of the navigation season of 1907. During that season 23,721 vessels, with a tonnage of 48,958,328, passed through

this river. The merchandise traffic amounted to 67,292,504 net tons, of which 46,966,193 tons represented iron ore, lumber and grain from the northwest southbound for Buffalo and other Lake Erie ports. The northbound traffic represented 20,326,311 net tons, of which 18,427,121 tons was coal from



Fires 600 Shots a Minute

the mines of Ohio, Pennsylvania and West Virginia.

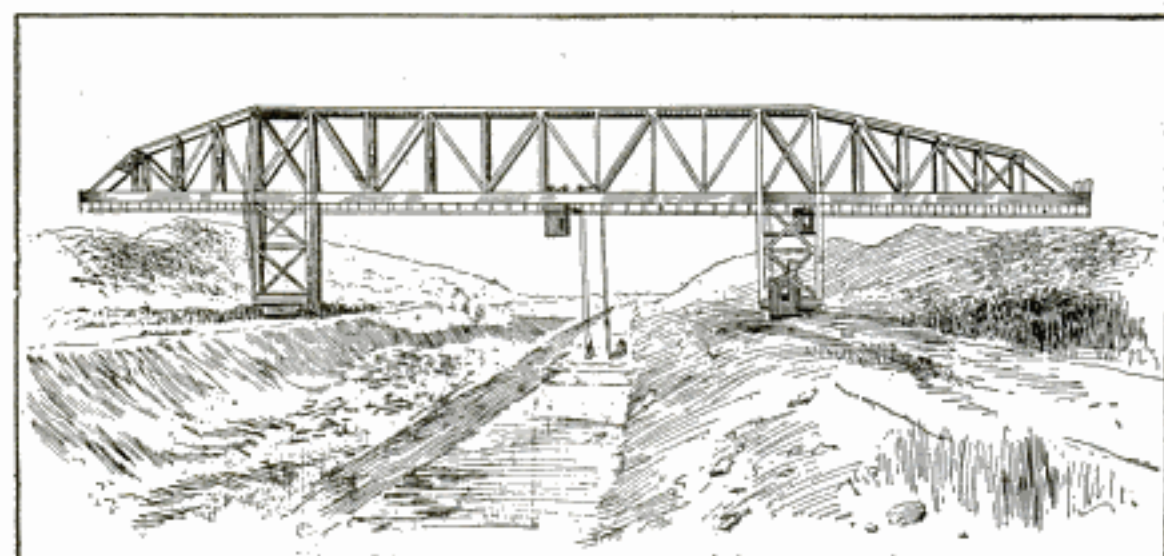
GIRLS TAUGHT LIFE-SAVING

A course in life-saving has been instituted among the women students of Columbia University for the purpose of making them as adept as men in rescuing drowning persons. They receive the regular life-saving drill, including the grips and breaks, towing to shore and artificial respiration. A fully dressed girl is thrown into the water at one end of the swimming tank and other girls are obliged to rescue her from the opposite end and take her back, which is already done in 57 seconds. This new departure in co-education has become immensely popular.

EXCAVATOR DOES WORK OF 800 MEN

A new type of excavator is being used with great success on a canal contract just west of Rochester, N. Y., where a prism 35 ft. deep is being excavated through earth and rock, in con-

nection with the enlargement of the canals of the state, for which \$101,000,000 was appropriated four years ago by a referendum vote of the people.



New York State's Hundred Million Dollar Ditch

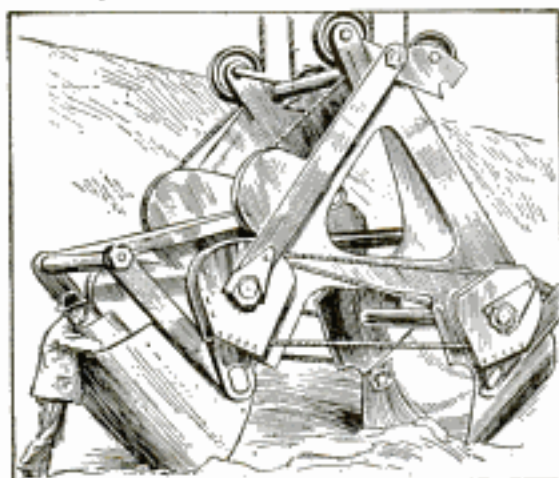
The structure, designed by the contractors and built at a cost of \$175,000, is 428 ft. long and 92 ft. wide. It is operated by electricity derived from an electric light plant some miles distant.

In the car suspended underneath the bridge is the operator and machine which lowers and hoists the clam-shell bucket, carries it to either end of the

spoil banks. The bucket weighs 22 tons, has a capacity of 8 cu. yd., and makes a round trip in one minute. It is estimated that the excavator does the work of 700 or 800 men.

AERIAL LETTER BOXES

Aerial letter boxes have been placed in all large tenement houses and apartment buildings in Budapest, Hungary. When the postman enters the hall on the first floor of a building he places the letters in the boxes allotted to the different families. A spring is then pressed and electricity does the rest. The boxes are shot up to the floor required, where they remain until emptied, or until the postman comes again and brings them down by touching another spring.



The Bucket Weighs 22 Tons

By a vote of miners and mine officials it was decided to adopt fulminate powder as an explosive in the Hazel mine at Canonsburg, Pa., the belief being that this explosive is much less liable to cause explosions of gas than the powder formerly used.

UNITED STATES WILL STRIVE FOR AIRSHIP SUPREMACY

Yankee Ingenuity Demanded to Construct Heavier-Than-Air Flying-Machine--Must Fly 40 Miles an Hour and Stay in Air That Length of Time

By Francis M. Buzzell.

[Editor's Note—It is impossible to illustrate the machines accepted, as the government refuses to allow the plans to be made public at present.]

As the present has solved the problem of the dirigible airship, the near future will undoubtedly solve the problem of flight by heavier-than-air flying-machines, and that near future, if the United States of America gains its demands, is only a few months distant.

Ever since the first heavier-than-air flying-machine took its first leap into the atmosphere and succeeded in gliding for a few seconds before sinking back to earth again like a bird with a broken wing, enthusiastic aeronauts have labored and risked their lives in trying to imitate the birds. In first attempts everything went up in the air but the flying-machines, but gradually the aeronauts have become more familiar with the science of aero-dynamics, until at the present day successful flights of considerable distance have been made.

France was the first nation to take a serious interest in aerial navigation. Germany and England soon followed, but the United States government continued to play with a few spherical balloons until American airship inventors began to despair of government co-operation.

Now, however, the United States has taken an initiative that has caused more than one aspiring aeronaut to wonder whether Missouri is part of the United States or the United States part of Missouri. "Show me!" it says, and in such a manner as to prove beyond doubt whether the problem of aerial flight by airships heavier than air is solved or still in the solving.

On Dec. 23, 1907, the United States government, through the Signal Corps of the War Department, sent out ad-

vertisements and specifications for a heavier-than-air flying-machine. Every aeronaut who believed he could solve the problem of such flight was eligible to submit his proposal on or before Feb. 1, the government reserving the right to reject any and all proposals. During that period the office of Gen. James Allen was literally swamped with letters from every part of the country, serious and otherwise. At noon, Feb. 1, 41 bids had been received. Of this number the Board of Ordnance and Fortification only found three showing enough serious thought and practical ability on the part of the inventor to warrant recommendation. These three were tentatively accepted by the war department. The trials will be held at Fort Myer, Virginia, in July and August. The successful bidders are as follows: J. F. Scott, Chicago; A. M. Harrington, New York; Wright Bros., Dayton, O. The machines of the first two are to be delivered by July 10 and the third by July 20.

In reading the requirements it is easy to see why the aeronauts have raised the question of the United States and Missouri. European countries, as before stated, have lent their aid to solve the problem of aerial flight and made demands on the ingenuity of airship inventors, but it remained for the United States to demand, not a successful flight of a mile, and a few minutes spent in air, but a machine capable of carrying sufficient fuel for a flight of 125 miles, and able to stay in the air at least one hour in the trial tests.

The requirements are as follows:

The flying-machine must be designed

so that it may be quickly and easily assembled and taken apart for transportation in an army wagon. No more than an hour should be required to take it from wagon and prepare it for flight.

It must be able to carry two persons having a combined weight of 350 lb., and a sufficient fuel supply for a flight of 125 miles.

It should have a speed of at least 40 miles an hour. Less than 36 miles an hour will be rejected. Before acceptance, a trial endurance flight will be required of at least one hour, during which time it must remain continuously in the air without landing, be steered in all directions without difficulty, and be at all times under perfect control and equilibrium.

It must be so designed as to ascend in any country which may be encountered in field service; the starting device must be simple and transportable, and it must be able to land in a field without a specially prepared spot and without damaging its structure. It is also to be provided with some kind of a device to permit of a safe descent in case of an accident to the propelling machinery.

The speed accomplished during the trial flights will be determined by taking an average of the time over a measured course of over 5 miles, with and against the wind. In the trial flights the machine will make a flying start, crossing the starting line at full speed. All tests must be completed within a period of 30 days from the date of delivery to the government. Three trials will be allowed for speed and three for endurance.

Bidders must furnish evidence that the government has the lawful right to use all patented devices which may be part of the flying-machines and that the manufacturers are authorized to convey the same to the government. This refers to the unrestricted right of the government to use the machine, but does not mean the exclusive purchase of patent rights for its duplication.

The United States has thus placed the standard of success at the highest

point, and it now remains for Yankee ingenuity to meet this demand with at least one heavier-than-air flying-machine that will embody all the requirements. Whether this is at present possible or not has yet to be proved, but if the requirements are met with the successful inventor will have solved the problem.

Even before the government commenced advertising for bidders to present their plans for heavier-than-air flying-machines, notifications were sent broadcast through the country requesting the presentation for approval of plans and bids for the construction of dirigible airships. The time limit for the receipt of these bids closed Jan. 15, and they are being examined for acceptance along with the others. The trials for the two styles of aerial craft will be held at Fort Myer at the same time.

The specifications for the dirigible balloons call for a speed of 20 miles an hour in still air by a ship not longer than 120 ft., but capable of carrying two men having a combined weight of 250 lb., and at least 100 lb. of ballast, which is to be used as a compensation for increased weight when the balloon is operating in the rain. Enough fuel must be carried for a continuous operation of the engine for at least two hours, determined by a trial endurance flight, the airship traveling continuously at an average speed of at least 70 per cent of that which it accomplishes during the trial for speed. The engine must have suitable cooling arrangements to insure that no excessive heating will occur.

The scheme for ascending, descending and maintaining perfect equilibrium must be regulated by shifting weights, movable planes, or by other approved methods. Balancing by the aeronaut changing his position in the car will not be accepted. The gas bag must be inflated with hydrogen, but its dimensions and shape are left to the inventor, excepting length.

As is seen by these specifications, the dirigible airships must be also of a high

standard of excellence, but the problem of aerial navigation with this style of aerial craft has been solved, while with the heavier-than-air type the beginning has hardly been reached. Therefore the greatest interest of the future will be centered around the style of craft that really flies, not floats. The greatest aeronautic experts in the world say that the ultimate solution of aerial navigation rests with the heavier-than-air flying-machine, and that the dirigible balloon, with its many limitations, is simply the stepping stone to greater aerial triumphs. "If man would fly, let him imitate the bird," says Santos Dumont.

THRILLING PARACHUTE LEAP

The world must be amused and thrilled, and every year the "thrillers" must be new and more exciting than the preceding one.

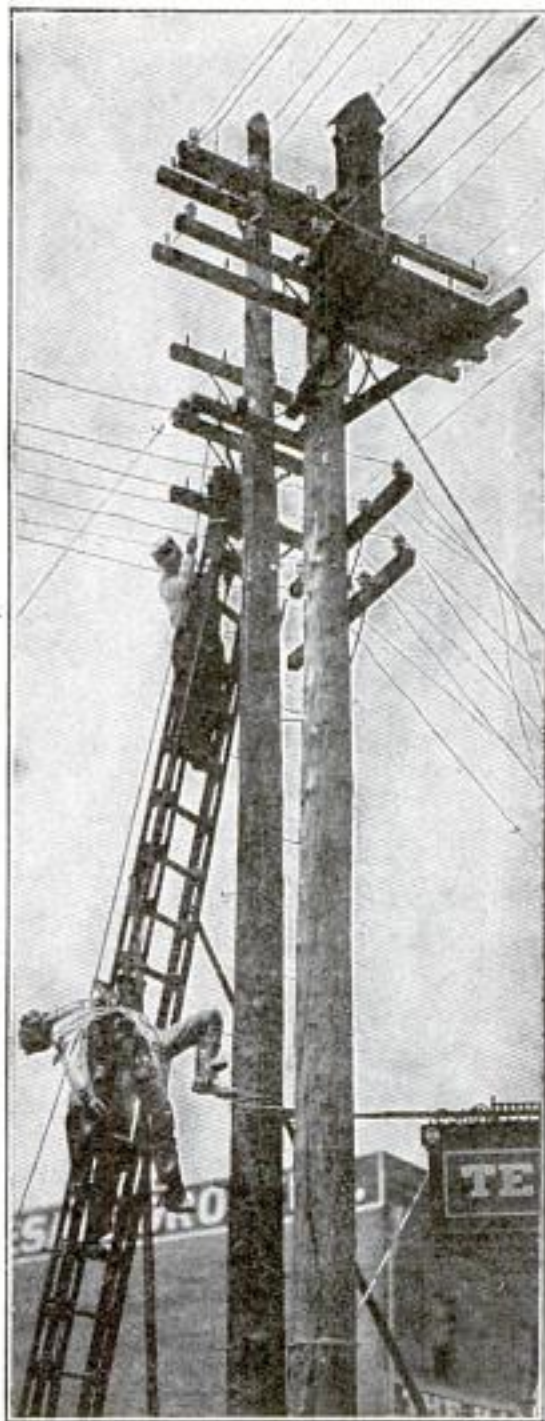


Among the latest "thrillers" is the triple parachute leap, in



which one aeronaut uses three different parachutes before reaching earth. He leaves the balloon in his downward flight with a red parachute, but after falling a short distance liberates it and makes a second plunge through space with a white parachute. This feat is repeated again after another drop, and he finally lands with a blue parachute. Another "thriller" is a double parachute leap from the same balloon, in which a man

and woman race to earth in parachutes which fall five or six hundred feet before opening out.



This photograph shows a victim of a live wire being taken down from a pole at El Paso, Tex. It was found necessary to call out the fire department to remove the body. Photo by "The Humphries Co."

Spain will expend \$80,000,000 on a fleet of warships to be built on the Clyde.

DOUBLE-DECKED WATER TOWER

The smaller tank raised high above the main tank of this water tower, in



High Tank for Fire Pressure

the Colorado desert, constitutes the fire protection of a railroad hotel near by. The added water pressure thus gained is sufficient to throw a stream of water a considerable distance.

OLD MONITOR AS TARGET

The double-turreted monitor "Florida" is to be made the target of the 12-in. guns of one of the big battleships of the U. S. navy. It is not the purpose to destroy the monitor altogether, but to direct the gunfire against one of the turrets, to determine the effect of actual gunfire upon the controlling machinery of a ship.

Prince Henry, brother of the German Kaiser, has joined the Berlin airship club.

NEW YORK TO PARIS AUTOMOBILE RACE

United States Presents Polar Aspect to Contestants—Cars Struggle Through Snowdrifts as High as a House

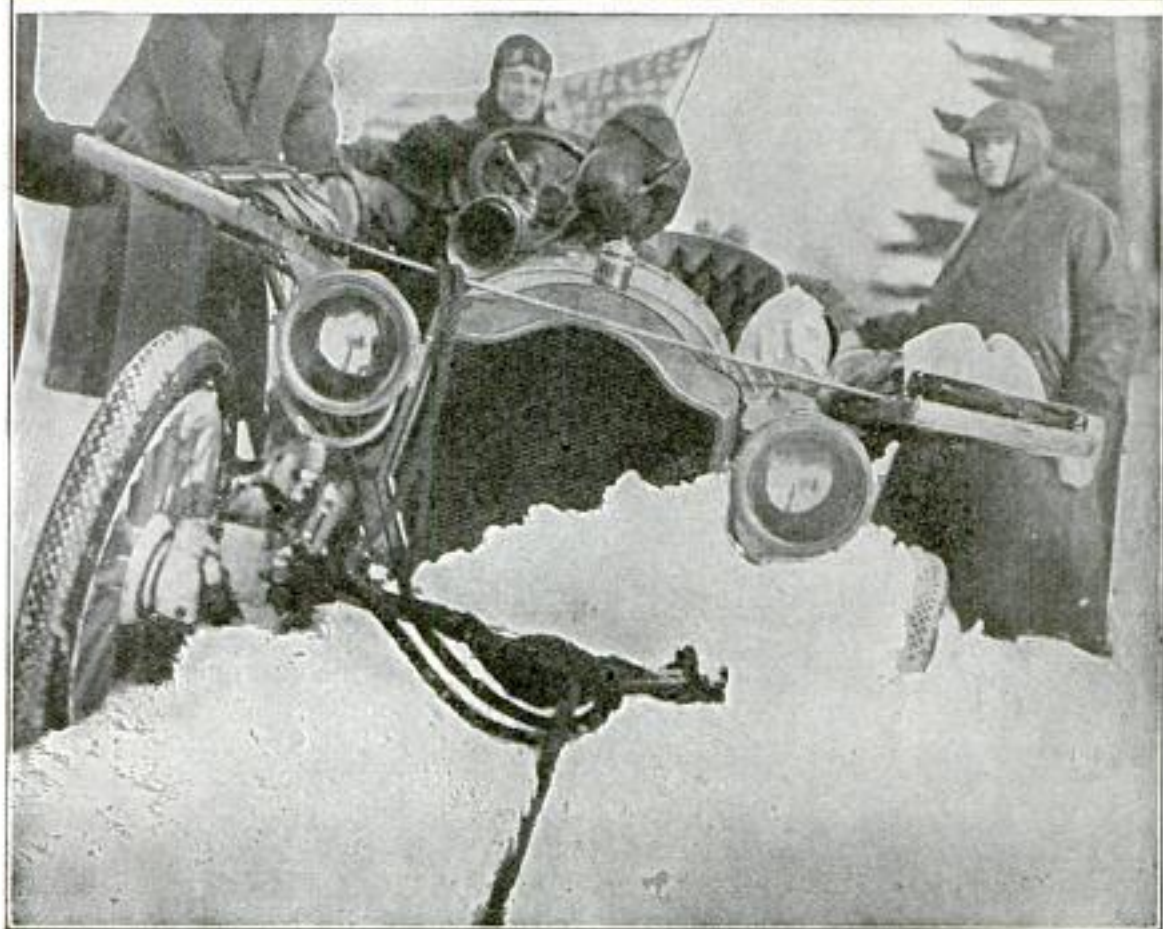
The six automobiles which started from New York on February 12 on the first lap of the 20,000-mile race to Paris, three-quarters around the world, by way of Chicago, San Francisco, Alaska and Siberia, met with difficulties before reaching Chicago, in comparison with which the trip across Alaska and Siberia, so some of the contestants believe, will be easy.

Of the six cars entered, only one, the Thomas Flyer, driven by Montague Roberts, flies the American flag. The other cars are the De Dion, French, driven by M. St. Chaffray; Motobloc, French, driven by M. Goddard; Sizaire-Naudin, French, M. Pons; Brixia-Zust, Italian, Antonio Scarfoglio; Protos, German, Lieutenant Koeppen.

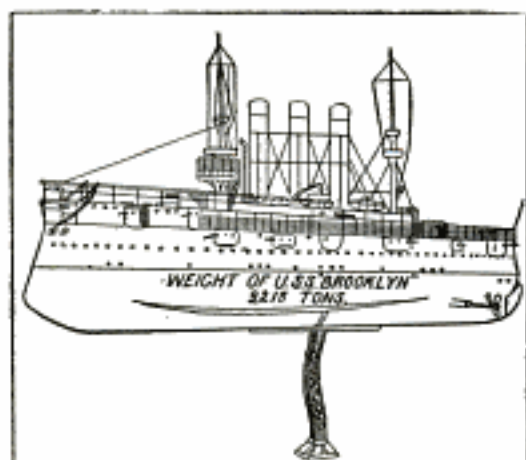
Montague Roberts and the American car took the lead soon after leaving New York and ran into Chicago during the last week of February, still in the lead. Through the worst blizzard of the winter, the American car bucked snowdrift after snowdrift, breaking the path through hundreds of miles of snow-blocked roads. Where the roads were absolutely impassable, railroad tracks were straddled and the car pumped its way over the ties. In two instances deep gullies were crossed on narrow electric railway trestles. The French and Italian cars were still fighting their way through the snowdrifts of Indiana when the American entry reached Chicago.

One of the illustrations shows the American car bucking the Indiana snowdrifts, and the other is a scene in Paris just before the French and Italian cars started for America.

Orders have been posted in the shops of the Pennsylvania railway system prohibiting swearing among the men while at work. The penalty will be an enforced vacation.



Paris Gives a Warm Send-Off--Indiana a Cold Reception



The steel girder which broke and caused the fall of the Quebec bridge was supposed to stand a load of over 9,000 tons, or a load equal to the entire weight of a big battleship. Imagine a single girder holding up the battleship "Brooklyn," which weighs 9,215 tons, and you have the load the broken girder was expected to carry.

STILL IMPOSSIBLE TO RESTORE TONE OF CRACKED BELLS

Every attempt so far made to restore the tone of cracked bells has proved unsuccessful. In many instances the cracks have been filed and sawed out and hot bell metal has been poured in, but the results have been the same. Bell metal is an alloy composed of 75 per cent copper and 25 per cent tin.

"The only way the tone of a cracked bell can be restored is by recasting it," says the manager of the McShane Bell Company. "There have been any number of experiments made by those claiming to restore the tone in various ways, but these experiments have never been successful."

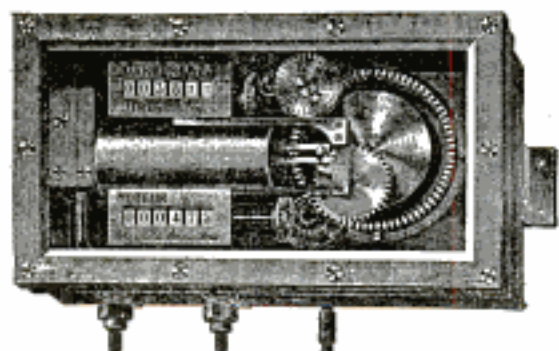
The same assertion is made by Chester Meneely, of the Meneely Bell Company, who says that the hot bell metal will not fuse properly and the cracks appear after a few blows have been struck with the hammer.

Undoubtedly a way will be discovered some day by which the tone of a cracked bell may be restored. To successfully solve this problem will fill a long-felt desire. There are historic bells in existence for which countries or societies would pay hundreds of dollars to have successfully mended and the tone restored. The great American Liberty

Bell is one instance, and the old Spanish mission bell at Anaheim, Cal., another. It was only a couple of years ago that it was thought impossible to braze cast iron, but it is now an accomplished fact, and the process may eventually prove successful in repairing bells.

GASOLINE METERS FOR AUTOMOBILES

Among many other schemes devised for the purpose of keeping an accurate account of the movement, or lack of movement, of the different parts and accessories of automobiles is a meter for measuring the amount of gasoline



A French Idea

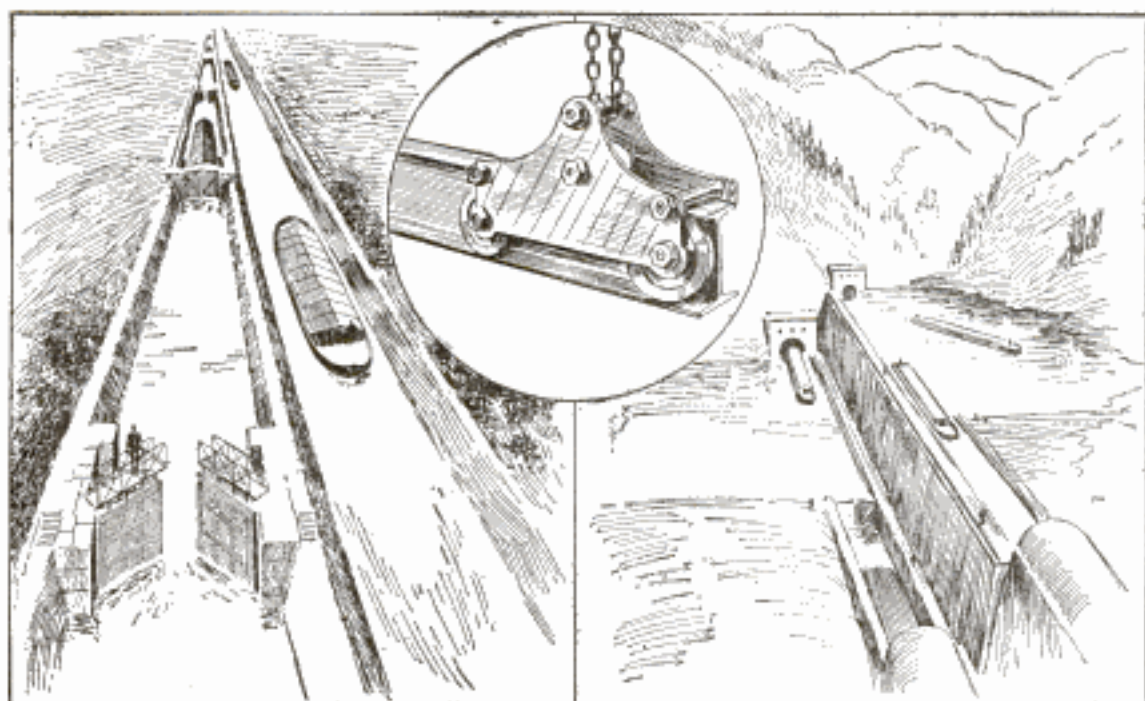
consumed by the engine at different speeds. The upper dial shows the amount of gasoline used and the lower one indicates the revolutions of the motor in hundreds.

RUNAWAY ENGINE WRECKS 30 CARS

A runaway Buffalo and Susquehanna locomotive broke away from its train and ran wild for a distance of 15 miles, killing one man, injuring several more and completely wrecking a freight train of 30 cars, which stopped its mad flight. The cause of the runaway is believed to have been a defective spring, which allowed the throttle to slip several notches and let in a full head of steam.

American automobiles sold in 1907 brought \$105,000,000.

TO CLIMB THE ALPS WITH BOATS



Proposed Method for Floating Boats Over Mountains

An Italian engineer named Signor Caminada proposes to connect Genoa with Lake Constance and float barges over the Appennines and the Alps by a ship canal project more stupendous and seemingly more impracticable than the wildest dreams of imaginative and unpractical brains. Yet Europe is impressed, and the scheme has won the support of the famous engineer, Senator Columbo, president of the Polytechnic of Lombardy. At first view the idea is startling enough to make the most sanguine thinkers become skeptical, but as it unfolds and takes shape possibilities present themselves which are worthy of more serious consideration.

Signor Caminada's scheme is to construct what might be called a water ladder over the mountains with a long series of locks and canals. The canal is composed of two parallel tubes or channels, one of which is for barges running down the mountains and the other for barges climbing over. In the locks the barges are raised and advanced by the power of incoming water, the vessels being kept straight by two

sheaves running on rails above and below. When the canal has to pass through a mountain it runs in two tunnels inclined in opposite directions. The key of the scheme is the fact that the water descends in both tubes, but crosses from one to the other alternately, so that when a barge descends with the sinking water in one tube, another barge is rising with the same water, which necessarily rises in the lower section of the other. Further water from the main reservoir carries the ascending barge to the top, and the descending boat enters the next tubular section. The canals will be constructed of masonry and closed with iron gates. The cost of such a scheme is estimated at \$300,000,000.

1. The running sheave and rail to keep the barges in a direct course through the locks.

2. Canals with sloping bottoms, the upward passage divided into locks, the downward passage free for descending barges.

3. The ends of a mountain tunnel with its supply basins and boats ascending and descending

MAKING THE FAMOUS TOYS OF NUREMBERG

One of the quaintest industries of Germany is the manufacture of wooden toys which has been carried on for centuries by the famous toymakers of Nu-

deer. The toymakers slice these wheels as a loaf of bread is sliced. The roughly outlined pieces then pass into other hands in the family and by stages are gradually brought to a finished state.



HIGHEST BLAZE ON RECORD

What was undoubtedly one of the highest fires in the world's history occurred recently when the wireless telegraph station at the top of the Eiffel tower, 900 ft. above the streets of Paris, was burned out with a loss of \$16,000. The fire could not, of course, be reached by lines of hose, so firemen ascended from the street in the hope of extin-

remberg, and its environs at the edge of the Black Forest.

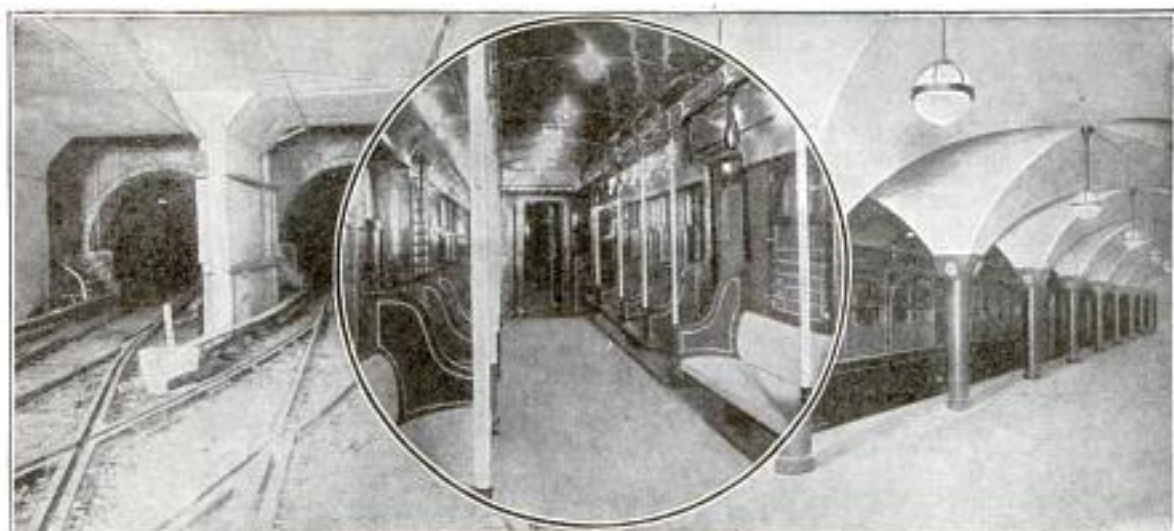
Today, as in past years, the homes of the toymakers are their shops, and each family works by itself. Not only every village but every family has its specialty, forming a veritable monopoly, curious from an economic standpoint. Each village and each family withholds the right to manufacture its specialty, and if a rival family or village usurps a style or a product, this right is maintained by family or village disputes. The 1,400 inhabitants of Seiffen live by work on wooden toys, their specialty being animals in pens and the Noah's ark. One family makes the cows, another the horses or goats, and still another the lions and elephants, etc. Each family sells its products directly to toy agents who come periodically to buy the separate pieces.

The manufacture of wooden animals is quite simple, but does not want for ingenuity. The work starts with a specially prepared circle or wheel of white wood, which is turned and grooved to make the outline of a pony, horse or



guishing the blaze with chemicals. By the time they reached the top the delicate apparatus had been ruined. New instruments will be installed

NEW YORK-HOBOKEN TUNNEL COMPLETED



Section of Tunnel

An All-Steel Car

Vaulted Roof at Stations

The first section of the \$70,000,000 system of tunnels connecting New Jersey with New York was opened February 25. It is the first tunnel for passenger traffic under the Hudson river and forecasts the doom of the Hudson ferries. The opening was celebrated by officials of the two states, the nation, and thousands of commuters, who no longer have their coming and going dependent upon fog, ice, and ferry delays.

The two tubes of the tunnel are separated by a thick wall, each being an individual cylinder. The trains, as they rush through, act as pistons and draw in with them fresh air from the stations.

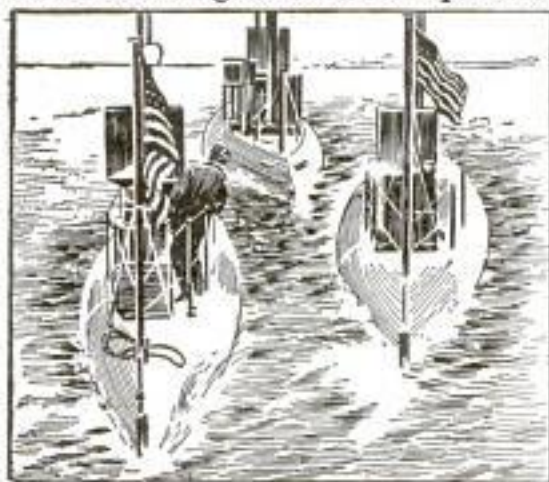
The cars are of a new type, constructed of steel, with concrete floors. They have three big doors on each side and one at either end, all controlled by compressed air. The motormen cannot start the trains until they receive a flash signal from the guards, and the flash signal cannot be sent until every door in every car is completely closed, insuring safety to passengers. The seats run along the side and accommodate 100 passengers.

The ceilings of the stations are vaulted, the lights bringing out an effect which is restful to the eyes. At the stations the trains run in between two platforms. On one of these the pas-

sengers alight, while from the other the cars are entered. The trip from Fourteenth street and Sixth avenue, New York, to Hoboken is made in 10 minutes.

SUBMARINE SQUADRON ON CRUISE

The United States submarine boats "Cuttlefish," "Viper" and "Tarantula" have been making a cruise from New York harbor to Hampton Roads, the longest trip of the kind ever made by boats of their class. The first start was interfered with by great quantities of floating ice in lower New York bay, and the little fighters were compelled to

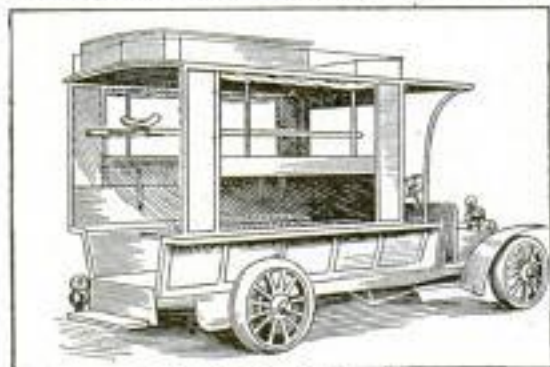


On a Loan "Hike"

return to the Brooklyn navy yard, all of them more or less injured, rudders and propeller blades being bent. Rumor places their destination as Manila Bay.

PARIS AUTOMOBILE AMBULANCE

This automobile ambulance is one of a number of types in use in Paris. It is completely equipped for the comfort



French Hospital Auto

and care of patients of every description. The sides are curtained instead of being solid, and can be rolled up when more than the usual amount of

fresh air is desired. The box on the roof is filled with surplus bedding and hospital necessities.

SINKING FLOORS TO PROTECT THEATER AUDIENCES FROM FIRE

A prominent German constructing engineer has devised a novel and somewhat remarkable scheme of fire protection for theaters, which he proposes to demonstrate this summer by the building of a theater and then its destruction by fire to prove the complete availability of the system.

In case of a fire an electric button is pressed and the whole parquet floor is automatically sunk a distance of 7 ft. Asbestos flooring then shoots out from different parts of the theater, making a fireproof covering over the heads of the people as they make their way to the streets through numerous exits. At the same time the audience in other parts of the house is protected by steel curtains which drop in front of the boxes and balconies.

A SOUTHERN COTTON DOCK



The cotton unloaded at this Galveston dock is brought from Mexico in small coast freighters, loaded onto floats at the inner side of the dock, and taken to sheds, where it is stored until the arrival of ocean steamers to transport it to England. Mexican grown cotton is now in great demand.

One of the Great Cotton Docks—Vessels Loading for Export

ALUMINUM HEAVIER-THAN-AIR FLYING-MACHINE

Mammoth Mechanical Flyer Is Balanced Like a Bird

Dr. A. R. Silverston, a Milwaukee inventor, backed as a partner by Woods Plankinton, one of Wisconsin's younger millionaires, has completed a heavier-than-air flying machine, which, in addition to the aluminum construction, has two distinct features, both of which are worthy of serious consideration. The first, and probably most important, is the method by which the inventor expects to automatically maintain the equilibrium of his machine, so that the center of gravity will always coincide with the center of air pressure. The second is the method of propulsion and maintenance in the air.

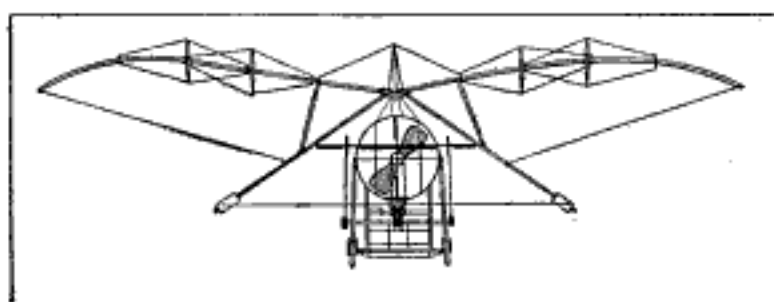
The main portion of the machine consists of a cylindrical body 8 ft. 3 in. in diameter, by 24 ft. long, mounted and supported 6½ ft. over the body of the car, which is 16 ft. long and 9 ft. wide. This cylinder is constructed entirely of 30-gauge aluminum sheeting and to prevent these thin sheets from collapsing, trusses are run across 12 in. apart. Over 22,000 rivets were used in its construction. Inside the cylinder or drum is an 8-ft. cast aluminum propeller, which is held in place by light steel and aluminum tubing. The propeller has two blades and is driven by a sprocket chain from the 40-hp. engine located in the car.

Above the cylinder or drum, are two sets of carrying planes or gliders, one set adjusted across the top of the cylinder at the front, and the second across the top of the cylinder at the rear, a space of 12 ft. intervening.

The two sets of wings or gliders are independent each of the other, but the wings of each set have only a see-saw motion—that is when one

wing goes up its mate goes down correspondingly.

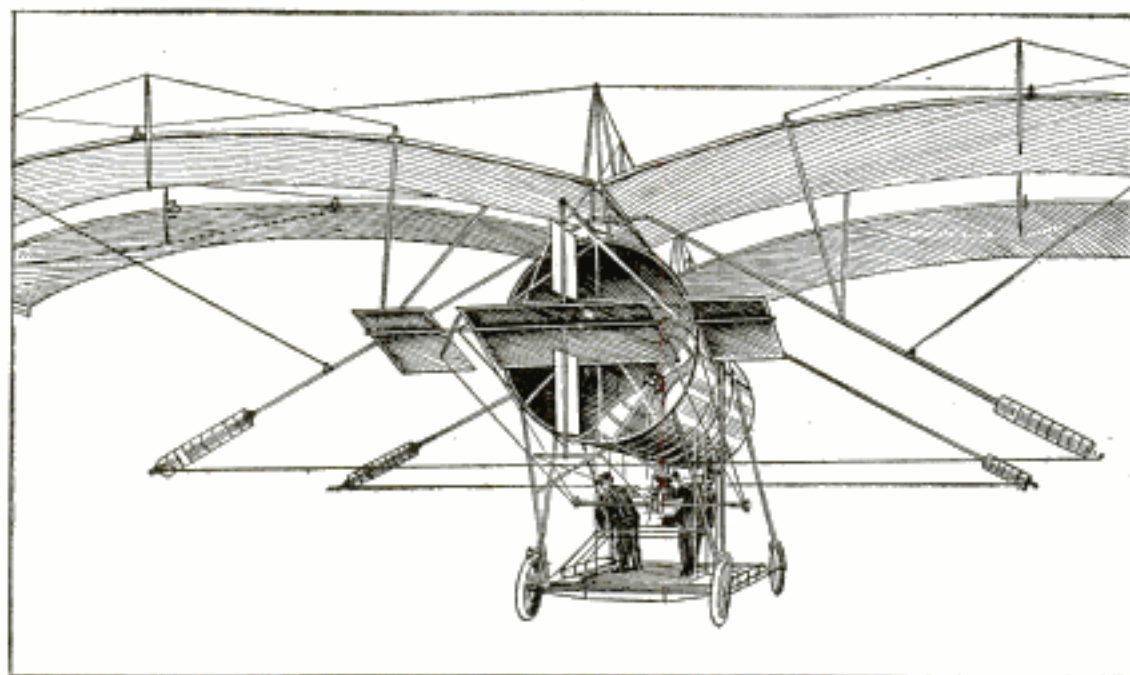
Each pair of wings has a total



spread of 60 ft. from tip to tip, and are 6 ft. wide. From these two great pivotal planes, covered with oiled Japanese silk, the cylinder and car hang like a pendulum from a clock.

The theory is a simple one. Revolving the propeller at a sufficient speed a partial vacuum is created and consequently the machine is drawn forward. The planes are not necessary to keep the machine sailing through the air. Their mission is to maintain an absolutely automatic equilibrium, holding the cylinder and car vertically in suspension, no matter from what direction the wind.

As shown in the illustrations, two balance rods connect with the shaft of each pair of planes and straddle the cylinder. At the ends of these rods are weights, sufficiently heavy to swing the planes back to a horizontal position when the pressure of the wind is withdrawn. Piano wires fastened to the framework of the planes connect them with the ends of the balance rods, which are themselves connected by two piano wires run between the cylinder and car. Flying south, for instance, with the wind blowing from the west, the wings execute a movement like a bird gliding through the air, but the car and cylinder hang straight down. Under this condition, the wings of the two planes on the right side swing up from their horizontal position, and at



The Wings of This Aluminum Bird Spread 60 Ft.

the same time the wings on the left side swing just as far downward. The supposition is that before the planes could swing far enough around for the balance rods to strike against the cylinder, thus throwing the machine off balance, the left wings would also catch the wind, and meeting with this resistance, aided by the weights on the right-hand balance rods, continue to maintain the equilibrium.

The greatest problem was to make the pivotal planes so as to obtain the required angles and distances thereon, and still keep the original spread of 60 ft., monoplane system.

The steering apparatus is fastened to the forward opening of the cylinder, and consists of a lifting or horizontal rudder, which has an area of 48 sq. ft., and a vertical rudder having an area of 16 sq. ft. Both are operated by steering wheels from the car.

Dr. Silverston believes that the machine has the full power of a strong and perfect gyroscope. The pivotal planes have a surface of 750 sq. ft., with an additional plane area on the cylinder, including the horizontal rudder, of 650 sq. ft.

Although built almost entirely of steel and aluminum the entire machine

weighs only 1,400 lb. Nearly 900 castings were used in its construction, 250 of which were of different patterns. The big cylinder weighs 198 lb.

Only two tests have been made, both of which were without the planes in position, but from these tests the inventor is confident that the machine is a success and will fly under perfect control at a speed of at least 80 miles an hour. With the propeller running at 300 revolutions a minute it was necessary for six men to strain at the machine to keep it from forging ahead and rising in the air. At this speed of the propeller a current of approximately 320,000 cu. ft. of air a minute was drawn through the cylinder.

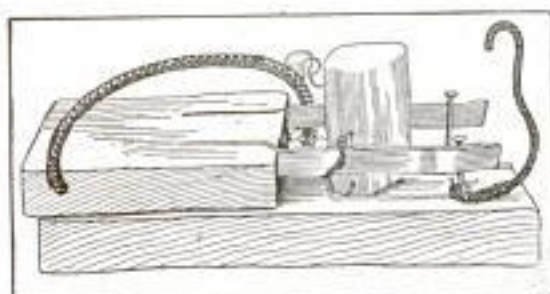
According to Dr. Silverston the experiment demonstrated clearly the complete efficiency of the propeller to lift and move the machine with ease at 300 revolutions a minute, and that it can utilize 90 per cent of the horsepower developed. Without taking momentum into consideration a speed of $37\frac{1}{2}$ miles an hour was figured out in the tests, with the propeller making only the 300 revolutions above mentioned, and only 8 hp. being used. The high efficiency speed of the propeller is mathematically figured out to be 1,680 revolutions a minute; the maximum speed of the en-

gine is 2,000 revolutions. The propeller is geared 3 to 1.

The gasoline is carried in two elongated tanks, holding 14 gal. each, sufficient for three hours' flight. The machine is designed to carry at least 1,000 lb. more than its own weight.

DANGEROUS DOUBLE-POLE SWITCH

This dangerous but unique double-pole switch was found by the Chicago electrical inspection department. It was



Dangerous Home-Made Switch

doing service in a regular lighting circuit, and although dangerous as a fire hazard, it showed considerable ingenuity on the part of the designer.

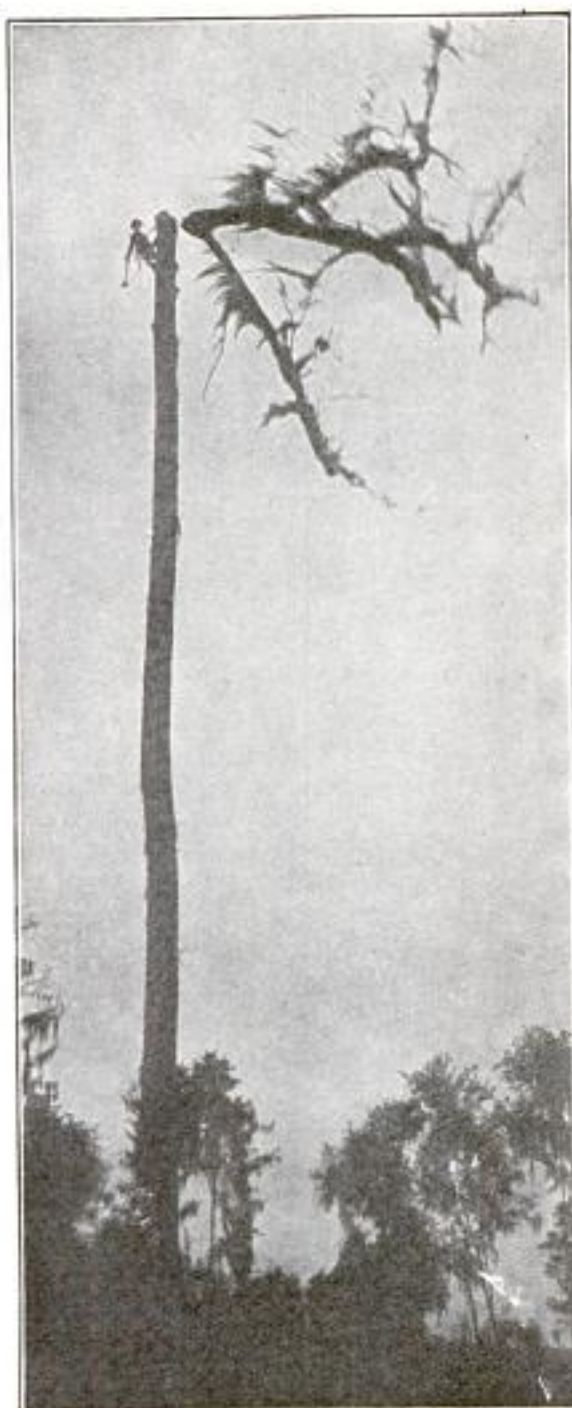
Wires were attached as shown in the illustration, and two pieces of spring steel and two nails formed the points of contact. An oblong block of wood mounted on a pivot between the strips of steel served to connect the circuit. To break the circuit it was only necessary to turn the block sufficiently to force the steel strips from the nails.



For Shipping Gas: Germany

TOPPING A CYPRESS TREE

Perilous But Exciting Work in Midair



A Thrilling Moment

The work of topping a cypress tree looks dangerous as shown in the illustration, but in reality is quite simple, if the chopper knows his business. Properly belted and spurred, he climbs to the top of the long bare trunk and

makes himself fast with straps and steel snaps. He digs the spurs of his climbers into the trunk, swings himself outward, and begins to chop. When the trunk is almost severed he leans far out on the opposite side from which the top is to fall and with a well-directed blow sends it crashing to the ground.

A steam logging skidder was to be placed under this tree and it was topped so that falling limbs could not endanger the lives of the workmen under it. Its height was 150 ft.—Contributed by Chas. Martin, Harmony, La.

ELECTRICAL BANANA UN- LOADER FOR SHIPS

At least two-thirds of the ordinary waste accompanying the shipment of bananas by water is prevented by this electric unloading apparatus. At New Orleans, where the machine is in use, over 7,000,000 bunches of bananas are annually unloaded. Formerly this work was all done by negroes who were stationed in the hold at one hatch at a time. They passed the fruit from deck to deck, and then to the shore, as a bucket brigade passes water from hand to hand.

With the machine, only a few negroes are needed, the fruit is not bruised, and 2,500 bunches per hour can be unloaded. The apparatus is built upon a platform upheld by 10 trucks. From the platform booms rise in the shape of a hinge which opens and shuts. When ready to commence operations, the hinge is opened and the lower joint dropped into the hold. The canvas carrier, which revolves around pivots placed at each end of the steel boom, is divided by bars of wood into pockets 30 in. in length and 48 in. wide. The fruit is loaded into the pockets at each deck by negroes and is swiftly carried up the perpendicular boom and across to the wharf.

A lookout tower is stationed on top of the machine, from which one operator controls the entire mechanism. The trucks on which the platform is built

rest on a track which runs the entire length of the wharf, making it possible to move the apparatus from place to place. This is accomplished under its own power.



Mammoth Unloader

The Nantucket Central railroad has adopted motor cars in place of the steam locomotives hitherto in use. The motor cars will run on the same tracks under their own power. The road is 8 miles long.

Coal briquettes proved unsatisfactory on the flagship "Connecticut."

COOKING SCHOOL IN THE NAVY

Methods Used for Obtaining Good Cooks on Our War Vessels

Naval officials believe that the best way to make a man efficient and keep him contented is to feed him well. Sometimes there are complaints of the food in the navy, but in most instances the complaint is unfounded; and in the few cases where there is cause for grumbling it is either due to conditions which make it impracticable to supply fresh provisions, or to an incompetent or unreliable steward or cook.

In order to prevent good food being spoiled by poor cooks, the department has recently established a school at Newport, R. I., for ships' cooks and bakers. It is the purpose to send to this school all men recruited as cooks or bakers. In addition, men already in the service, who want to become cooks, and can show some fitness, will be sent to the school in limited numbers.

The school will be equipped with electrically driven meat choppers, large bake ovens, coffee urns holding 50 gal., mechanical dishwashers, cold storage, dough-mixing machines, and several ranges, sufficient to prepare a meal for three or four hundred men. It will be on the same plan as the galley on board a battleship.

The instruction will last for four or five months, and will be under the supervision of a chef, while a first-class ship's cook will be in charge of each galley.

The recruits will first be put to work tending fires, cleaning up, and helping prepare the food. They will be given certain dishes to prepare, and finally will be placed in charge of the galley, superintending the cooking of an entire meal.

The students will also be required to take part in military drills, and while at the station will swing in a hammock, so that when they complete their instruction and are sent to a man-o'-war they will be familiar with the mode of living.

Ships' cooks are paid from \$25 to \$55 a month, and as they have no living expenses, their pay is nearly all clear money. Every recruit is supplied with an outfit of uniform which usually lasts a year. The pay is materially increased with each re-enlistment.

Ships' bakers get \$35 and \$45, while a chief commissary steward is paid \$70 a month, with allowances.

With the inducements of good pay and the thorough instruction received at the school, the navy is enabled to furnish the fleet with first-class cooks, bakers and stewards.



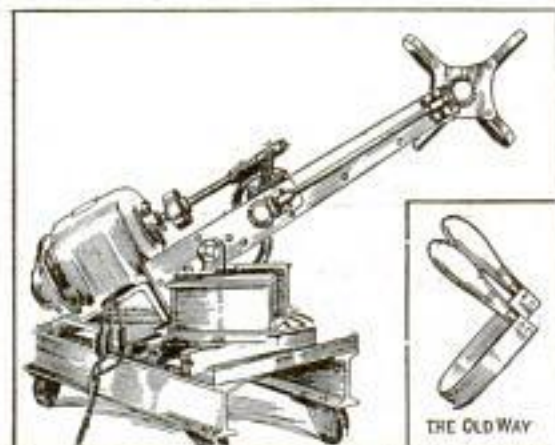
SHAMMING THE LOSS OF AN ARM

The genuine cripples of Paris have organized a club for the purpose of protecting themselves by exposing sham cripples. All the members of the club are delegated to keep a close watch for mendicants who live by feigning the loss of limbs, and reporting every instance they find to the authorities.

These illustrations show one of the simplest tricks by which sham cripples awaken the pity of the passer-by. A false stump is attached to the shoulder, and the arm at that side is tied to the body. The full blouse does the rest. The man who posed for these photographs had in reality only one leg.

EXCAVATION MACHINE FOR TUNNELING THROUGH CLAY

This electric excavation machine, for use in tunneling through clay formations, is so simple that a day laborer can use it without fear of seriously damaging it through his ignorance of mechanical tools. Invented by one of the best known construction engineers in the country, it is designed to take the



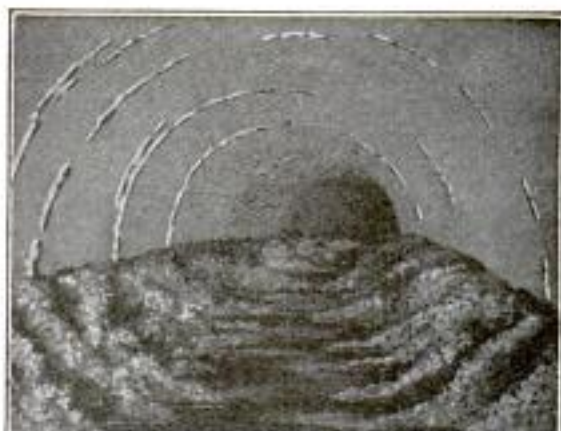
Courtesy Geo. W. Jackson

place of the gangs of 6 or 8 men who still cut into the formation at the head of a bore with the crude excavation knives used years ago.

One man operates the machine, standing back of the carriage. As the four hoop-shaped knives whirl into the clay the operator moves the long arm up or down and to either side, pushing the car further along as it cuts. A conveyer attachment catches the clay as it drops from the knives and carries it back to the dump carts.

CEMENT WATER PIPE AFTER 18 YEARS' SERVICE

The clogged condition of a 30-in. cement water pipe after 18 years' service in southern California is shown in this illustration. The foul condition on the sides and bottom is a hard deposit of lime, common in the arid regions. The primary cause of the fouling was the failure of the workmen to remove the mortar squeeze at the joints and the gravel dropped during construction. These formed obstruction and the lime, which is hard and



cement-like, lodged against them and clung, greatly reducing the capacity of the conduit.

TUGS TO STEAM 14,000 MILES WITHOUT STOP FOR FUEL

The problem of providing oil for the two oil-burning tugs, "Hercules" and "Goliath," on their 14,000-mile trip to the Pacific coast was solved by fitting out one of the tugs as a tank boat, and having it towed by the other. In this



U. S. Tug "Hercules"

way the two tugs are making their way around the continent without having to stop for fuel. Oil, unlike coal, cannot always be procured at call in every port.



Rotary Cement Kiln

MAKING TEST BORINGS WITHOUT WATER

In drilling test holes in earth most boring machines use water to wash up the material or to make the drilling easier, a method somewhat unsatisfactory because the



action of water changes some earths materially by softening and washing away fine sands. This inexpensive, portable machine does the work without water, and at the same time takes a core.

The drilling is done with one of the several tools attached to the drilling rod most adapted for the particular kind of ground being drilled. The tool and rod are operated inside the casing by the men on the platform, who raise and drop them like a churn drill. The men on the ground rotate the casing, which has a sharp cutting shoe on the lower end. The casing, with its burden of platform and men, keeps cutting and sinking into the ground several inches ahead of the tool. The material which enters the casing is drilled

and forced into a sand pump at the same time. An accurate core is thus obtained, and the exact nature of the ground shown. The casing is generally of 4-in. pipe.

FIRELESS STEAM ENGINES

A railway locomotive running along under a full head of steam, but with no fire box and no fire, is the latest



Makes No Smoke

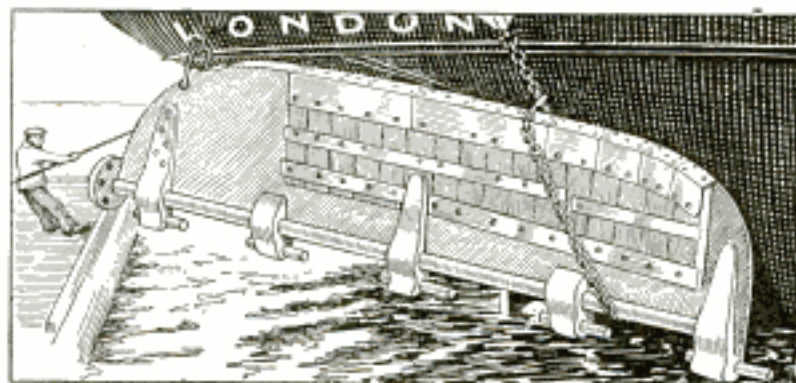
German type of engine for use in shops and yards where the presence of fire and sparks would be dangerous.

The engine is run by superheated steam under high pressure. This is condensed in a chamber, one-fourth of which is filled with cold water, surrounded by an insulating air mantle. Several iron jackets and a felt layer cover the condenser. The condensing continues until the temperature and the pressure equals that in the feed boiler.

Glass telephone poles, reinforced by wire, are being used in some parts of Germany.

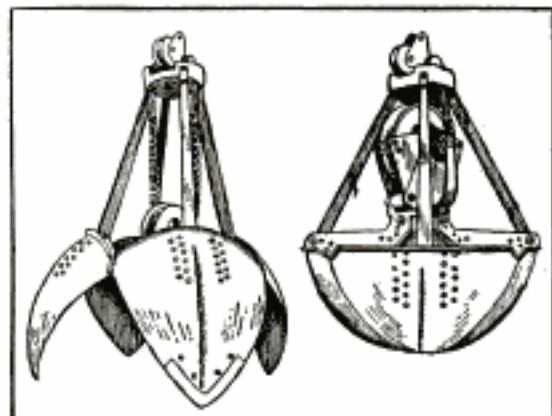
REPAIRING A SHIP'S RUDDER

This rudder was damaged by a storm at sea and the vessel put into the nearest port to have it repaired. In the illustration it is being placed in position again, somewhat patched but still capable of steering the great hulk which would be so helpless without its services.



ORANGE-PEEL BUCKET FOR DREDGING

This extra heavy standard orange-peel bucket is built in sizes of from 1



Lifts 7-Ton Rocks

to 10 cu. yd. capacity and 5 to 12 ft. diameter when closed. At New Brunswick, N. J., rocks weighing six and seven tons were handled by a $1\frac{1}{2}$ -cu. yd. bucket, the capacity varying from 300 to 500 cu. yd. per day.

ELECTRIC RAIL BOND WELDER

This machine is in use by the Toronto Railway Company for joining the ends of their rails with copper strips so as to make perfect electrical connection between them, and thus overcome the troubles of faulty contact at the fishplates. Each rail is joined to its neighbor by a copper band electrically welded to them by this ma-



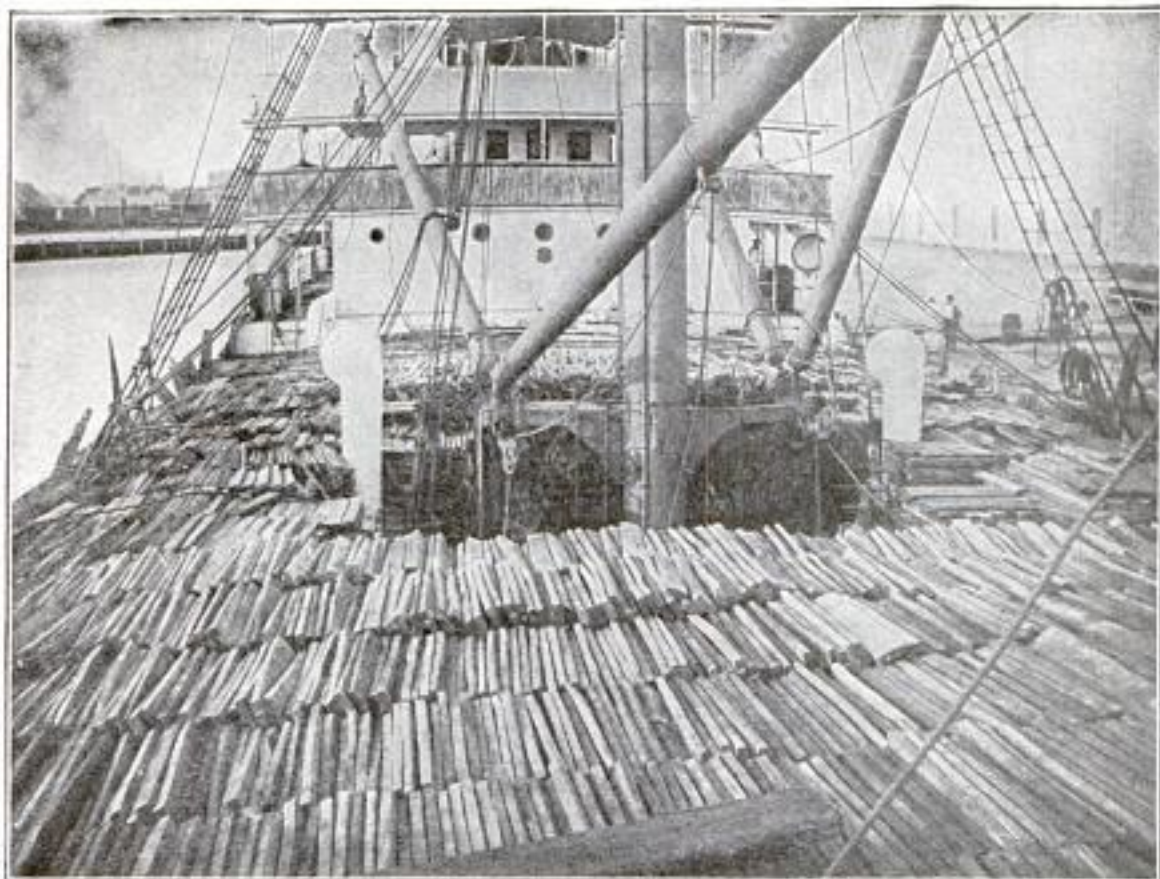
Portable Electric Welder

chine. The machine takes its power from the overhead wire by the trolley pole, which is just cut out of the picture. All the appliances necessary are mounted on the truck, which has a traction device by which it can be driven from one rail joint to the next. The work is done by the two carbon-faced jaws shown in the picture above each rail. The amount of heat required is controlled by the rheostat, shown also. The work is done much more easily, quickly and better than by the old method, and without much delay to traffic over the lines, as might be expected. This is overcome by employing a pivoted jack in the center of the truck, which lifts it from the track and allows it to be turned and pushed off to the side of the road to allow cars to pass. It usually takes about 5 minutes to finish one rail-joint, a man working at each rail at the same time.—Contributed by A. M. McPherson, Toronto, Can.

MACHINE TO REVEAL HUMAN EMOTIONS

Wonders, or supposed wonders, never cease. The latest is a machine called the "Phlethysmograph," and tells whether or not you are worried, frightened, angry, or happy, by recording the varying effects of thoughts and emotions upon the circulation of the blood. It consists of a sort of sleeve into which the arm is inserted. Any shrinkage or dilation of the blood vessels is shown by the rising or falling of a column of water in a glass tube connected to the sleeve. The supposition is that not only the pulse beat but the fullness of the blood vessels vary with the different emotional states, and that this machine tells just which emotion is uppermost, no matter how successfully the patient hides his or her thoughts.

The Pennsylvania railway will soon be running trains composed entirely of steel cars between Chicago and New York.



After Filling the Hold the Staves Are Piled 10 Ft. High on Deck

SHIPLOAD OF STAVES

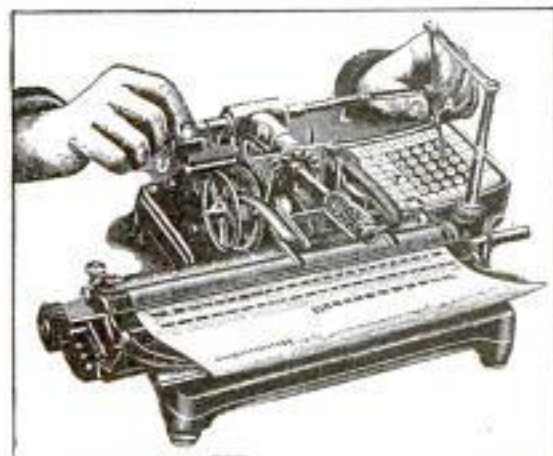
This ship, en route from Galveston to Antwerp, is heavily loaded with staves, a somewhat unusual cargo to start from that southern city. The value of the full cargo is \$50,000. The cargo is more bulky than heavy, and after the hold was filled the staves were piled 10 ft. high on the deck.

TYPEWRITER WITHOUT KEYBOARD

This French typewriter is built on the idea that speed means complicated and exceptionally accurate mechanism, and that such mechanism means a price that is prohibitive to a large number of people. Speed was therefore sacrificed and the machine was built with as few parts as possible.

It carries no keyboard and the designation of characters to be used is made by a stylet or needle which is moved by the left hand of the operator until its

point is over the desired letter, figure or sign enameled on the plate. The characters are arranged line by line on a cylinder, and as the stylet is moved over the plate this cylinder revolves and advances or recedes until the desired



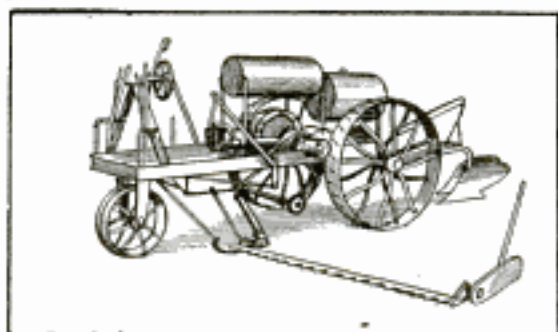
Not Built for Speed

character is in the proper position to make the impression on the paper. A key is then struck by the right hand and the impression made. Another key makes the spaces between words.

GAS POWER DIRECTLY APPLIED TO FARM IMPLEMENTS

The gas traction engine, which is so widely used on the larger farms of the country, now has an auxiliary in the self-contained principle of applying gas power to the implements themselves. By this principle the power will be part of the machine it is driving, not connected to it in the form of a tractor which pulls it or drives it by belts.

One illustration shows a mowing machine which can be changed into a plow. The other is a conception of a

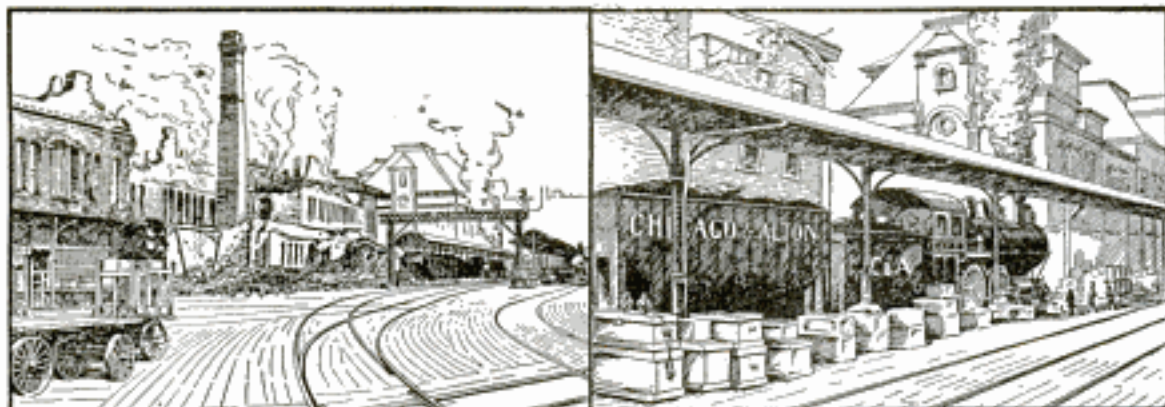


Plow and Reaper

hay bailer thus equipped, and is the idea of Gas Power. No one has as yet made such a machine, but its advantages would be great.

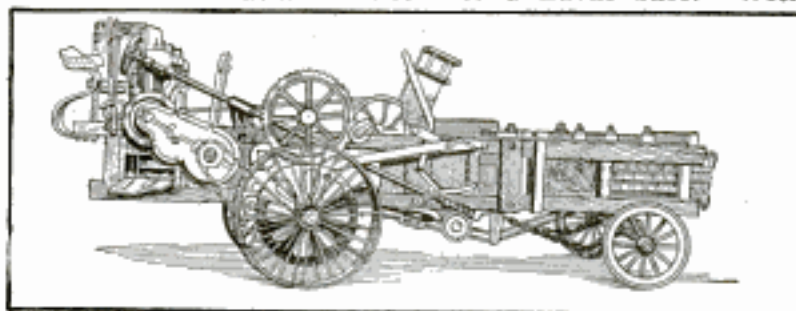
GERMANY TO FORTIFY HELIGOLAND ISLAND

A deep impression has been produced



"The Only Way" to Heat the Kansas City Depot

in European naval circles by the decision of Germany to fortify the island of Heligoland, which is about 14 miles off the mouth of the Elbe in the North sea, and turn it into a naval base. With



Suggestion for Motor Hay Baler

this island and the shore fortified with the type of guns carried by the "Dreadnaught" it would be almost impossible for the ships of an enemy to pass the mouth of the Elbe. Heligoland became a great strategic base when the Kaiser Wilhelm canal, connecting Kiel with the mouth of the Elbe, was completed a few years ago.

LOCOMOTIVE WARMS DEPOT

A fire recently consumed the plant which furnished heat to the Union depot at Kansas City and power to operate the interlocking switches and signals in the yards. To meet the sudden emergency a Chicago & Alton mammoth engine was coupled to a coal car and headed in close to the depot, where it furnished sufficient steam heat to keep the building at an even temperature of 70 deg., and also supplied the power to operate the interlocking switches.

THE GHASTLY END OF OLD HORSES



"Tied in Roughly Constructed Stalls Between Decks"

Horrible and revolting to the extreme is the traffic in old worn-out horses regularly carried on between England and the Netherlands, ending with the final scene in which the most useful and human of all domestic animals is served up on a platter in the form of so-called Bologna sausage and filet d'anvers.

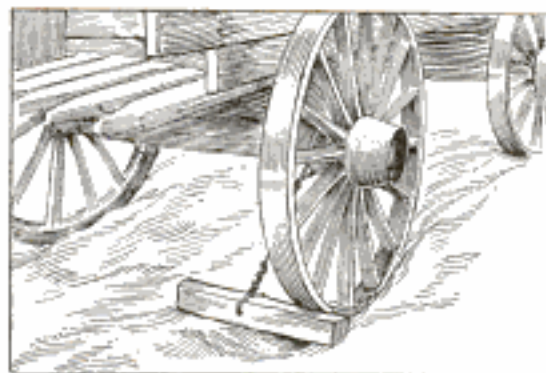
The sufferings of the horses are the most intense during the passage from England to Rotterdam on shipboard. Tied up in roughly constructed stalls between decks, they are at the mercy of the storms, and in many instances are thrown into tangled heaps on top of one another. All that survive are dragged from this tangled heap to start the miserable procession through the streets to the abattoir or slaughter house, their most unsightly wounds covered with sacking.

This traffic is sanctioned by the British Board of Agriculture, and the society for the prevention of cruelty to animals found in a recent investigation

that no avoidable cruelty was suffered, although many cases were noted of horses in agony from disease and horrible wounds.

SIMPLE AUTOMATIC WAGON BRAKE

In drawing heavy wagon trains up hilly or mountainous roads the rear wagon is often provided with the automatic brake shown in this illustration. It is simply a block of wood, about 2 ft.



Fence Wire; Block of Wood

long and 4 in. square, fastened by a wire to the rear axle. The block drags along the ground behind the wheel and works automatically the moment the horses slack up.

SIMPLE PROCESS OF MAKING CHARCOAL

At some of the sawmills along the California coast, numbers of negroes can be seen busily at work converting the accumulation of slabs into charcoal. The slabs are placed in piles,

of water per minute, according to the size of the machine. The advantages claimed for it are its extreme simplicity, small power required, small quantity of condenser water necessary, and safety in operation.

The refrigerant used is sulphurous acid. The compression system is employed, but without the use of suction or discharge valves, stuffing boxes, gauges and cocks. The machine is composed of two spherical bodies attached to a single shaft rotated by a pulley.

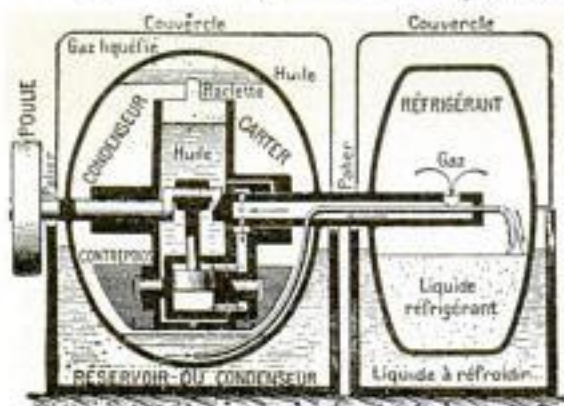


Working Up Mill Waste into Valuable Product

carefully covered with seaweed and earth, and then fired. The bags contain charcoal ready to be hauled away.

ROTARY ICE MACHINE

This motor-driven rotary ice machine, invented by a Frenchman, makes



Courtesy Ice and Refrigeration
French Ice Churn

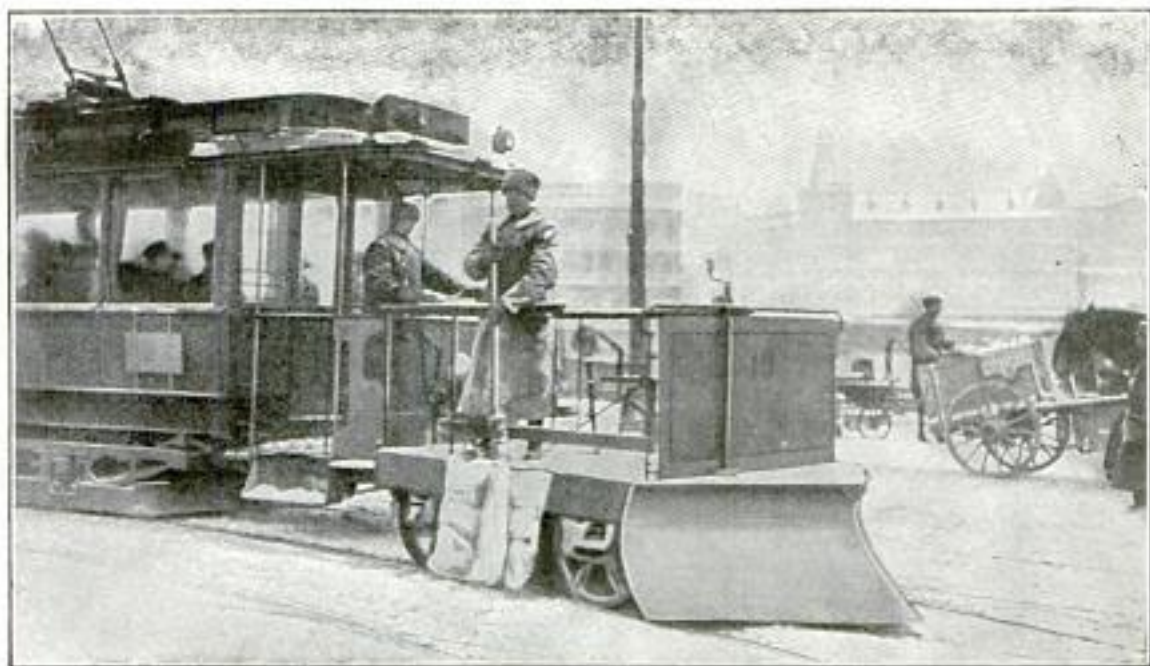
small pieces of ice in from 3 to 10 minutes, and can cool from $\frac{1}{2}$ to 12 qt.

The power required for ice-making is $\frac{1}{4}$ hp. for the 4-lb. per hour machine, and 2 hp. for the 100-lb. per hour machine.

SHORT LIFE OF MODERN SHIPS

Not more than 20 years ago the first express steamship was introduced to the world by one of the big trans-Atlantic companies. She was considered a marvel of perfection in every detail, but a couple of months ago was sold as scrap iron. A great warship built at about the same time was recently destroyed as a target for the guns of newer ships. The life of a ship is short but full. A great navy can become obsolete or practically so in 10 years. Many of the old-time wooden frigates lived four times as long as modern steel battleships.

Chicago packers are selling gallstones to the Japanese at \$14.94 a pound. What the Japs do with their queer purchase is a mystery.



Not an Observation Car—Just a Snow Plow

SNOW PLOW ATTACHED TO STREET CAR

On the street railways in Stockholm, Sweden, snow plows are attached to the front of ordinary passenger cars. One man to control the plow and brooms is all the added crew necessary.

CALL BELL ON HITCHING POST

A western druggist, with an eye for business, extended his hitching post a couple of feet and placed an electric call bell at the top of it. Prospective customers, arriving in carriage or automobile, press the button without leaving their seats, and the drug clerk immediately attends to their wants. The same bell is used for night calls. A $\frac{1}{2}$ -in. gas pipe extends from the top of the post to the second floor, carrying the wire to the druggist's living quarters. The extension from the top of the post to the bell is of 1-in. gas pipe.



ENGLISH BOILERS FOR AMERICA

With the high tariff wall to guard the United States from industrial invasion it would seem impossible for foreign manufacturing concerns to compete with manufacturers of the same kind of product in this country. This boiler is being landed at an American port after a stormy passage across the Atlantic ocean from England.

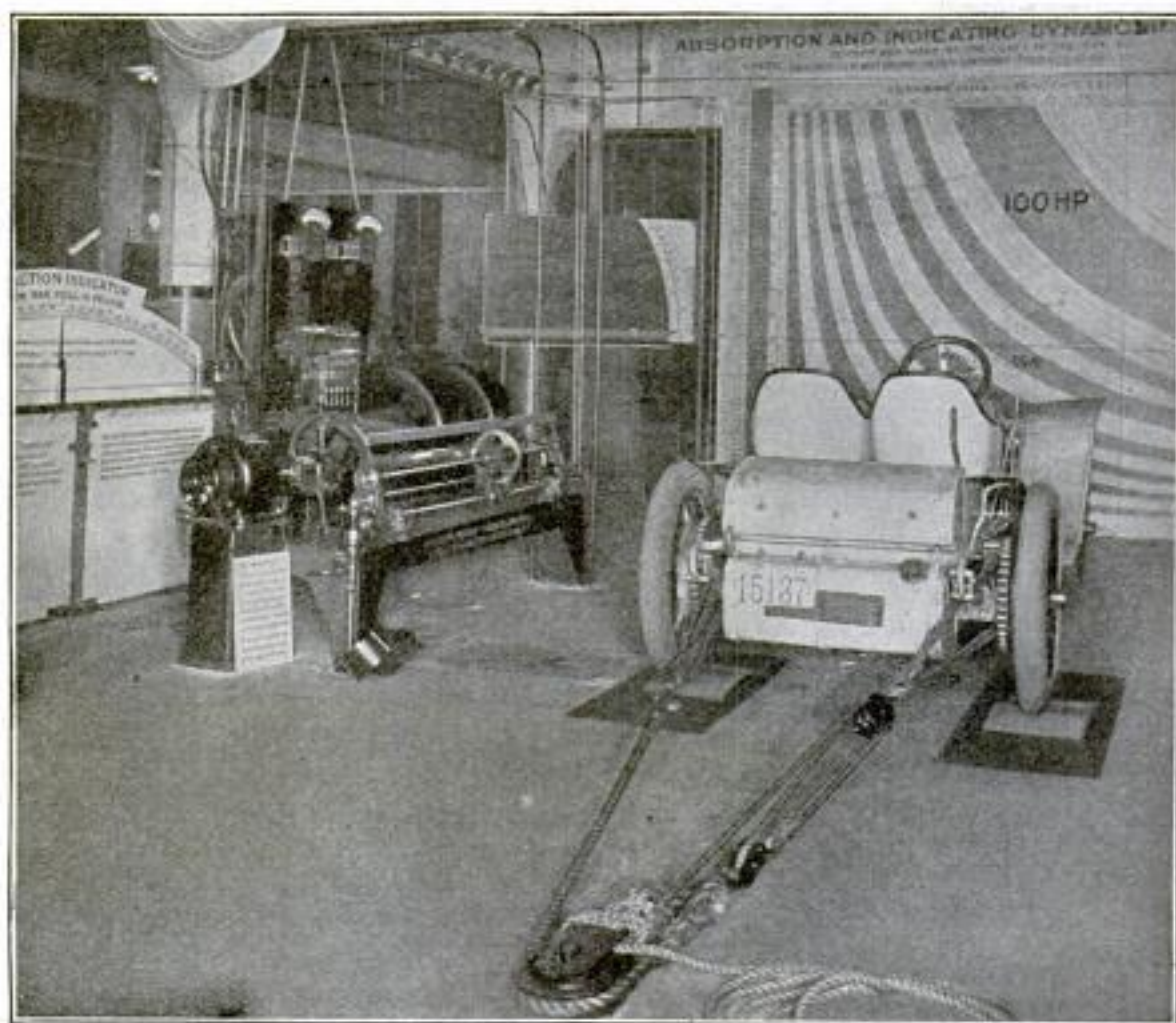


Made in England

UNIQUE AMERICAN AUTOMOBILE DYNAMOMETER

The accompanying illustration shows the equipment of the new Absorption and Indicating Dynamometer for automobiles as devised and constructed by the Automobile Club of America, for the use of its members. This novel machine determines instantly the speed from 1 to 75 miles per hour, as

of the dynamometer, which just projects through the floor. The car is held by a block and tackle while its motive power is placed in operation. The revolving rear wheels of the auto transfer their speed, horsepower and pull to the wheels of the dynamometer, which records the draw-bar-pull and tractive effort by the recording needle on the board to the left in the engraving, at the same time recording the speed and



Machine That Determines Power and Speed

well as the speed in feet per second, also the draw-bar-pull or tractive effort from 0 to 1,600 lb. It gives the horsepower from 0 to 85 at 20 miles and 213 hp. as the limit at 50 miles, while it also gives the grade-climbing ability and power of the brakes of any auto car tested by it.

The car is placed in position with its rear wheels in contact with the wheels

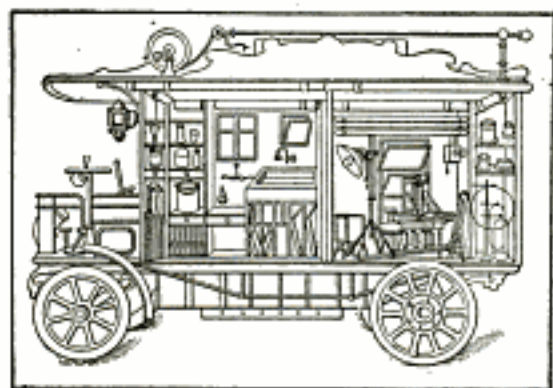
horsepower by the cross-wires on the board in front of the car. This is all operated by the dynamometer shown to the left of the car.

The first Perkins medal awarded for achievement in applied chemistry has been presented to J. R. R. Herreshoff, in recognition of the improved methods he has introduced for refining copper.

COMPLETELY EQUIPPED PHOTOGRAPHERS' AUTOMOBILE

This photographers' electric automobile, completely equipped to take, develop and print photographs, has been placed on the road by a German photographer. The storage battery which operates the car supplies light to the studio where cameras, backgrounds, lenses and head-rests are stored. The front compartment carries the developing sink, negative racks, trays and shelves for bottles and chemicals. On the roof is a turntable or stand to be used as a viewing point in photographing street scenes.

The automobile can be propelled by gasoline motor if desired, the motor to make the electric light through a gen-



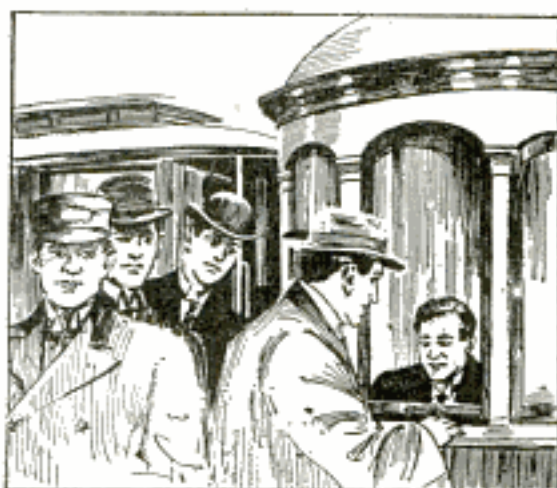
Traveling Motor Studio

erator when required. A drum is arranged on the roof to hold surplus electric cable, allowing the light to be carried some distance from the car.

CHANGE BOOTHS FOR STREET CARS

The greatest drawback to the pay-as-you-enter street cars is the necessity of always having the right change ready when you step onto the platform. Otherwise the service is blocked while the conductor comes to your assistance. Especially is this the case when the passenger has both arms full of bundles.

In Buffalo this problem is being solved by placing change booths in the more congested business districts,



"Get Change Here"

where passengers get exact change, which they hand to the conductor as they enter the car.

KEEPING SMALL FRUIT IN COLD STORAGE

Experiments have proved that for freezing small fruits and keeping them in cold storage for several months, the best results can be obtained by use of a closed package, providing it is not so tight as to prevent the escape of gases given off by the fruit after it is packed and before it is frozen.

Strawberries and blackberries were frozen for six months in the boxes shown in these illustrations, with varying results. The flavor of the fruit wrapped in the open crates was tainted with the odors from other articles in the storage rooms, and the flavor of the



Strawberries Kept 6 Months

fruit in the triple-wrapped boxes was but little better, having become tainted by the carbon dioxide gas exhaled by the fruit before it became frozen. The flavor of the fruit in the double-wrapped carton, however, was not contaminated and retained much of the flavor of the fresh fruit. The frozen fruit is used in making fresh fruit pies and fruit ices in midwinter.

A HILL-CLIMBING HOUSE

This large four-tenement dwelling house is slowly but surely climbing up, over and beyond the steep side of Fort Hill, in East Providence, R. I. The



House Climbing the Hill

task is considered one of the biggest and highest house-lifting feats ever attempted. The same system of piers, with the usual blocks, wedges, beams, rollers, shoes, capstans, and chains as used in ordinary house-moving are being employed, but the greatest skill and exactness is necessary to keep the whole structure firm and level while progressing up the slope.

One of the principal features of the work is in terracing the hill. Flat squares of dirt are dug out, making a flight of immense steps over which the building makes its laborious ascent to the top. From step to step the structure is raised by screws, and then a wedge-shaped shoe is inserted under the main supporting beams, rollers are placed, and the house dragged onto the terrace. It takes two days to raise the

house from one terrace to the next, but only 40 minutes to drag it onto the terrace afterward.

SHIP ELUDES TEN WATER-SPOUTS

In a recent passage of the Norwegian steamship "Cecilia" from Cartagena, Spain, to Philadelphia, 10 waterspouts were encountered and successfully eluded. In the wake of a hurricane off the Carolinas in which the vessel was buffeted for 12 hours, came the waterspouts. The first was seen on the starboard side, and its large size brought terror to the crew. The captain evaded this spout, only to find the vessel apparently running into the track of another one. From port to starboard the "Cecilia" was steered around 10 spouts over a course extending only 5 miles.

"PAY-AS-YOU-LEAVE" STREET CARS

Following close upon the heels of the "pay-as-you-enter" street cars, comes the "pay-as-you-leave" type of cars, patented by the chief engineer of one of the large rapid transit companies of the East. The great advantage of the latter type over the former is claimed to be in the fact that passengers can much easier get their money ready while riding than with their arms full of bundles on the street.

AN AEROPLANE LEVEL

This device is a level for determining the angle at which an aeroplane is flying. It consists

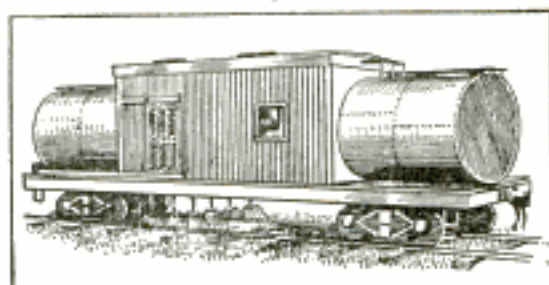


The Level

of a concave brass dish in which a drop of mercury naturally centers when equilibrium is secured. The circular lines are set about one-fourth of an inch apart, the first four lines representing an angle of about 2 deg.

THEATERS ON TRAINS

A company is being formed in Paris for the purpose of providing theater cars for all the important express trains on the continental lines. These railroad theaters are to have 60 seats, a little stage, and an orchestra consisting of a piano, a flute and a cornet. Passengers will book seats as they now engage tables in a dining-car.

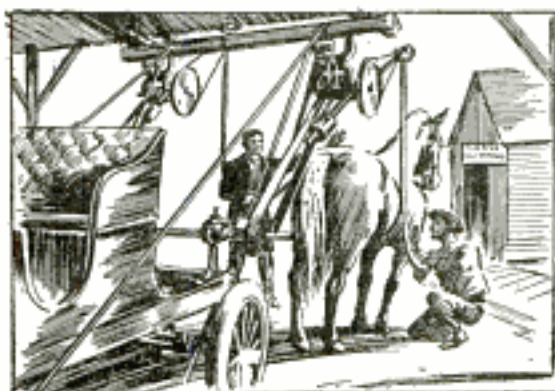


KILLING WEEDS WITH CHEMICAL SOLUTION

Another recent invention for the destruction of weeds along railway tracks is the chemical sprayer shown in this illustration. The outfit consists of a 40-ft. flat car, carrying two tanks of 4,000-gal. capacity. Between the tanks is a cab for the storage of the necessary chemicals and steam-heating apparatus. The spraying apparatus consists of six nozzles arranged in a line across one end of the car. The solution used is a secret, but tests of its efficiency are satisfactory. Only one application is necessary to kill vegetation root and branch. Each mile of track takes 500 gal. of the solution.

HORSE-CLIPPING MACHINE ATTACHED TO AUTOMOBILE

With this handy and practical horse-clipping outfit two men can travel through the rural districts plying their trade with satisfying returns and enjoy the pleasures of an automobile trip as they do it. The transformation from pleasure to work is simple. The ton-



Auto Horse Clipper

neau is removed and a double horse-clipping machine is connected to the engine shaft by belt and pulley. Half an hour after completing the task the clipping machine is dismantled, packed away and the automobile speeding on to the next job.

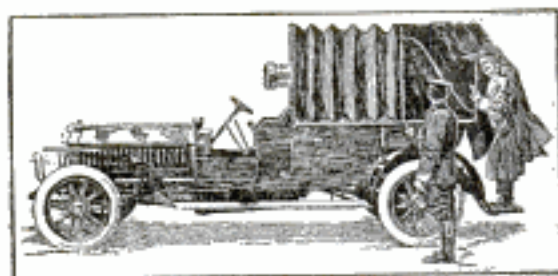
THE NORTH ELBE RAILWAY BRIDGE

Crossing the North Elbe near Hamburg, Germany, there is a most interesting and novel bridge of the type seen in the accompanying view, with three spans, massive masonry archways or towers being constructed at the entrances; short arched steel spans being employed for the approaches.

Each of the three spans measures 325 ft. in length, and it is estimated that the entire weight of the steel work of the bridge is about 4,500,000 lb.



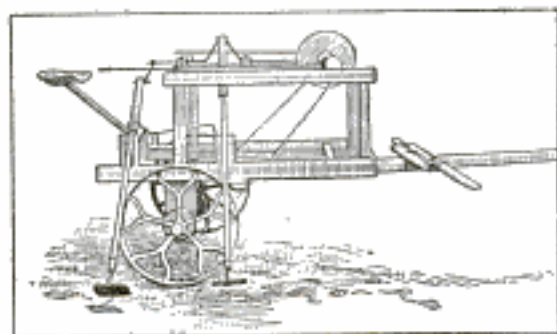
Elbe Bridge Near Hamburg—Each Span 325 Ft. Long



The subject of this illustration is simply the dream of an enthusiastic motoring photographer in Motor, London; but every great or small invention was at one time the same kind of a dream. Today is a period of big things and photography has its place in the race. One enthusiast is preparing to take life photographs for \$1,000 each. It is not unlikely that if some enterprising photographer started out with a giant camera mounted on an automobile he would find people desirous and able to pay for extra large landscape photographs.

HOEING MACHINE FOR COTTON FIELDS

The interesting device here shown is a hoeing machine used on one of the cotton plantations of Tennessee. By the use of levers and a small friction disc in contact with a larger disc, the operator can regulate the speed and stroke of the hoes so that the cotton



The Hoeing Machine

plants can be cut as desired. The machine receives motive power from a belt and pulley attached to the axle of the machine truck. One machine, operator and team can do the work of from 8 to 15 hand-laborers.

OCEAN RACE TO BERMUDA

An interesting ocean race for sailing craft will start from Marblehead on June 3 and finish off St. David's Head, Bermuda, in as short a time as a spanking breeze and expert skippers can hurry the graceful, white-winged craft

over the 675-mile course. The race will be in charge of the Corinthian Yacht Club and is expected to be the leading yacht race of the coming season in American waters.

SLEEVES FOR CARRYING SMALL DOGS

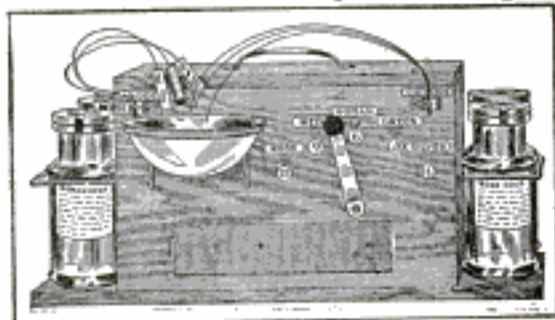
Dressmakers in London, England, are now making women's sleeves in which the small pet dogs of society — too delicate to face the cold of winter and too precious to be left at home when their mistresses go out — can be carried in comfort; at least to the dogs. The new sleeves have cuts wide enough for the "canine pets" to "snuggle" into, and yet are not so wide that they can fall out of them.



AUTOMATIC PLATING MACHINE

This automatic plating apparatus is intended for small jewelers who do a limited amount of plating. It consists of a box containing six batteries and a rheostat. By placing the lever of the rheostat at the stops indicated by the lettering, and at the same time using the right solution, the desired shade of gold may be obtained. Silver is plated with 1½ volts, green-gold with 3 volts, roman-gold with 6 volts, red-gold with 9 volts, and rose-gold with 12 volts.

The solutions are placed in glass



Portable Electric Plater

jars at the side of the box, the proper solution being poured in the bowl, where the article to be plated is connected by means of spring clips with anode and cathode wires. The weight of the apparatus is 30 lb.

“MODEL” CEMENT HOUSES FOR GERMANY

Because the Kaiser expressed his enthusiasm over the workingmen's cottages he saw in England, and his opposition to housing workingmen's families in large tenements, a company of German millionaires is being organized to build cottages by the thousands near all German industrial centers. If Edison's model cottages prove as cheap and as practical as he claims, a great number of them may be built in the suburbs of Berlin.

SHIPPING TREES FROM BELGIUM

The method of packing the Belgium “Bay” tree for shipment to this coun-

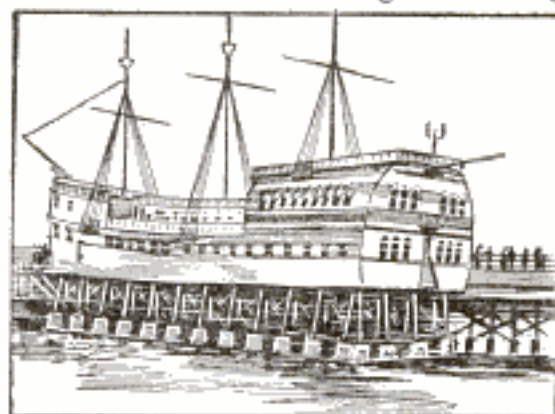


Crating the Trees

try is considered almost perfect. Of a recent shipment of 500 trees across the Atlantic ocean and the American continent to California, not a tree was injured. It requires 4 men to carry one of the tubs, each of which has a pair of heavy ears through which the carrying bars are passed. The largest trees are over 50 years old.

SHIP-SHAPE CASINO

This peculiar looking structure is a sea-shore casino and restaurant on the California coast. Wishing something



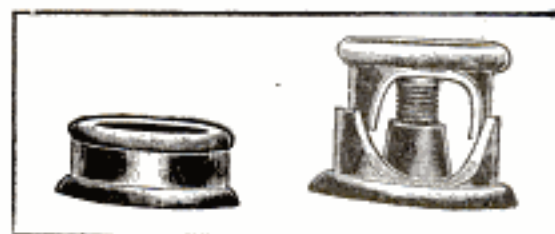
An Odd Pavilion

unique to catch the eye of pleasure seekers, the proprietors had it built in imitation of an old Spanish ship. It is 200 ft. long and three stories high.

AN ADJUSTABLE RADIATOR PEDESTAL

Owing to floors of buildings not being level and the settling of new buildings, radiators are often thrown out of level and a strain is put on the piping as well as on the eye of the owner who wants things to look right. To overcome this annoyance an adjustable pedestal has been brought out to take up any unevenness. The sketch shows the pedestal, which consists of two little iron blocks that extend or open from 1 in. to 3 in. by simply turning the top piece, which is so cast that any radiator foot will fit it. A substantial screw holds the two pieces together and allows the proper adjustment.

There is the advantage of allowing



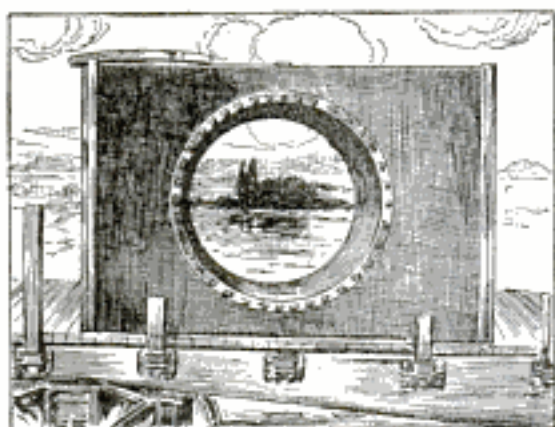
Adjustable Radiator Pedestal

carpets or other coverings to be easily put down or taken up without the ne-

cessity of cutting to accommodate the radiator legs, and should a radiator lose its alignment, on account of the floors settling, the loss can be instantly adjusted and remedied at absolutely no cost. This device can be used advantageously for bathtub adjustments and for adjusting sinks and other fixtures that must stand level on the floor.

MASSIVE STEEL CYLINDER

This is a low-pressure cylinder of a 7,000-hp. engine for generating electric-



Immense Engine Cylinder

ity. Its massive bulk was shipped across the continent from the eastern states to California.

MAP OF FRANCE MADE OF PRECIOUS STONES

One of the most unique gifts on record between two countries is a map of France in precious stones, recently presented to the French government by Russia. It is 40 in. square composed entirely of gold and precious stones. The sea is represented by a pale, rich marble, and the portions of foreign countries necessarily included are in dark gray onyx. France is shown in polished jasper, each department cut from stone of a different color. Some 106 of the most important towns are designated, their names written in letters of gold. The towns themselves are represented in jewels, Paris being marked by a large ruby. The rivers are

represented by bars of platinum sunk in the jasper.

The idea of the map is said to have originated with the Czar, who took great personal interest in its execution. The cost is estimated at about \$500,000.

LIGHTSHIP BLOWN FROM STATION

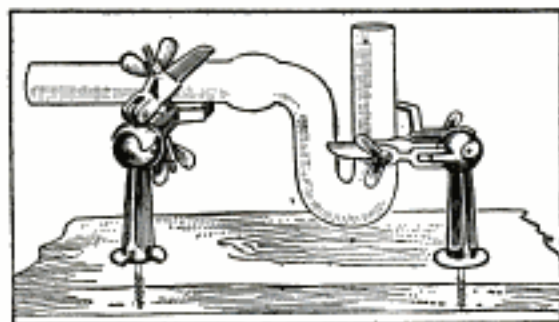
During a recent storm the lightship anchored off the dangerous Nantucket shoals was blown 5 miles from her position, but returned again under her own steam to guard the path of the Atlantic liners. The force of the gale carried the ship along, regardless of the 7,000-lb. sinker, which served as an anchor, and 1,000 ft. of heavy steel chain.

MONEY MADE OF ALUMINUM

For the first time in history, the British royal mint is using aluminum for coinage purposes. In all, 31,872,132 coins have been struck from this metal, comprising half-cent pieces for use in Uganda and one-tenth of a penny pieces for circulation in the Nigerian protectorates. Both the new coins are perforated in the center to permit the natives to string them as a child strings buttons. Aluminum was used because the immense number and low value of the coins made extremely light metal necessary.

PIPE HOLDING CLAMPS HANDY

A piece of lead or iron pipe can be held in any position desired by the set of clamps shown in this illustration. The holder or clamp consists of a



Handy for Plumbers

standard with a wood screw in the bottom for holding it rigidly upright, and a ball or socket joint, with jaws properly shaped to hold a pipe fitting or faucet securely.

COMBINATION RUBBER-LEATHER BOOT

A combination rubber-leather boot is being manufactured which contains a leather inner sole, rubber inner sole, rubber welt sole and a sole-leather outer sole. It is said that this combination will outwear any rubber boot made and prove absolutely water-tight.



VOICES IN GERMANY HEARD IN DENMARK

Valdemar Poulson, the Danish inventor whose wireless telephone system is proving so successful, recently carried on a conversation between Wymburg, Denmark, and Weisensee, Germany, a distance of 250 miles, hearing the voices of his assistants clearly as they talked into the transmitter at German station. His latest wireless invention is an ink writing apparatus for wireless telegraph instruments. It writes the messages received automatically, and it is claimed that the record is perfect.

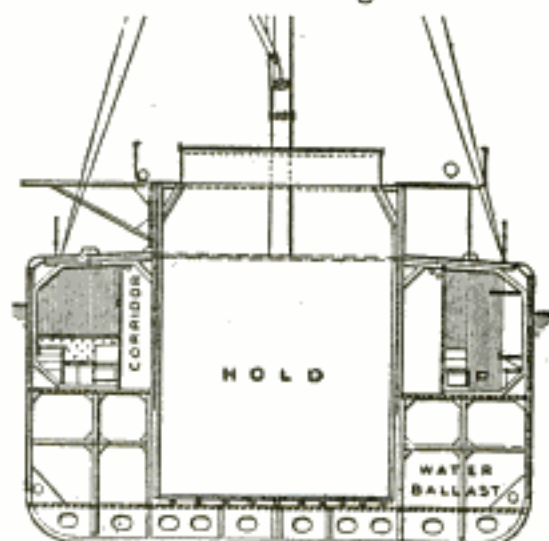
AUTOMOBILE TIRE TRUNK

A tire trunk has been added to the equipment of the up-to-date automobile. It fits inside the spare tire, making a handy receptacle for inner tubes and other small articles which otherwise would take up necessary and available space.



THE HOLD OF A FOREIGN ORE FREIGHTER

The hold of this Swedish built ore carrier is typical of foreign built vessels of its class. The cargo hold is nar-



Cross Section of Hull

row and high and tends to steady the ship when in a sea. The lower side tanks have the same effect when in ballast. The cabins are arranged along each side of the hold, with a corridor running between. In one section of the hold is a hopper with a capacity of 200 tons of coal.

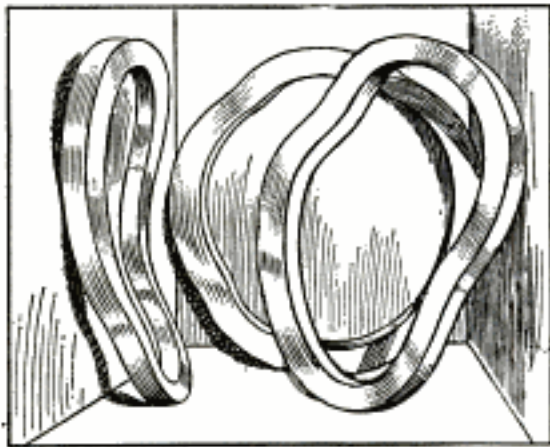
DERAIL PROTECTS MAIN LINES

Every once in awhile a serious railway accident is caused by a string of freight cars breaking loose from a siding and running onto the main lines in front of fast passenger trains. This derailing device is being used to prevent just such accidents. The mechanism is easily seen in the illustration. When cars are left on a siding the lever is pulled and the derailing block slides onto the rail. When an unobstructed track is again desired the block is thrown off in the same manner. The rail is not cut as in most derailing devices.



STEEL RINGS FOR KNEADING CLAY

These misshapen cast-iron rings are used for kneading clay at brick works, and instead of being distorted are per-



Clay Kneaders

fect in the shape designed for them. The rings are worked round and round in a circular pit, pulled by a team of horses hitched to a long sweep. If the rings were straight the process would be almost useless.

DEEP MINE HOISTING ENGINES

Knowing that the life of every man working in a deep mine is dependent to a great extent upon the reliability of the hoisting engines, every effort is made to get an engine which can be depended upon at all times and under all conditions, adverse or otherwise.

The engine shown in this illustration is designed to operate cages at a depth of 3,500 ft., and is of the first motion type, the steel winding drums being carried by the main engine or crank-shaft. The cylinders are provided with automatic cutoff and governor, and the forward and backward motion is controlled by a steam reversing gear.

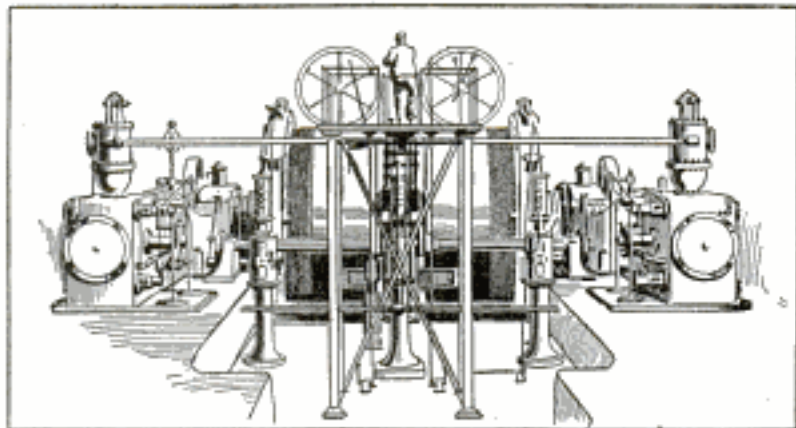
With a steam pressure of 140 lb.

these engines can lift 17 tons from a depth of 3,500 ft., and will develop 2,500 hp. The weight of the cable alone is 7 tons. The cages are required to make a trip every 12 minutes throughout the 24 hours, which means 120 trips a day.

The operator's platform is plainly seen in the illustration. The operator from his position between the two controlling wheels can handle without help the entire mechanism. All levers are placed close together within easy reach, thus affording absolute control without having to turn from the indicators, which are the operator's only guide to the position of the cages in the shaft.

CONVERT SHIP INTO FLOATING HOTEL

Plans have been practically completed in England to buy an obsolete ocean liner, take its engines out, remodel the interior, and anchor the vessel in Falmouth Harbor as a first-class floating hotel. Amusements of every kind will be provided for on board ship, and when the guests are disposed to put foot on land, a steam launch will take them to the tennis and cricket grounds and the golf links. The manager of the hotel will be captain of the



Lifts 17 Tons 3500 Ft.

ship and the hotel staff will be dressed as seamen.

President Roosevelt has approved the recommendation to increase the width of the canal locks from 100 to 110 ft.

THE LAUNCHING OF LAUNCHES

A 16-ft. launch is light and buoyant on the water, but it becomes a dead weight on land and requires several men's strength to haul her on the beach. Boats of larger size increase so rapidly in weight that tackles are found necessary, and boards, rollers, beams, or even regular sliding ways, are required, according to the size of the boat.

One of the handiest contrivances for a skiff is to fasten a sort of easter to the after end of the skeg, as shown in Fig. 1. It makes but little resistance in rowing through the water, but enables one man to take hold of the bow and walk up the board runway as if the skeg were a wheelbarrow.

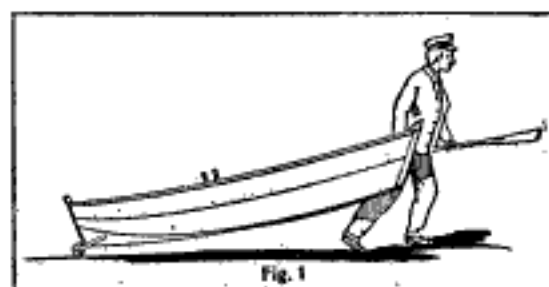
Small launches are hauled out by laying parallel boards on the beach, inserting rollers made by sawing some round spar into 2-ft. lengths. A spar about 4 in. in diameter will do, though one of 6 in. will work easier; or rollers of iron pipe will suffice.

A launch 30 ft. and upwards becomes too heavy to haul on rollers, and must be handled on grease. This requires heavier stringers than a plank, says the Motor Boat, from which this article is condensed.

Get four pieces of 6 by 6-in. spruce or yellow pine; the former is preferable, as it is far lighter to lug about, though the latter is better if they are to be left down for steady use as stringers. The longer they are the better, as there will be fewer joints to go over and get out of line. Where you join the two lengths of stringers be sure the two ends are on the same blocking, as shown in Fig. 2. Two edges of each stringer should be planed up smooth. Lay them so one edge is up, the other on the outer edge, and measure with a stick so as to get the two parallel.

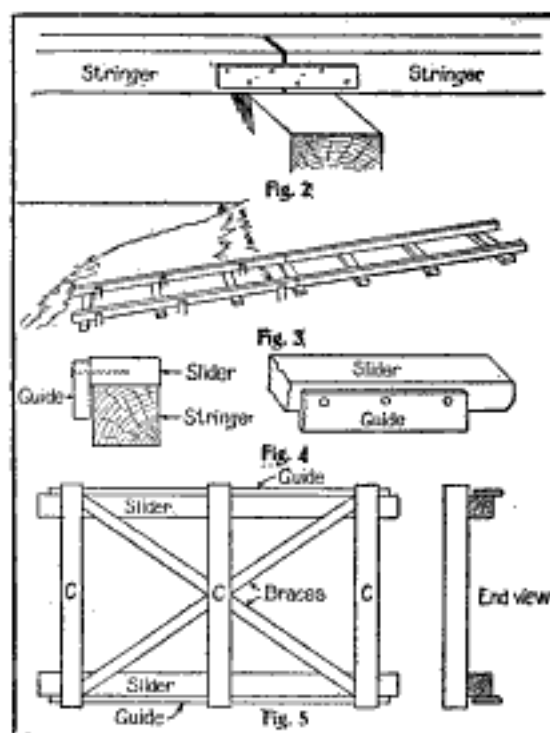
This forms the foundation or track to haul on, and is all one needs in tidal waters, as one length can be laid at low tide and held from floating away by being nailed to stakes driven down into the sand or mud bottom at intervals along each side of the stringers,

as shown in Fig. 3. For fresh water, where there is no perceptible rise or fall in the water level, it is necessary to board across on the lower edge of

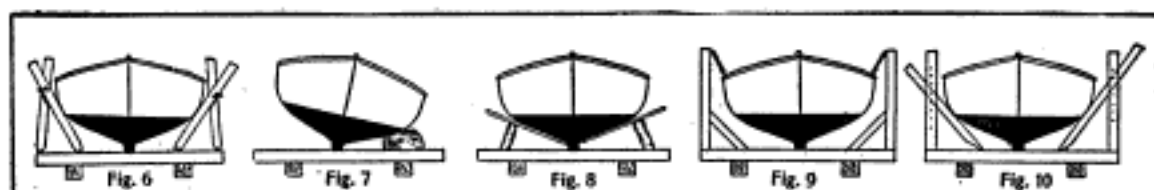


the stringers at each end, particularly the outer end, as that has to sink the most. By piling rocks on these boards after floating it so the outer end is in deep water, it can be sunk into place.

The sliders or cradle to hold the yacht is now to be made. For this get two pieces of 4 by 6-in. spruce, 8 to 10 ft. long, planed upon one side, with the ends slightly rounded like a runner on a sled. To keep these sliders from slipping off the stringers, get some 2 by 6-in. yellow pine or oak, about as long as the sliders, and bolt them so



they lap down about 2 in. below the sliders, as shown in Fig. 4. Then lay the two sliders the proper distance apart, about 6 ft. for a 30 to 40-ft.



launch, wider, of course, for larger boats, and within a foot or so of each end lay a cross-piece, C, Fig. 5, of 6 by 6-in. oak or yellow pine, and through-bolt them to the fore and aft sliders with two bolts of about $\frac{1}{2}$ -in. iron; countersink the heads well into the under side of the sliders, so they will not scratch.

If the launch is very heavy, any number of extra cross-pieces can be laid across to carry her; but be sure and toe-nail them down or they will float away when in the water.

To prevent this cradle from shutting up like a parallel rule, cut two diagonal braces forming an X of, say, 3 by 6-in. spruce, and spike them fast to the sliders as shown in Fig. 5.

To haul this cradle a temporary arrangement can be made by simply making a long loop in the ends of a good piece of 1-in. rope and hooking them over the outer ends of the fore and aft sliders. A wire nail or two will hold them in place there. Several methods are used to increase a man's power to haul this cradle with a launch on it. If the beach is flat and not very much slope, three or four men can move the cradle and launch; but if there be a steep grade, greater power is needed. This can be supplied either by a horse or by making a wooden "crab," as the trade calls it; the novice would probably call it a capstan or winch.

We now come to the various ways of putting and holding the launch on the cradle to prevent her falling over. Most launches have very shallow keels; they are nowhere near as difficult to block up as the deep, narrow-keeled sailboats.

With a great many launches all that is necessary is to float them on to the cradle and slip a block of wood under one side, letting them list or tip over on to that block, and straightening them up after they are high and dry

as shown in Fig. 7. Another way is to slip a plank under each bilge and then jam in a brace under it, as in Fig. 8.

Cradles that are to be used repeatedly are sometimes fitted with regular sliding bilge blocks, or upright posts securely braced with tackles at the top to hold the boat as in Fig. 9; others have two slant arms pivoted to the middle cross-piece on the cradle like a pair of scissors, as in Fig. 6. In some the outer uprights are stationary and doubled, so the inner arms work up and down between them, as in Fig. 10. As soon as the launch is securely grounded on the cradle a bolt is slipped through holes in these arms so it holds the slanting arm up against the bilge. In others both arms pivot and accommodate any angle, being held by a boat-clamp when up against the hull.

REMEDY FOR A LEAKING FOUNTAIN PEN

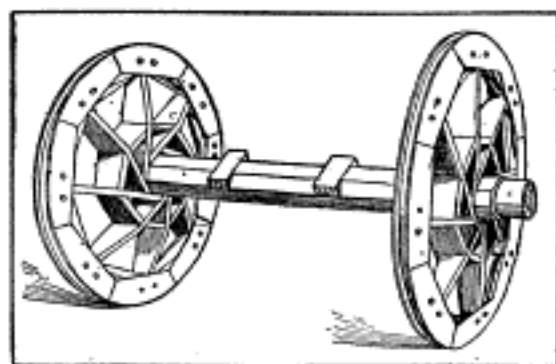
If the threads in the rubber connection of a fountain pen are worn a little the joint will leak enough to soil the fingers. Dry the threads with a blotter and cover them with melted paraffin. Turn the nozzle into the barrel while the paraffin is still warm and you have an ink-tight joint.—Contributed by Bruce W. David, Meadville, Pa.

Overheating of gas engine cylinders may be due to improper flow of water through the cylinder water jacket, to the water jacket having become coated with scale or to have an accumulation of dirt in it, says the Practical Engineer. The temperature of the out-flowing water should not be greater than 140 deg.; some makers of gas engines advise that it should be as low as 100 to 120 deg. Fahrenheit.

SHOP NOTES

Home-Made Spool for Oil-Drilling Rig

A solid wooden shaft is made from a piece of timber about 14 in. square. This is trimmed in the shape of an octagon. This shaft is supported on axles

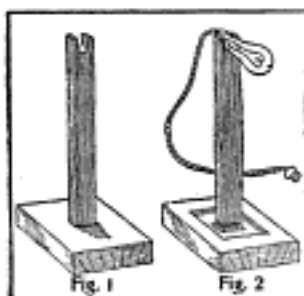


Oil Drillers' Spool

at the ends. The wheels are about 8 ft. in diameter and built up with spokes made from 2 by 12-in. planks nailed to the flat sides of the axle and braced by connecting pieces of the same material. The right-hand wheel is used to propel the spool, either by hand or with a rope drive from an engine. Pegs are inserted in the rim of the wheel to be used when operated by hand. A strap brake is placed on the other wheel.

Home-Made Electric Light Stand

The accompanying sketch shows the construction of an electric light stand for the drawing table. A 6-in. square block is nailed to a 1 by 1½ by 12-in. strip of wood, which is notched at its upper end, as shown in Fig. 1. The square block may be hollowed out, as shown in Fig.

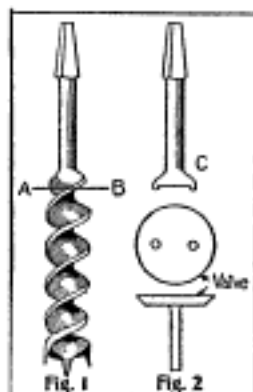


2, to receive tacks or instruments. The notch in the upper end of the strip is fitted to receive the electric socket.

A Home-Made Tool for Grinding Valves

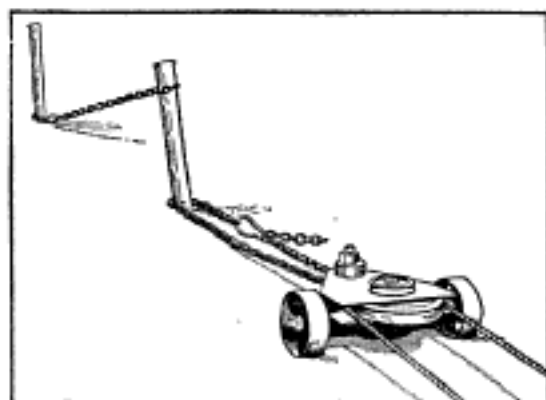
The valves in gasoline engines and automobile motors sometimes need to

be ground so they will fit closely to their seats. A very handy tool for this purpose may be made by using a carpenter's old bit and bitstock. The bit is cut off on the line A-B, as shown in Fig. 1. The end of the remaining part is shaped as shown at C in Fig. 2. If there are no holes in the top of the valve, drill them as shown to fit the tool. A few turns with this tool, using a little fine emery on the valve seat, will make the valve fit closely.



How to Fasten a Dead Sheave Pulley

The accompanying sketch shows how to fasten, as well as the construction of,

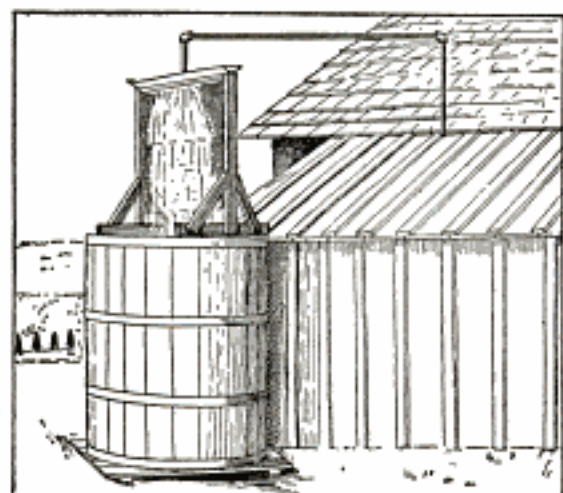


Dead Sheave Pulley Fastened

a dead sheave pulley for moving structures. The sheave pulley is mounted on two wheels for easy transportation, also to keep the cable from touching the ground when in operation. Two stakes fastened with chains as shown will hold it in position.

Cooling Water for a Large Gasoline Engine

A method of increasing the cooling capacity of a water tank in connection with a large gasoline engine is shown



Wire Screen Promotes Cooling

in the accompanying sketch. Galvanized wire netting of about $\frac{1}{4}$ -in. mesh is fastened to a frame above the tank. On top of this frame is a metal trough that receives the hot water coming from the engine through a pipe. The water spills from the trough on the wire netting, which causes it to spread and run down into the tank in a thin sheet. This greatly aids the cooling of the water.

Quickly Made Extension Insulator Arm

Sometimes it is necessary to use an extension for an insulator on buildings.



This may be made quickly by using a 1-in. waste nut into which is screwed a 1-in. pipe of

the proper length. The wooden pin holding the insulator is turned to fit the end of the pipe. It is connected and fastened to the building, as shown in the sketch.—Contributed by George Thorpe, Jr., Millville, N. J.

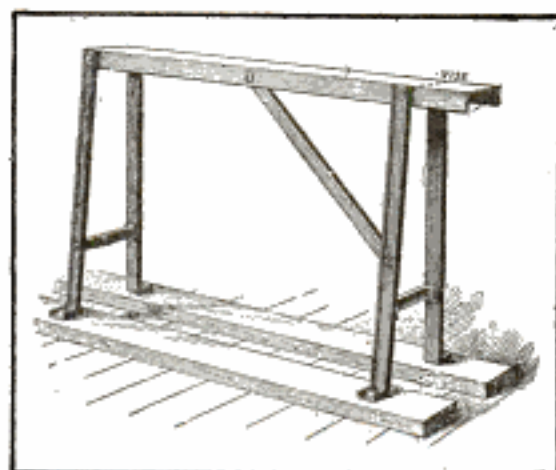
A Window Washing Kink

When washing windows it is very disagreeable to have the water run down the handle of the washing brush, on to the hands and into your sleeves. Cut a circle of leather from an old boot sole and slip it over the handle of the brush, as shown in the sketch. This will sidetrack the water at the point where the leather is placed.



A Pipe-Fitter's Knock-Down Bench

A form of knock-down bench suitable for the work of the steamfitter is illustrated in the accompanying sketch. The bench is comprised altogether of metal, in the form of channel irons. It is light and at the same time rigid. When partially taken apart it can be folded into little space, to be carried from or about a building, says the Metal Worker. The top of the bench is made from a channel 5 ft. long and 8 in.

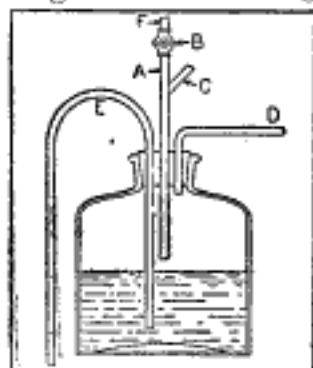


Knock-Down Bench of Channel Irons

wide, which is supported by legs of channel 3 ft. long. The two pairs of legs are bolted to two long planks, these being long enough to assist very materially in the stability of the bench. For general convenience the planks and the bench as a whole can be moved from place to place. When it is desired to carry the bench some distance it is only necessary to loosen the legs from the planks and turn them parallel with the large channel.

How to Make a Water Pressure Blowpipe

Secure a jar with a large tight-fitting cork. Referring to the sketch the



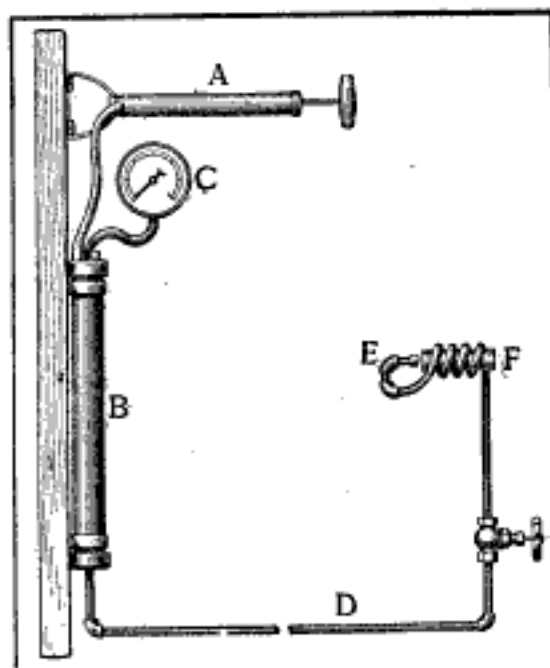
pipe F is connected to a tank or city water pressure. The open projecting pipe, C, allows the air to mingle with the water as it flows into the jar through the pipe A. The air as it is compressed will pass out of the tube D, which is connected to the blowpipe. The water is syphoned off through the pipe E. The valve B is used to regulate the flow of water.—Contributed by D. Jennings, Clear Lake, Iowa.

A Slipping Belt Starts a Flame

A peculiar incident occurred recently in a mill at Stockton, Utah. An $\frac{1}{2}$ -in. rubber belt, which had been frequently "doped" with cylinder oil to make it pull, became badly worn. It finally slipped on the pulley and the friction ignited the oil-soaked and frayed belt and it blazed and burned in two. It then wrapped itself around the shaft, and the whirling motion fanned the flame, which burned until it reached the part that was tightly wrapped to the shaft, where it burned out.

A Home-Made Brazing and Tempering Torch

All jobbing shops have a call at some time or other to do brazing and the forge fire is not the proper one to heat the parts to secure a first-class job. A torch using gasoline or kerosene will furnish a much better fire, and such a device can be constructed by anyone



Home-Made Brazing Torch

of mechanical ability. Make a tank, B, as shown in the illustration, by using a piece of 2-in. pipe 20 in. long and covering the ends with caps. Three holes are drilled in the top cap, to one of which the rubber tube from a bicycle pump is connected, a steam gauge, C, is attached to another, and the remaining one is fitted with a screw plug and used in filling the tank with fuel oil.

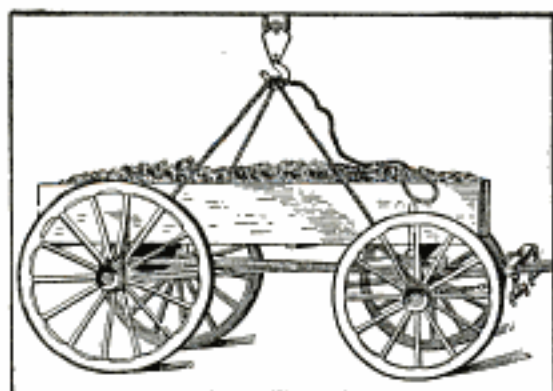
A hole is drilled in the bottom cap of the tank and connections are made with $\frac{1}{2}$ -in. pipe, D, which may be of any length to suit the surroundings. About 10 in. of the end of this pipe is first filled with lead and coiled around a 1-in. pipe, F, 6 in. long, turning the end out so as to receive the two elbows and a short nipple. When the coil is finished the lead is melted and run out. A small hole is drilled in the center of an $\frac{1}{2}$ -in. cap and placed on the end

of the pipe, as shown at E. The hole in this cap must correspond with the center of the pipe F. It is necessary to have a globe valve placed somewhere in the $\frac{1}{2}$ -in. pipe to regulate the flow of oil in the burner, and also shut it off when not in use. To generate it have a little cup or can of some kind that will hold three or four teaspoonfuls of oil and fix it to hang just below the coil while burning.

If one burner is not sufficient to heat the work two may be connected on the same pipe with a tee, so they will throw their blasts together.

How to Remove Dirt from Excavations

A contractor who is excavating the cellar for a new skyscraper in Chicago has hit upon a method of avoiding the expense and effort of removing exca-



Removing Dirt from Excavations

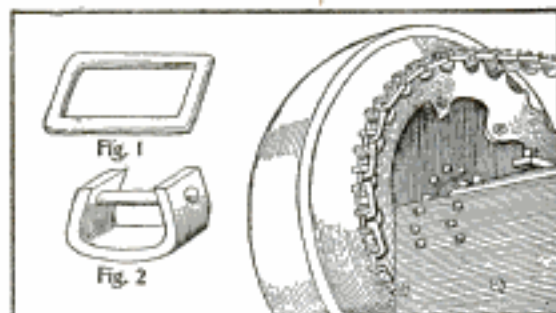
vated material by mule power. It is as simple as it is effective, and, of course, the wonder is that no one thought of it before.

The usual way is to build an inclined roadway into the hole, up which small loads of dirt are dragged by double teams. The new method avoids all this by lifting the loaded wagon bodily out of the excavation by means of a derrick and four looped cables, as shown in the illustration. Each loop is passed between the wagon body and one of the wheels, between the spokes and over the end of the hub. When each loop is securely in place the signal is given to hoist away, and in a few seconds the

whole outfit—2 cu. yd. of earth and a big wagon—is lifted up through the air and swings to the brink 20 ft. above. A team is waiting to be hitched on and draw the load away to the dump.

How to Make a Heavy Drive Chain

The accompanying illustration shows the construction of the parts to make a heavy chain that will not break. One

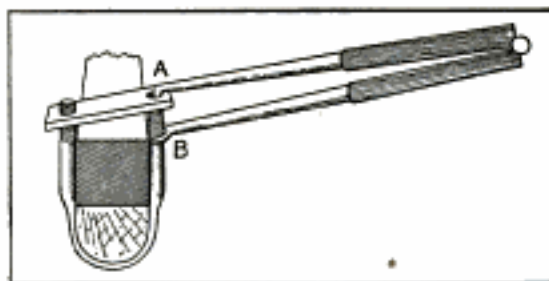


Making Heavy Chain

part of the link is made from $\frac{3}{4}$ -in. round iron and formed as shown in Fig. 1. The other part is made in the shape of a U from $\frac{3}{8}$ by $2\frac{1}{2}$ -in. wrought iron with a hole drilled through the upper ends. After placing the links together to form the chain a pin is inserted in the holes drilled through the U-shaped piece and riveted.

A Tool for Placing Axle Clips

The device is made by using the joints from an old buggy top. A hook, A, is made on one end and a fork, B, on the other. When closed the hook should center in the fork. To place the clip in position the device is applied as shown in the sketch.—Contributed by P. E. Bolstad, Lake Mills, Iowa.



For Placing Axle Clips

A Folding Carpenter's Horse

Not only when doing little jobs of carpentering, but also in many other operations, such a support as illustrated is found necessary. This horse is an improvement over the ordinary stiff affair in that it shuts together when not in use, and so can be packed out of the way, says a writer in *New England Homestead*.

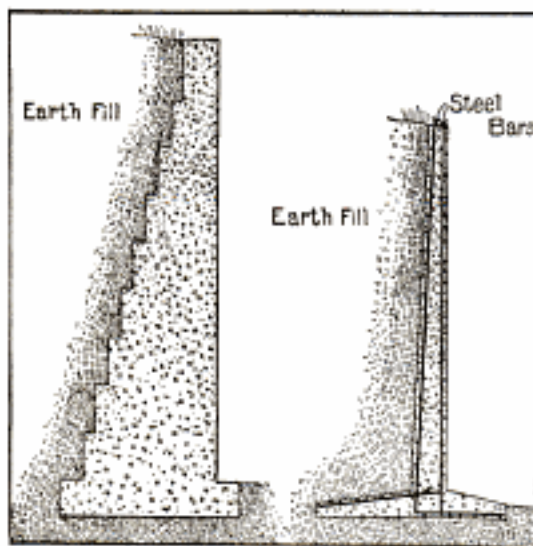


The horse is made of boards cut in strips, the two horizontal boards at the top being hinged together. While in use the legs are kept apart by a long hook, as shown in the sketch.

Cost Reduced in Building Concrete Walls

In some cities the engineering problem of retaining and area walls to support and hold back earth banks is of more than passing interest. Concrete is the most suitable material for the construction of such walls and the accompanying cut shows two styles of design, the ordinary plan and the reinforced wall. The reinforced construction is coming into general use on account of its strength and economy.

The sketch shows in cross section two

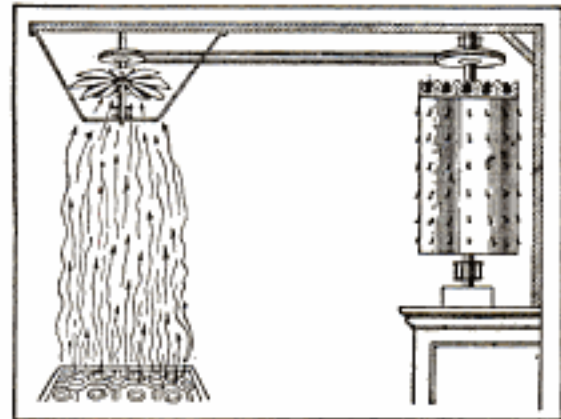


Area Wall Construction

walls of equal strength, while in walls less than 10 ft. in height economy would not be effected, but in those extending higher the saving is about 25 per cent, even when the steel bars and the richer mixture of concrete is taken into consideration. The reinforced wall here shown is held in place by the earth fill resting on the base projecting backwards into the filling. This assists very materially in preventing overturning or tipping of the wall. The face and back of the wall as well as the projecting base are tied together into one solid monolith by means of the embedded steel bars.

How to Make a Goods Exhibitor

A practical tinner of a western city submits the accompanying sketch of a



Novel Exhibitor for Store

novel goods exhibitor for a hardware or other store which is simple in construction and ought to attract much attention, says the *American Artisan*. A tin drum 20 in. in diameter and 28 in. high, with some top ornamentation, is provided with a central shaft, a 2-in. wide pulley above and a couple of bicycle pedals attached, one each above and below. A fan wheel 20 in. in diameter is then made and located above a furnace register, the fan having a 1½-in. band iron support from above, and a simple pulley, such as is used as a sash pulley, attached to shaft as shown. A light sewing machine belt is used to connect the pulleys. An upward flow of hot air from the register operates

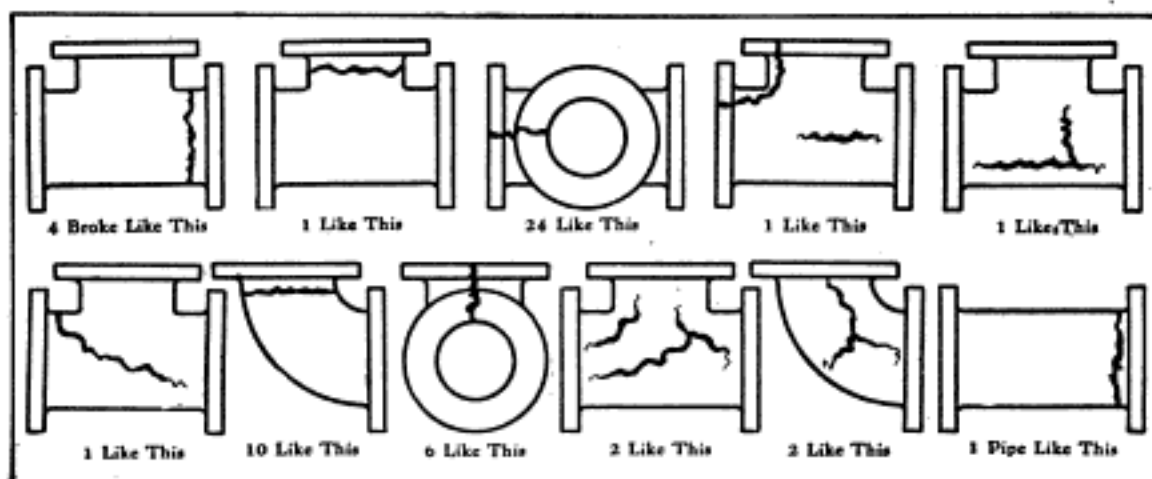
the whole device and causes the drum full of goods to revolve steadily and with good effect. It is an ingenious device and one that will attract much attention.

The Bursting Point of Flanged Fittings

Recently a number of tests were made on flanged fittings of the various sizes to determine the average point at which they would burst under hydraulic pressure. All tests were made by bolting blind flanges to the openings of the fittings and admitting water through a small opening in one flange, says the

required to rupture. If the thickness of body metal is known, to determine the bursting point multiply the thickness of the metal by the per cent of tensile strength and divide by the inside diameter. The bursting point being given to determine the thickness of the metal, multiply the bursting point by the inside diameter and divide by the per cent of tensile strength. The percentage of tensile strength up to 12 in. in diameter is 65; for larger sizes use 60 per cent.

If the fittings are made of ferro-steel, 33,000 lb. per square inch may be taken as the tensile strength, and for cast-iron the tensile strength will average 22,000 lb. per square inch.



Of 52 fittings and one piece of pipe tested to the bursting point by hydraulic pressure, the results illustrated were obtained.

Valve World. Each fitting was cast with a key number for the purpose of identifying the date and heat for comparison with test bars run out of the same ladle. This gave a check against any fitting which might show strength or weakness beyond the average.

When making the fittings for these tests no particular care was exercised in the foundry, each piece being made in the regular way.

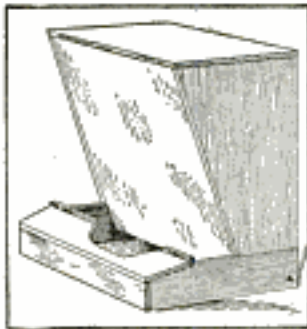
By using these destructive tests as a basis a rule was formulated which, when applied to flange fittings, can be used to determine the thickness of metal for a given pressure, or, the metal being known, to determine the pressure

A Temporary Hose Substitute

A piece of ordinary hose was used to clean out the waste pipe in my sink when obstructed. One day the hose could not be found. For a substitute hose I used one made from newspapers. A quantity of the papers was wrapped around a broom handle, which formed a hollow tube when the handle was removed. One end of this tube was attached to the faucet and the other held over the outlet in the sink. A string was wrapped around the outside on each end and a few turns all along the space between. It served the purpose as well as the regular hose.—Contributed by Henry Bisbing, Trenton, N. J.

How to Make a Dry Food Hopper

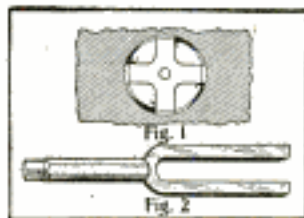
The accompanying sketch shows how to construct a dry food hopper from which fowls may feed but cannot stand in the food. The exact dimensions must be followed in order to get the real worth of it, says the Poultry Keeper. Ground feed or cracked grains work equally well in it.



The bottom or trough is made 7 in. high with the part projecting in front $9\frac{1}{2}$ in. wide, while the length may be optional. A board $4\frac{1}{2}$ in. wide is nailed on the front of the trough so it has a slant and dirt will work away from the opening. A $\frac{1}{2}$ -in. piece is fastened to the edge of this, as shown, which will greatly aid in keeping the dirt out. This will leave an opening $4\frac{1}{2}$ in. wide across the front of the hopper, from which the fowls may feed. On the ends of the trough nail other boards and, extending above it so that the fowls must stand in front in order to get the food, which they can get by standing on the $4\frac{1}{2}$ -in. strip across the top of the trough.

How to Remove a Broken Tap

A machine tap should never be rushed, and especially when taking a deep cut. Cutting threads in wrought

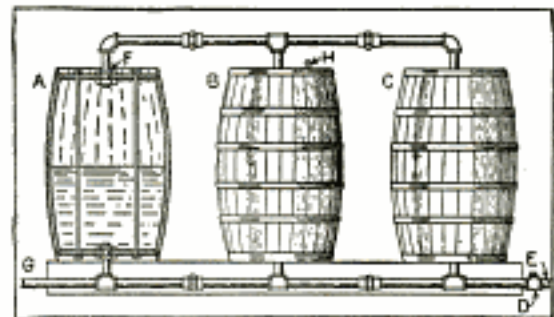


iron, the metal will form as shown in Fig. 1. The tap will cut its entire length if it is turned back frequently to cut off this metal. Never turn a tap by one handle of the holder, as this will cause a side strain that often breaks it. If a tap is broken off flush with the work the broken part may be removed with a tool made as shown in

Fig. 2. If it will not start, heat the work with a plumber's torch.—Contributed by Donald S. Stewart, Waynesburg, Pa.

Home-Made Pneumatic Water System

A party living some distance from a city wished to have a cheap water system for his buildings and grounds and he constructed a successful one, as shown in the accompanying sketch. Three barrels and a 20-gal. keg were secured. The keg was used for a hot water tank in the kitchen connected up in the same manner as connecting a range boiler. The three barrels were connected as shown by first removing



Pneumatic Water Supply

one head of each barrel in order to put lock nuts, F, on the pipe. After replacing the heads two $\frac{1}{2}$ -in. rods were run through each barrel, as shown at A, and a heavy washer placed on each end with the nuts so as to hold the pressure. The pipe E leads to a force pump at the well and a check valve is placed in this pipe at D to prevent the water being forced back into the pump. The pipe G connects with the house, chicken yards and the barn. A bicycle pump is used to supply the air pressure and is connected to a bicycle tire valve, which may be fastened in any one of the barrels, as shown at H. If all the connections are airtight it will require air filling only once a month. The water is pumped into the barrels by a force pump, which may be operated by hand or power.

How to Erect a Line Shaft

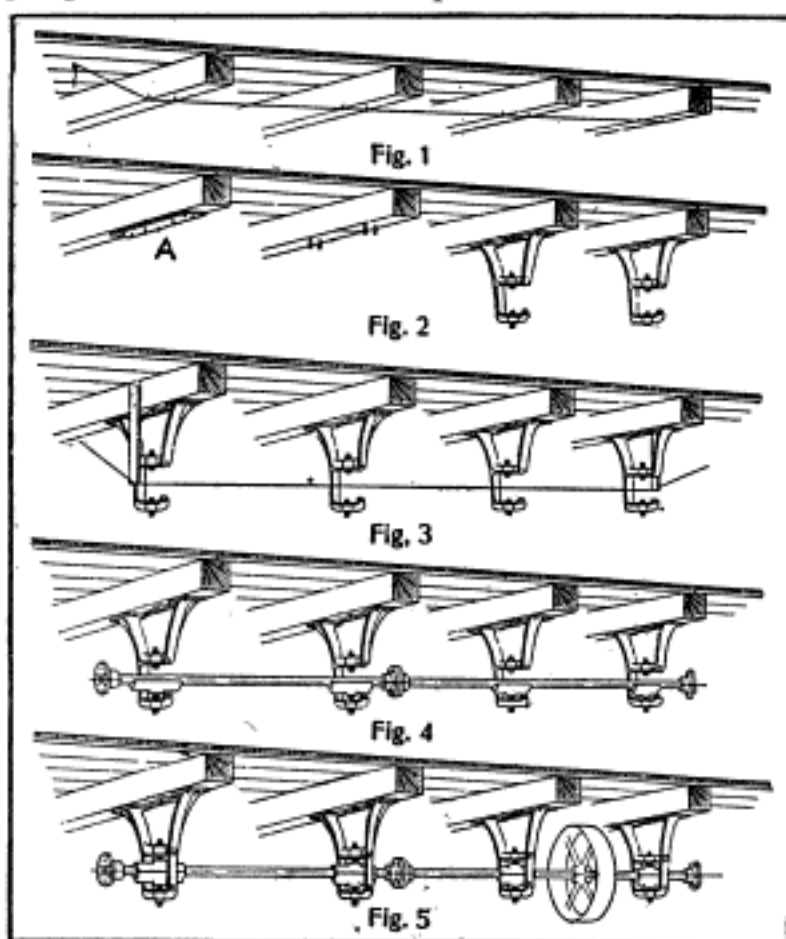
The first operation of erecting a line shaft is to lay off in some manner on the ceiling beams or hanger planks a line, Fig. 1, to represent the center line of the shaft, or, more properly, of the hanger feet directly above the shaft.

This line being marked plainly on the supporting beams or planks, the holes for lag screws or hanger bolts may be bored. The work is made easy and its accuracy insured by use of a templet board having holes to suit the hanger feet and marks to indicate the center line. Placing the templet board with its center line in proper register with the center line marked on the hanger beam and fastening it by partly-driven nails, A, Fig. 2, the bolt holes may be bored quickly and without laying out.

Removing the templet by drawing the nails whose heads were left protruding, the hanger bolts may be inserted, as shown on the second beam in Fig. 2. On the third and fourth beams the hanger frames are up and held by the bolts, which should not yet be set up tight, says Power and Transmission. If lag screws are used, the hanger frame must be lifted and held while one or two screws are entered. The regular hanger bolt, with thread and nut where the lag screw has a head, is a much preferable thing for this work.

The hanger frames up, but without the bolts tight, they are ready for transverse alignment. To do this a line may be stretched in any convenient manner, Fig. 3, through the hanger jaws, to represent transversely the shaft center line, but lower, so as just to

clear the bottom plunger screws, in hangers at mid-length of the sagging line. By screwing the lower plunger screw of each hanger frame—one frame at a time—up close to the line the



Erecting Line Shaft

alignment is readily observed. The hanger feet may be tapped with a hammer to move the frame either way, as is necessary to bring the center of the plunger screw directly underneath the line. When so placed the supporting bolts are set up, care being taken to see that such tightening does not alter the alignment. Then the plunger screws should be run down to fill the line perfectly, after which the operation of alignment may be repeated at the other hangers. When this work is done the transverse alignment of the shafting is assured, regardless of varying diameters.

Then the bases of the bearings may be placed on the lower plunger screws, either before or after the shaft is lifted into place, Fig. 4. With the bearing

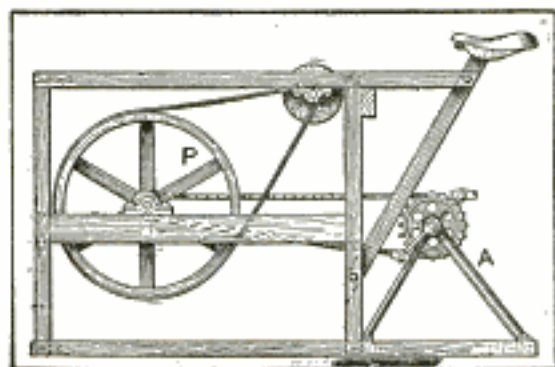
caps placed, Fig. 5, and the upper plungers screwed down, the line is ready for vertical alignment by adjustment of the plunger screws, as dictated by the use of a level along the shaft. With the four-way hanger the preparation of bolts to receive hanger is made in the same manner, but when it comes to bolting them up they must be put up as they are. The transverse alignment must be secured after the shaft is in place, using a line to one side, above or below the shaft. Measurements are made from the line to the shaft in this case.

A Simple Etching Fluid

Prepare a fluid by using powdered copperas and water, of which the quantity need not be more than a spoonful of each. Clean the part to be etched and, by warming it, apply a thin layer of beeswax. With a sharp-pointed instrument write the name or make the design desired through the beeswax coating and cover with fine table salt. Apply enough solution to the salt just to make it wet. Let it remain until dry and remove the beeswax with kerosene.—Contributed by Frank G. Lilja, Indian Orchard, Mass.

Home-Made Foot Power Emery Wheel

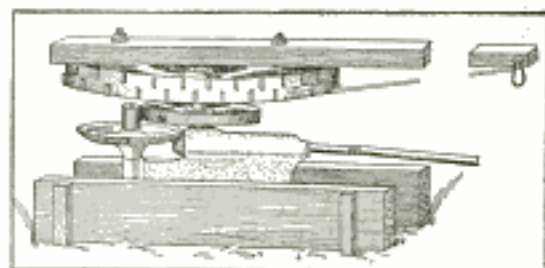
The accompanying sketch shows the design and construction of an emery wheel stand made by a correspondent of the Blacksmith and Wheelwright. The belt wheel, P, is 26 in. in diameter with a 2-in. face and is lined up with a 2-in. pulley on the emery wheel shaft.



A part of an old bicycle frame that contains the hanger is used as the propelling device. It is attached to the stand, as shown at A. Two bicycle chains will connect the bicycle sprocket to the shaft on which is placed the large pulley wheel, P. The upright pieces of the stand are 2 by 2-in., and the top and middle rail are 2 by 4-in. material. The frame is 8-in. wide and is mounted on a 2 by 12-in. plank. The saddle of the bicycle is used for a seat.

Converting a Mower Into a Horsepower

A horsepower which may be used for light work about the shop or farm may be made from an old mower. Remove the drive wheel from the opposite side



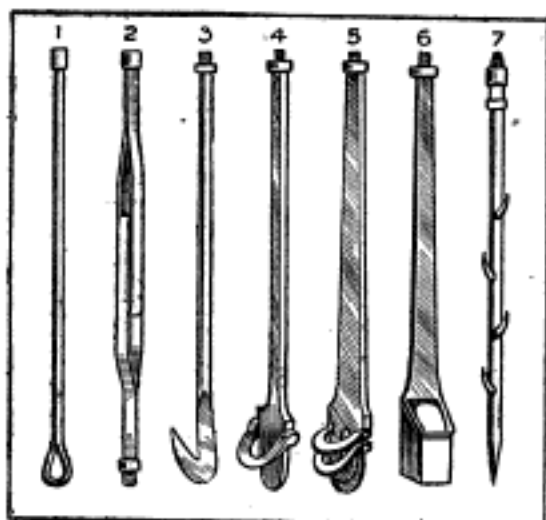
Horsepower Made from Mower

that contains the gearing. Turn the frame of the machine on its side so the main wheel shaft stands vertical and bolt it between two 2-in. planks about 8 ft. long, to which are bolted stakes that have been driven in the ground. Take the tongue of the mower and clamp or bolt it to the drive wheel. A truss rod should be fastened to the outer surface of the wheel and to the end of the tongue.

Gas pipe is used for a tumbling rod which is slipped over the end of the pitman shaft after the wheel has been removed. A hole is drilled through both the gas pipe and the shaft and a pin fitted loosely so the pipe may work at an angle. The gearing is ready for action and will need no remodeling. The ratchet is left in the wheel so, when connected with machinery having a heavy flywheel, the horses may be stopped and the machinery run loosely without interfering with the sweep.

Fishing Tools Used in Drilling Wells

When drilling tools become fast in a well these tools are used to cut the rope and fish them out so that work can be



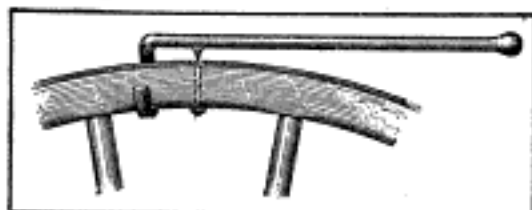
1—Rope Knife Sinker 2—Rope Knife Jars 3—Hook Rope Knife 4—Horseshoe Rope Knife 5—Trip Rope Knife 6—Valve Rope Knife 7—Rope Spear

continued. The rope knives here shown are used in cutting the drill rope when it is necessary to get hold of a drill with a slip socket. They can be used on a string of sucker rods, pipe or sand line. When the latter is used the sinker and jars are necessary. The "trip rope knife" is best, because, when the trip is set, the rope cannot be cut until the knife strikes the rope socket.

The rope spears are used to take hold of a broken cable or rope. They are generally used with the jars and sinker, the sinker being placed above the jars in order to give weight enough to force the spear deep into the rope.

Another Tire Bolt Holder

The accompanying sketch shows how an ingenious device was constructed by a correspondent of the Blacksmith and

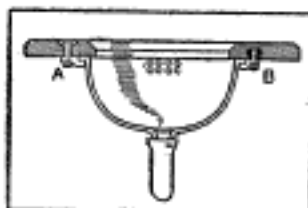


Tire Bolt Holder

Wheelwright to hold a tire bolt while turning the nut. This is made of $\frac{3}{8}$ -in. soft steel with a hard steel point inserted $2\frac{1}{2}$ in. from the hook end to hold the bolt. It is about 18 in. long when finished.

Fastening Clamp Bolts on a Lavatory

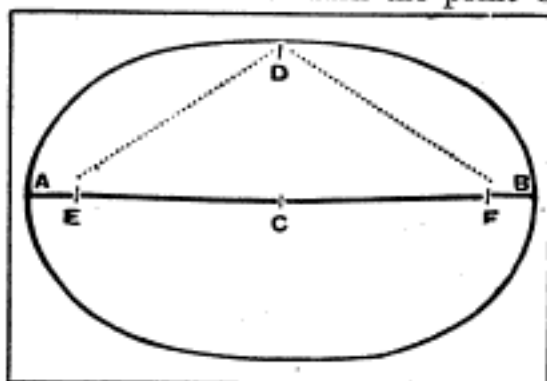
A basin of a lavatory is held up by three or four clamps fastened to the slab by bolts leaded into holes drilled in part way, as shown at B in the sketch. When these bolts loosen and come



out it is hard for the repairman to lead them again so they will hold. To make a good holdfast job drill the hole through the slab as shown at A, countersinking the top for the head of the bolt. After the bolt is put in place the hole is filled with plaster.

How to Draw an Oval

Draw a horizontal line the length of the desired oval and mark the ends A and B. Bisect and mark the point C.



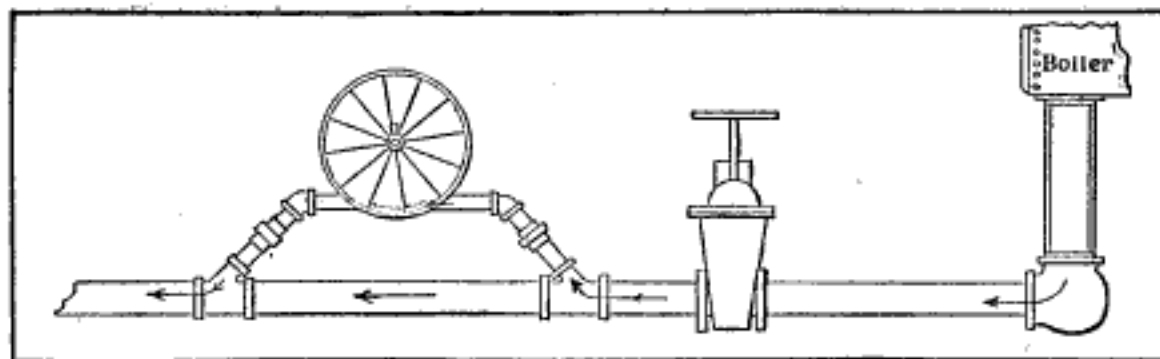
Drawing an Oval

From C draw a vertical line one-half the width of the desired oval and designate the end of this line D. Measure from this point D a distance equal to one-half the length of the oval, or the distance from A to C, back to the horizontal line between A and C and mark this point E. Do likewise from D to

the line between C and B and mark the point F. Drive pins in these points E and F. If working on marble or other material where the pins cannot be driven, put a drop of hot sealing wax on the place where the pin is to be stuck, says the *Monumental News*. The wax will secure the pin for making the oval and can be removed without damage to the stone or other material. A small loop is made in each end of a thread to be placed over the pins E and F. This thread must be the exact length from A to B. By using a pencil point stretch the string tight on both pins, making it take the position as shown by the dotted lines. Draw a line from A, crossing D, to B. This forms half of the oval. Repeat the operation for the other side.

A Boiler Blow-Off Recording Device

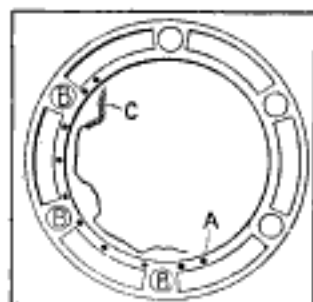
The accompanying sketch will almost explain itself. By attaching a small water wheel on the blow-off pipe by means of two tees, with branches at angles of 45 deg., and by directly connecting a common bicycle speedometer to the shaft of the water wheel a reading will be obtained from time to time as the boiler is blown down. A little experimenting will enable one to learn readily the approximate amount blown down by subtracting the last reading from the preceding one, says a correspondent in *Power*. For instance, if while blowing down 5 in. of water the speedometer has run from 100 to 700 it will indicate that the speedometer has to swell its figure by 600 in order to lower the boiler level 5 in.



Blowing Off a Boiler

Repairing a Cracked Cylinder

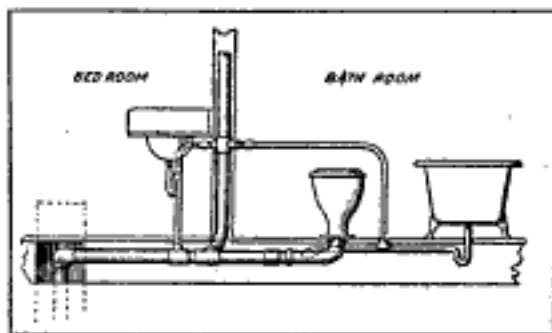
The sketch shows a gas engine cylinder that was cracked by lighting gas under the water jacket to remove the frost. The repair was made by putting stay bolts in the end of the cylinder with counter-sunk heads, as shown at A, and long bolts running through the water jacket as shown at B, says a correspondent in *Gas Power*. The crack in the cylinder was closed by drilling, tapping and putting in soft iron plugs, as shown at C, allowing enough room to head them over, then filing and scraping to make smooth enough for the piston to pass over the crack.



Size of Soil-Pipe for Dwelling Houses

The reason for the general retention of the 4-in. soil pipe stack as the basis for small residence installations is that the plumbing laws in many cities have named that size as the arbitrary standard for a water-closet connection. Naturally a small city or town contemplating the framing of a sanitary code makes inquiry into the plumbing laws and procedure in larger and healthier cities. The surrounding villages and towns emulate the neighboring cities in

the endeavor to get what is considered the best. The result has been the al-



Satisfactory 3-in. Soil Pipe System

most general acceptance of the 4-in. size as the only proper size for a water-closet connection.

Some time ago a person wanted advice regarding the placing of a bathroom next to a front bedroom and over an alcove in the parlor. There was a 4-in. stud partition available for a soil stack, and the owner positively refused to allow the marring of the finish in the parlor in any way. After some consideration and a talk with the plumbing inspector it was decided to use a 3-in. wrought pipe in the partition and to connect it at the bottom with a 3-in. cast-iron soil pipe, which was in turn connected to the 4-in. house drain. The customer had misgivings and raised objections on account of the novelty of the thing. The job has been doing excellent service for a number of years, says a correspondent of the Metal Worker. Other jobs of that character have since been installed where allowable. In one case the 3-in. pipe runs horizontally 14 ft. before entering the soil stack.

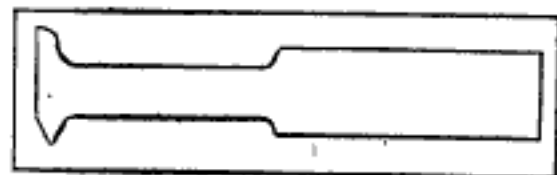
Stopping a Leak in a Gas Hose

Recently the gas hose connecting a hot plate sprung a leak and by applying a lighted match the seam was found to be about 3 in. in length. The repair was made quite easily by applying two or three coats of shellac varnish.—Contributed by A. W. Graham, Chicago.

Combined Boring and Threading Tool

The illustration shows a combination boring and threading tool that may be used to good advantage on some kinds of work, says American Machinist.

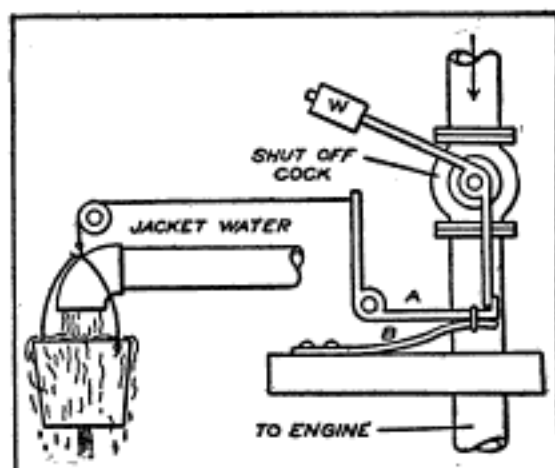
The back part of the tool, of which the sketch is the top view, is ground to be used as a boring tool with the lathe running backward, and the front part for threading. If a number of articles are to be bored and threaded by using a common lathe it is necessary to have two tools and make two settings for each piece, and caliper the thread and hole for each one chased and bored. Two stops are used for the tool slide, one in the back and one in the front.



This makes it only necessary to be sure the first is right and the others will be duplicates. The stop for boring was made so it would swing back; when the hole is bored to size, it is undercut at the back to allow the thread to run out. This tool is especially adapted to brass work.

Automatic Shut-Off for a Gas Engine

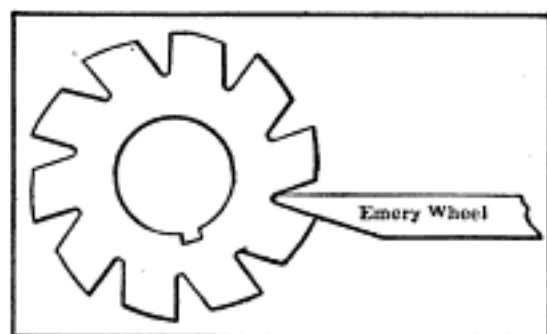
A simple device for shutting down the gas engine when the jacket water supplied to the cylinder fails to flow is described by the Engineer. The jacket water is discharged through a pipe outdoors and the stream from this pipe is caught in a bucket which is suspended by a cord passing over a pulley. The bottom of the bucket is pierced by a hole which is about $\frac{1}{4}$ in. in diameter. So long as the water discharges from the jacket the bucket will be kept full and running over. If the flow of water ceases the bucket will empty through



the small hole in the bottom and the catch, A, will be thrown downward by the spring, B, allowing the weight, W, to fall and close the shut-off cock.

How to Grind Formed Cutters

The usual method of grinding formed cutters is to use the flat side of the emery wheel. If the operator will true the beveled side of the wheel so as to make it perfectly straight and then ad-



Grinding Formed Cutters

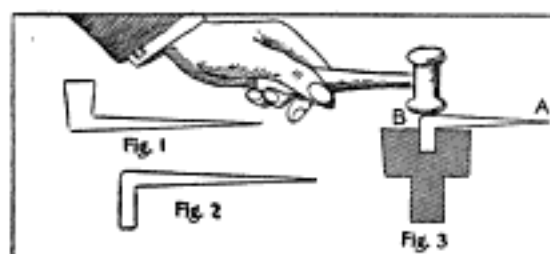
just his machine so as to bring this beveled side radial with the center of the cutter he will not be half so liable to draw the temper of the teeth and will get his cutter ground in less than half the time taken if the flat side of the wheel has been used, says the American Machinist. The sketch will explain itself.

To use the flat side of the emery wheel in grinding the wheel soon becomes glazed and heats the edges of the cutter very quickly, leaving the extreme cutting edge so soft that it will

make only a few cuts before it needs grinding again.

Home-Made Jewelers' Riveting Tool

"I have been using a home-made tool for many years and I never saw one like it," says a correspondent of the Keystone. It is a jeweler's riveting tool made from a common heavy wall hook, as shown in Fig. 1, with the hook cut



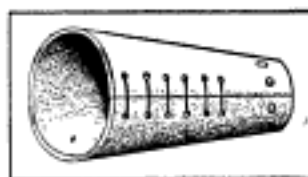
Jewelers' Riveting Device

off and bent as shown in Fig. 2, leaving the horizontal bar about 3 in. in length. The vertical drop end is screwed tightly into a vise, as shown in Fig. 3, leaving the horizontal bar about $\frac{1}{4}$ in. above the edge of the vise. When struck with a hammer at the end, B, it exerts great riveting power upon anything held at the point A, such, for instance, as a watch chain swivel.

Speed Indicator Attachment for Shafts Without Centers

Occasionally shafts are cut off and used without centering holes drilled, which leaves no place to insert the square-pointed end of the indicator to obtain the speed.

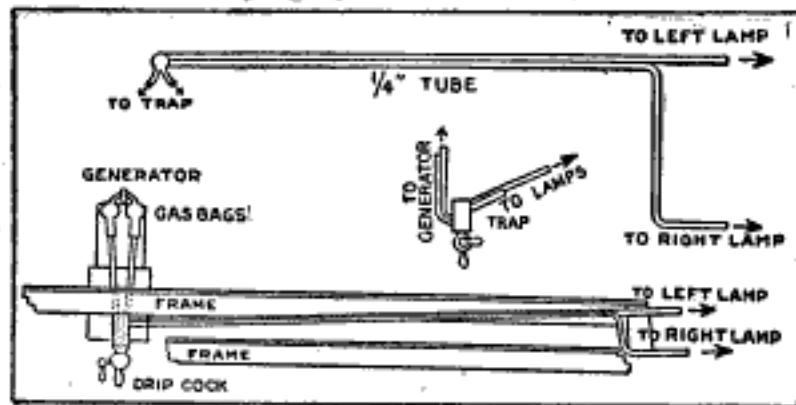
A little device can be made by using a common cork about $1\frac{1}{2}$ in. in diameter on the large end and $1\frac{1}{2}$ in. long, around which is placed a piece of 3-in. singleply belting, cone-shaped, to fit over the end of the shaft and to receive the pointed end of the indicator. The belting is fastened to the cork with a few tacks and the edges held together by



wire lacing. The pointed end of the speed indicator is placed in the cork and the cupped end over the end of the shaft.

Correct Piping for Automobile Lamps

The cause of lights acting badly on automobiles is usually due to defective piping. Many of the complaints are traced to water collecting in the tubes and forming a trap through which the gas cannot pass freely. Where rubber tubing is used and connections made only when lamps are in use it is a nuisance when in a hurry, says Motor Age. The accompanying diagrams show a system that has been used with much success. Any repair man can make and install this at slight expense, being careful to have all pipes pitch down to drip-cocks. The pipe to each lamp should be independent, except at the trap, and gas from the generator should enter the trap below the piping to the lamps. The drip-cock should be opened at least once a week and the pipe should be fastened securely to the frame so as to prevent chafing.



Correct Piping for Gas Lamps

crack was riveted over until all the different plugs looked like one piece. As the crack had been countersunk by filing off the top edge, the head was easily filed smooth, and after it was repainted no one could see where the crack had been except by taking off the head. It is sometimes necessary to hammer a little piece of copper wire into the crack which is left on the face of the head, so as to prevent leaking along the packing."

How to Repair a Cracked Water Jacket

A correspondent in Gas Power relates in the following how he repaired one of the worst cases of a cracked water jacket: "With a file we took off the edge or corner of the head and also the edge of the loose piece, which was entirely removed by the frost. Then we took a clamp and put the loose piece in its place in the head and held it there by clamping. We then used a $\frac{3}{8}$ -in. iron drill and drilled three or four holes in the crack at different places and tapped

Double-Lipped Crucibles

The use of double-lipped graphite crucibles is looked upon with dislike by some brass foundries, while others continually use them. Opinions may differ, but there are many instances where the double-lipped crucibles are advantageous. Flasks may be poured more rapidly and with greater certainty, says the Brass World. The bench molder, for instance, has his flasks set upon a spill trough and the crucibles are carried between two rows of flasks. If a crucible with two lips is used, the flasks on one side of the trough are poured and the molder simply changes his own

position to the other side of the spill trough and the crucible, tongs and helpers remain in the same place to pour the other side. The crucible is ready for pouring on either side and the danger of disturbing the flasks is avoided. A double-lipped crucible costs no more and is always ready when wanted.

Making Umbrella Handles by Electro-Deposition

Umbrella, cane or parasol handles may be made successfully by the deposition of copper upon a soft metal model until a sufficient thickness has been obtained, and then melting out the model or core. A handle of copper sufficiently stiff for all purposes and very light is thus obtained. Patterns may be copied which could not be cast in soft metal or made from stamped shells. By soldering various soft metal parts together so that undercut designs are produced, exceedingly beautiful handles may be made. They could not be made of solid metal in any other manner, says the Brass World.

The method followed for the production of these handles is first to cast the pattern or model of any soft metal. A mixture of lead and antimony in the following proportions answers well and is used for this purpose: lead 87 lb., antimony 13 lb. If difficulty is experienced in running the mixture into the thin or difficult patterns, then a few pounds of tin may be added to each 100 lb. of the mixture.

An "ear" is cast on the model as shown in the sketch in order to allow for holding it in the solution while plating. After the casting has been made and the fins trimmed from it, it is cleaned in the lye kettle and immediately placed in the plating bath. The success of the whole opera-



tion depends upon a smooth copper deposit.

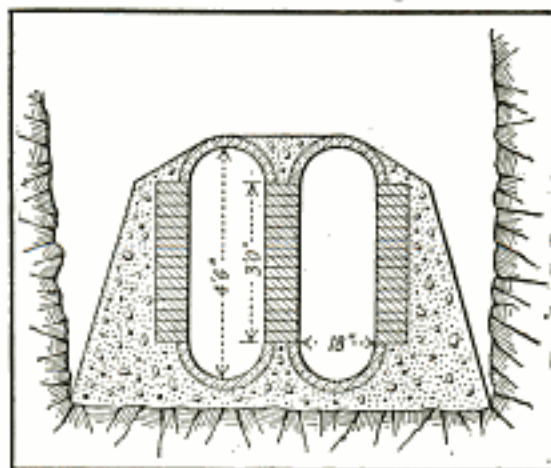
A Concrete Pipe Culvert

The accompanying sketch and following description of a double culvert appeared in Engineering News, and the culvert was constructed by George M. Cushing at Moca, Santo Domingo. The railway from Santiago to Moca is about 20 miles long and is not a difficult piece of construction. There are seven bridges of from 50-ft. to 75-ft. span and many large culverts. All of the culverts and bridge abutments have been built of concrete.

For pipe culverts cement pipe 18 in. in diameter, 3 ft. long and $3\frac{1}{2}$ in. thick was made, using Portland cement and bank gravel. About 4,000 ft. were made.

The breakage of vitrified pipe is from 50 to 75 per cent on account of the many handlings and the crude manner of transportation after leaving the United States, so that the manufacture of these cement pipes made a great saving.

It was decided to make the 18-in. pipes in two parts, using one-half for invert and the other half for the arch. The side walls were built of brick. The native brick are of very poor quality and to strengthen them they were soaked in Portland cement grout. They



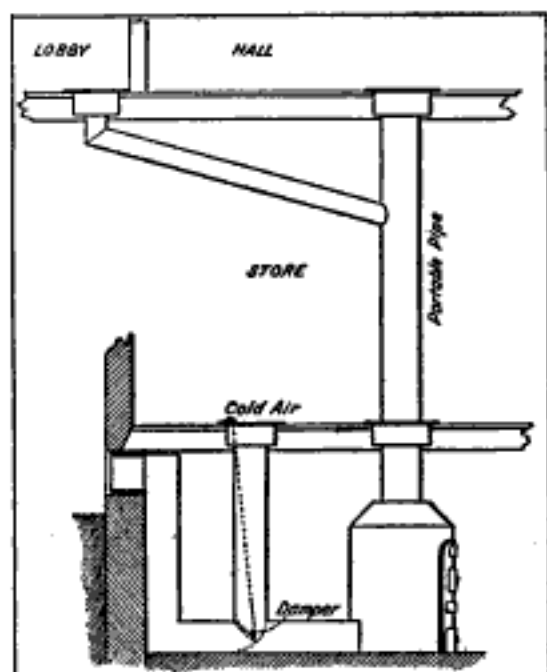
Cross Section of Concrete Culvert

were only used as a side lining and were built up first, taking the place of

lagging, the concrete being placed against it. This culvert is located between very high and steep banks some 35 ft. below the grade and is about 100 ft. long. The retaining walls at each end were laid in concrete against a brick facing, the brick being treated as in the side lining.

Heating an Amusement Hall with a Portable Pipe

In a certain place where an amusement hall was above a large storeroom, and when laying plans for heating, the question arose how to heat the hall? A suggestion was made by a correspondent of the Metal Worker to place the fur-



Heating Amusement Hall

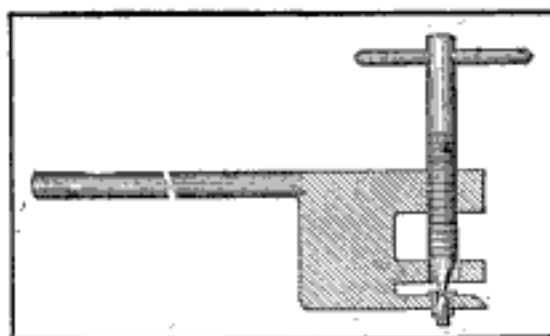
nace in the cellar as near the middle of the store as possible and run a 16 or 18-in. pipe up to a 20 by 24-in. register in the floor. Then place in the floor of the hall, immediately above, a register of the same size, arranging on the ceiling below for an opening which will accommodate a round pipe of the same size as comes from the heater. This pipe can be stowed in any convenient place in the store until it is needed, and then by pushing it up to

the opening left in the ceiling of the store it will make a direct connection with the hall register when it sets on the register in the first floor without making any tighter connection at the bottom than suggested. If it is also desirable to heat the lobby it is a simple matter to carry a 9 or 10-in. branch from this vertical pipe over to the lobby and connect with a smaller opening under the register in the lobby.

If the furnace is to heat the hall occupied by people the air supply should be taken from the outside, though this may not be necessary for heating the store, which will be occupied by few people, and which will have the air changed frequently by the opening and closing of doors, and arrangements can be made to take the air supply to the furnace from the store floor when the hall is not occupied. A combination supply duct with suitable damper, as shown in the sketch, will dispose of the air supply question.

Tool for Removing Gauge Indicators

Some engineers may have experienced difficulty in removing the indicating needle, or pointer, from a steam gauge. A tool may be made from a piece of bronze, as shown in the sketch, which will be more efficient than a screwdriver, says a correspondent in Power. A $\frac{3}{8}$ -in. hole is drilled in the topmost tongue and tapped for a $\frac{1}{4}$ -in. screw. The bottom tongue is slipped under the pointer, the end of the screw placed over the point of the pin, and the screw turned. This will remove the pointer without trouble.



Removing Hands on a Gauge



Amateur Mechanics



Photographs in Relief Easily Made



Reproduced from a Relief Photograph

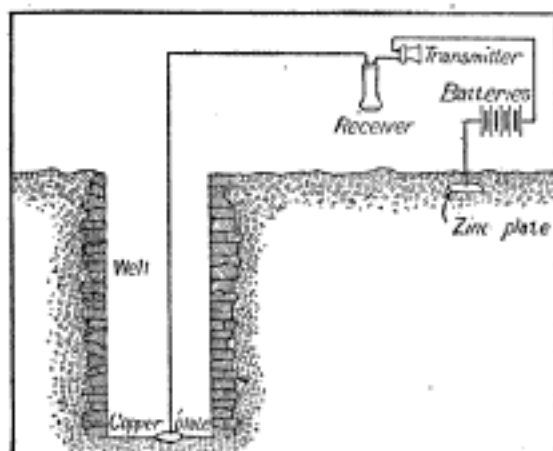
Relief photographs, although apparently a difficult operation, can be made by any amateur photographer. The negative is made in the usual way and when ready for printing a positive or transparency is made from it in the same manner as a lantern slide or window transparency, says the Sketch, Lon-

don. Use the same size plate as the negative for the transparency. To make the print in relief place the positive in the frame first with the film side out and the negative on top of this with the film side up in the usual manner. Put in the paper and print. This will require a greater length of time than

with the ordinary negative on account of printing through double glass and films. In using printing out papers care should be taken to place the printing frame in the same position and angle after each examination. The print is treated as any ordinary print.

How to Make a Wireless Telephone

A noted French scientist, Bourbouze, was able to keep up communications with the outside during the siege of Paris by making practical application of the earth-currents. The distance



Details of Wireless 'Phone Installation

covered is said to have been about 30 miles. Another scientist was able to telephone through the earth without the aid of wires. Nothing, however, has been made public as to how this was accomplished.

It is my object to unveil the mystery and to render this field accessible to others, at least to a certain degree, for I have by no means completed my researches in this particular work.

In order to establish a wireless communication between two points we need first of all a hole or well in the ground at each point. In my experiments I was unable to get a deep well, but the instruments worked fine for a distance of 200 ft. using wells about 25 ft. deep. As in ordinary telephone lines, we require a transmitter and receiver at each point. These must be of the long-distance type. If a hole is dug or a well is found suitable for the purpose, a cop-

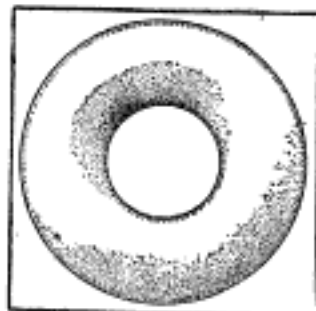
per wire is hung in the opening, allowing the end to touch the bottom. To make the proper contact an oval or round—but not pointed—copper plate is attached to the end of the wire. If a well is used it is necessary to have a waterproof cable for the part running through the water. The top end is attached to the telephone transmitter and receiver, as in the ordinary telephone, to the batteries and to a zinc plate which is to be buried in the earth a few feet away from the well or hole, and should not be more than 1 ft. under the surface. Four cells of dry batteries are used at each station.

Both stations are connected in the same way as shown in the sketch. This makes it possible for neighbors to use their wells as a means of communication with each other.—Contributed by A. E. Joeren.

How to Make a Life Buoy

Any boy may be able to make for himself or friends a life buoy for emergency use in a rowboat or for learn-

ing to swim. Purchase $1\frac{3}{4}$ yd. of 30-in. canvas and cut two circular pieces 30 in. in diameter, also cutting a round hole in the center of them 14 in. in



diameter. These two pieces are sewed together on the outer and inner edges, leaving a space about 12 in. in length unsewed on the outer seam. Secure some of the cork used in packing Malaga grapes from a grocery or confectionery store and pack it into the pocket formed between the seams through the hole left in the outer edge. When packed full and tight sew up the remaining space in the seam. Paint the outside surface and the seams well with white paint to make it watertight.—Contributed by Will Hare, Petrolea, C it.

A Home-Made Microscope

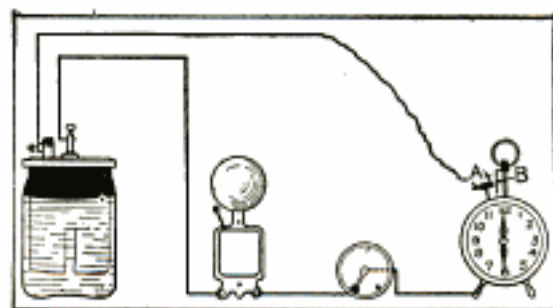
A great many times we would like to examine a seed, an insect or the fiber of a piece of wood but have no magnifier handy. A very good microscope may be made out of the bulb of a broken thermometer.



Empty out the mercury, which is easily done by holding the bulb with the stem down over a lamp or candle. A spirit lamp is the best, as it makes no smoke and gives a steady heat. Warm the bulb slowly and the mercury will be expelled and may be caught in a tea cup. Do not heat too fast, or the pressure of the mercury vapor may burst the glass bulb, cautions the Woodworkers' Review. To fill the bulb with water warm it and immerse the end of the tube in the water. Then allow it to cool and the pressure of the air will force the water into the bulb. Then boil the water gently, holding the bulb with the stem up; this will drive out all the air, and by turning the stem or tube down and placing the end in water the bulb will be completely filled. It is surprising how much can be seen by means of such a simple apparatus.

A Novel Electric Time Alarm

All time alarms run by clockwork must be wound and set each time. The accompanying diagram shows how to make the connection that will ring a bell by electric current at the time set without winding the alarm. The bell is removed from an ordinary alarm

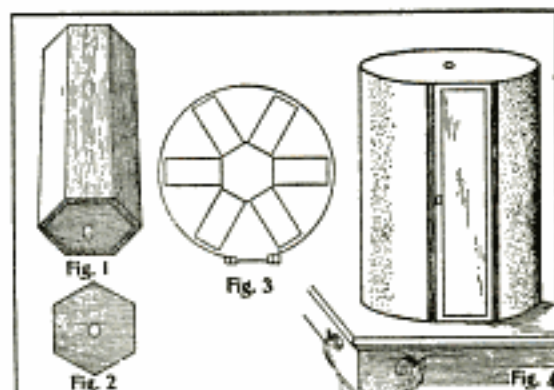


Electric Time Alarm

clock and a small metal strip attached, as shown at B. An insulated connection is fastened on the clapper of the bell, as shown at A. The arm holding the clapper must be bent to have the point A remain as close to the strip B as possible without touching it. The connection to the battery is made as shown. When the time set for the alarm comes the clapper will be moved far enough to make the contact. In the course of a minute the catch on the clapper arm will be released and the clapper will return to its former place.

How to Make a Phonograph Record Cabinet

The core, Fig. 1, consists of six strips of wood beveled so as to form six equal sides. The strips are 3 ft.



Phonograph Wax Record Case

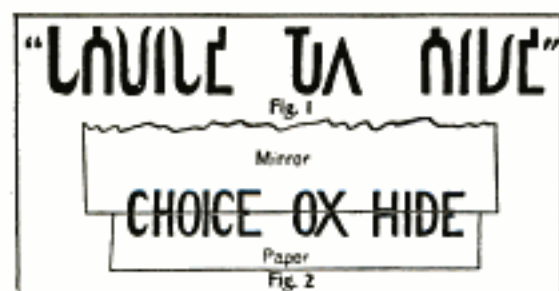
long and 3 in. wide on the outside bevel and are nailed to three blocks made hexagon, as shown in Fig. 2, from $\frac{3}{8}$ -in. material. One block is placed at each end and one in the middle. A $\frac{1}{2}$ -in. metal pin is driven in a hole bored in the center of each end block. The bottoms of the pasteboard cases, used to hold the wax records, are either tacked or glued to this hexagon core, as shown in Fig. 3, with their open ends outward.

Two circular pieces are made of such a diameter as will cover the width of the core and the cases attached, and extend about $\frac{1}{2}$ in. each side. A $\frac{1}{2}$ -in. hole is bored in the center of these pieces to receive the pins placed in the

ends of the core, Fig. 1. These will form the ends of the cabinet, and when placed, one on each end of the core, heavy building paper or sheet metal is tacked around them for a covering, as shown in Fig. 4. A small glass door is made, a little wider than one row of cases, and fitted in one side of the covering. The outside may be painted or decorated in any way to suit the builder.

Experiments with a Mirror

Ask your friend if he can decipher the sign as illustrated in the sketch, Fig. 1, which you pretend to have read over the shop of an Armenian shoemaker:



He will probably tell you that he is not conversant with Oriental languages. He will not believe it if you tell him it is written in good English, but place a frameless mirror perpendicularly on the mysterious script, right across the quotation marks, and it will appear as shown in Fig. 2. We understand at once that the reflected image is the faithful copy of the written half.

With the aid of a few books arrange the mirror and the paper as shown in Fig. 3 and ask your friend to write anything he chooses, with the condition that he shall see his hand and read the script in the mirror only. The writer will probably go no farther than the first letter. His hand seems to be struck with paralysis and unable to

write anything but zigzags, says Scientific American.

Another experiment may be made by taking an egg shell and trimming it with the scissors so as to reduce it to a half shell. In the hollow bottom roughly draw with your pencil a cross with pointed ends. Bore a hole, about the size of a pea, in the center of the cross. Place yourself so as to face a window, the light falling upon your face, not upon the mirror which you hold in one hand. Close one eye. Place the shell between the other eye and the mirror, at a distance of 2 or 3 in. from either, the concavity facing the mirror as shown in Fig. 4. Through the hole in the shell look at the mirror as if it were some distant object. While you are so doing the concave shell will suddenly assume a strongly convex appearance. To destroy the illusion it becomes necessary either to open both eyes or to withdraw the shell away from the mirror. The nearer the shell to the mirror and the farther the eye from the shell the more readily comes the illusion.

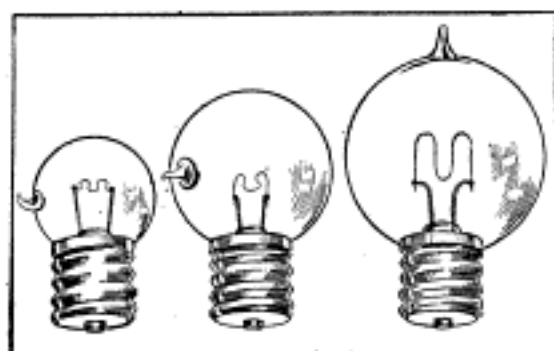
Miniature Electric Lamps

After several years' research there has been produced a miniature electric bulb that is a great improvement and a decided departure from the old kind which used a carbon filament. A metallic filament prepared by a secret chemical process and suspended in the bulb in an S-shape is used instead of the old straight span. The voltage is gauged by the length of the span. The brilliancy of the filament excels anything of its length in any voltage.



Experimenting with a Mirror

Of course, the filament is not made of the precious metal, radium; that simply being the trade name. However, the filament is composed of certain metals from which radium is extracted.

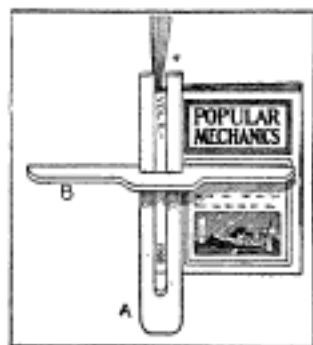


Types of "Radium" Lamps

The advantages of the new bulb are manifold. It gives five times the light on the same voltage and uses one-half of the current consumed by the old carbon filament. One of the disadvantages of the old style bulb was the glass tip, which made a shadow. This has been obviated in the radium bulb by blowing the tip on the side, as shown in the sketch, so as to produce no shadow.

How to Make a Magazine Clamp

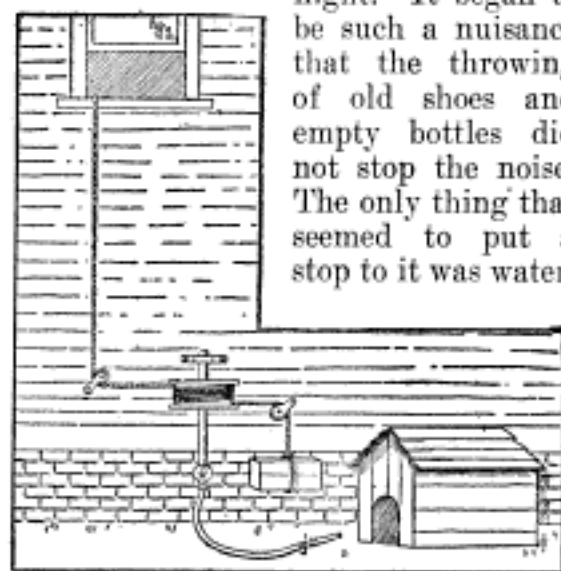
This device as shown in the illustration can be used to hold newspapers and magazines while reading. Two pieces of wood are cut as shown, one with a slot to fit over the back of a magazine and the other notched to serve as a clamp. The piece, A, may be slotted wide enough to insert two or three magazines and made long enough to hold several newspapers.



A color resembling pewter may be given to brass by boiling the castings in a cream of tartar solution containing a small amount of chloride of tin.

Drowning a Dog's Bark with Water

The owner of two dogs was very much annoyed by the dogs barking at night. It began to be such a nuisance that the throwing of old shoes and empty bottles did not stop the noise. The only thing that seemed to put a stop to it was water.



Water Treatment for Dog's Bark

Being on the third floor of the house, and a little too far from the kennel to throw the water effectively, a mechanism was arranged as shown in the sketch.

A faucet for the garden hose was directly below the window. An 8-in. wooden grooved pulley was slipped over an axle which had one end fitted on the handle of the faucet. A rope was extended to the window on the third floor and passed around the pulley several times, thence over an iron pulley fastened to the wall of the house and a weight was attached to its end. By pulling the rope up at the window the large pulley would turn on the water and when released the weight would shut off the flow. The nozzle was fastened so as to direct the stream where it would do the most good.—Contributed by A. S. Pennoyer, Berkeley, Cal.

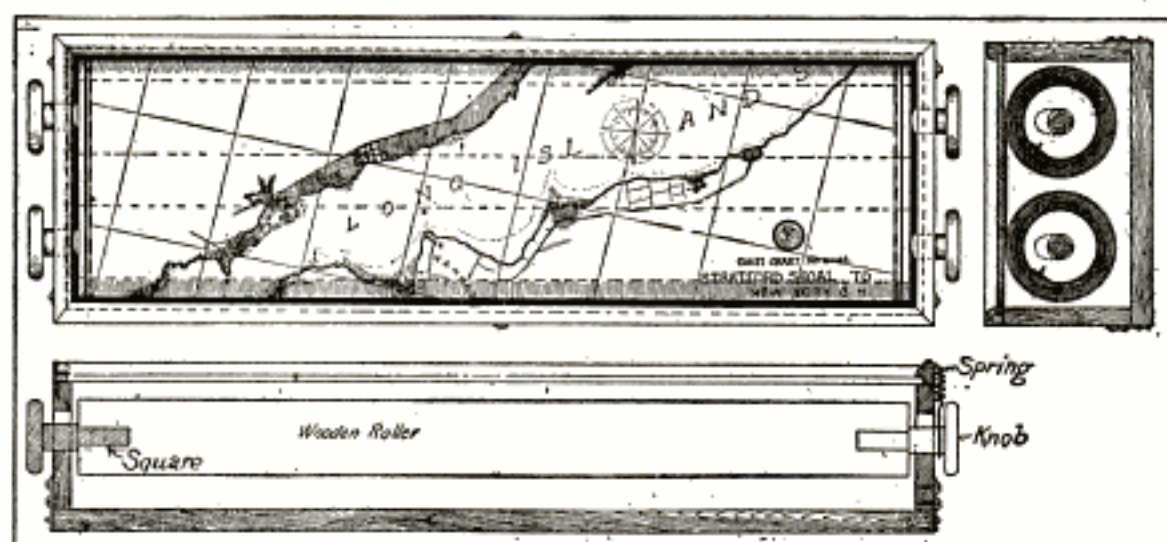
The average cost of supplying 1,000,000 gal. of water, based on the report of twenty-two cities, is \$92. This sum includes operating expenses and interest on bonds.

How to Make a Chart Box

If you have had the experience of trying to hold a chart on a windy day, or in the rain, you will be able to appreciate the handy little contrivance here described. The device consists of a box about 3 ft. long, 1 ft. wide and 7 in. deep, with a plate-glass top, beneath which is fastened the chart, on two rollers, just as the film is placed on the rollers of a camera. On an extended cruise the charts may be pasted together before the start in one long strip, so that the charts may be rolled along continuously as the cruise progresses, and the particular part of the chart which is needed is always before the navigator's eyes.

The rolls may be made of almost any diameter, but a size of at least 2 in. will be found better than if the diameter be made as small, say, as an ordinary window-shade roller. This is because the paper of the charts is so stiff that it is liable to spring off the roller, if it be too small, where held by the thumb-tacks.

The rollers are held in the box by round-ended knobs, with their ends stuck into the ends of the rollers. These knobs are used to turn the rolls in either direction, as may be necessary. In order to keep the chart taut under the glass, so that it can be read clearly, springs are fitted to hold the rolls up against the glass top, and this gives just enough friction, so that the rolls may be



Details of Home-Made Chart Box

New charts can be placed on the rollers at any time by taking out the rollers and attaching to them the new chart by the use of four ordinary thumb-tacks, says *Motor Boat*. Then merely wind the chart on the rollers and place them back in the case.

To explain the method of construction, as illustrated, the sides of the box are $\frac{3}{4}$ in. thick. For a nice job use mahogany, but pine, cedar or any other wood will answer the purpose. The bottom is made of 1-in. material, and is made removable by being attached to the side with hooks and eyes or with any one of a dozen or more different styles of spring catches, such as those used in cameras.

turned easily, and still not be loose enough to let the charts unroll or sag. To provide evenness, as the charts increase in size on one roller and decrease on the other, the axle of the turning knobs must be put through oval-shaped holes or slots, so as to allow the rolls to move up and down.

The glass top is held by a rabbeted frame, set down over it and screwed or bradded fast to the sides. Scuppers should be cut through this frame to allow the water to run off the glass in wet weather.

This chart box can be built by any one possessed of a little ingenuity, and it will be found a very handy affair.

This is a Warning Against Damage to Your Woodwork, Furniture and Floors



PEACH-JUICE will stain your table linen—probably, you can take out part of the stain—possibly, you can take it all out—but the table linen may be ruined.

That's *always* the trouble with all "stains"—you never know whether they're in to stay, or in to come out, or partly stay in and partly come out.

When you want to color any fabric properly—you dye it.

And this is every bit as good judgment in regard to the woodwork, furniture and floors of your home as it is to your dresses and things.

Most wood and varnish "stains" are made of such cheap, poor aniline or coloring matter that they smudge over the grain of wood and hide all its beauty because the color particles are too coarse to penetrate the pores—thus they show "laps," light and dark spots and streaks, and they "rub off" on your hands and clothes.

Now when you once get wood stained—maybe you can "do something with it" to rectify the error and maybe you can't—it's better not to take chances—particularly when it isn't necessary.

Johnson's Wood Dyes are really dyes—not mere stains—Johnson's Wood Dyes develop the beautiful grain of wood, accentuating the high lights and low lights, because we use the finest and most expensive colors—colors which we must import because their equal cannot be obtained in this country.

And Johnson's Wood Dyes actually color the wood *deeply*—because they possess a peculiar penetrative power due to the use of a liquid vehicle which we have found to be to the chemistry of wood finishing what "lanolin" is to medicine—the greatest "pore penetrator."

That is why Johnson's Wood Dyes give an unequalled richness of tone and permanency—and a perfectly even texture which will not rub off.

Many manufacturers combine stain and varnish in "varnish stains."

Years ago, an advertising man suggested that we put up such a preparation, calling it Johnson-lac. We wouldn't do it because we know that all stains and varnishes, shellacs, hard oils and similar preparations are nothing more than *surface* coat-ers, which mask the beauty of the wood and make woodwork, furniture and floors a constant source of care and trouble.

It is simply impossible for such preparations to give the

soft, smooth, artistic effects of Johnson's Artistic Wood Finishes, because varnish and shellac and hard oil are too "thick" to penetrate the wood, and so they must remain upon the surface to show white marks with every scratch and scrape and show the white wood where worn through.

There are other good reasons against stains and varnishes and shellacs—the principal objection being that "shiny" wood finish is a good way to make everything in the home look cheap and ugly—even fine pianos are being given a "dul!" finish now.

The only modern finish that will not scratch and mar and show every heel print like varnish, hard oil and shellac, and will not catch and hold dust and dirt like ordinary furniture and floor wax, is Johnson's Prepared Wax.

This is because Johnson's Prepared Wax contains 20 per cent more of the hard and very costly polishing wax than any other wax on the market—thus it covers a fifth more space and can be brought to the most beautiful and lasting polish with the least labor.

And the liberal percentage of hard wax enables you to secure a rich, subdued satiny surface impossible with any other finish.

When any part of a shellaced or varnished surface becomes worn or marred it is necessary to refinish the entire surface but Johnson's Prepared Wax is so hard that any part of its surface may be rewaxed without showing any "lapping"—thus you can easily keep everything in perfect condition.

We want to send you, with our compliments, a very handsome and interesting 48-page, illustrated book which tells you about "The Proper Treatment for Floors, Woodwork and Furniture," in detail.

S. C. JOHNSON & SON,

Station P. A. 4

Racine, Wis.

"The Wood Finishing Authorities."

JOHNSON'S WOOD DYES

"For the Artistic Coloring of All Woods"

in the following shades:

No. 126—Light Oak	No. 128—Light Mahogany
No. 127—Dark Oak	No. 129—Dark Mahogany
No. 125—Mission Oak	No. 130—Bog Oak
No. 130—Weathered Oak	No. 121—Moss Green
No. 131—Brown Weathered Oak	No. 122—Forest Green
No. 128—Green Weathered Oak	No. 123—Flemish Oak
No. 140—Manilla Oak	No. 124—Br. Flemish Oak

Half Pints, 30c; Pints, 50c; Quarts 85c—at your paint dealer's.



THERE ARE NO SUBSTITUTES FOR

JOHNSON'S
ARTISTIC WOOD FINISHES
JOHNSON'S

FOR FURNITURE, WOODWORK AND FLOORS



Please Mention Popular Mechanics

MOTOR BOATING HAS BECOME A GREAT NATIONAL PASTIME

Thousands of New Craft Being Built This Year--The Cheapest
and Best of All Out-Door Sports



Speed Boat "General," Time 2:04; 60-Hp.

MOTOR RACER OF LONG AND NARROW DESIGN.—The motor racing boat "General," which is practically a racing shell, made a speed on its first trial of one mile in 2:04. Its length is 39 ft. 10 in. over all, with a beam of 4 ft. 2 in., and is equipped with a 40-60 hp. engine.

FAST CRUISING MOTOR BOAT.—The "Grayling" is one of the fastest cruising motor boats in the world, having won the time prize in the 200-mile race on Lake Erie last August. The boat is owned by O. J. Mulford, and is a big, heavy, seaworthy cruiser, 66 ft. long, 11½ ft. beam. She is equipped with three 40 hp., 4-cylinder engines, and although designed for a safe, comfortable cruising boat, has developed a speed of 18 miles an hour, and cruises at a steady speed of 15 miles.—By courtesy of Gray Motor Co.



The "Grayling"

THE SPORT OF MOTOR BOATING.

By William N. Bayless, Jr.

History is silent as to whether young Cain and his brother Abel stuck an embryo mast on a chip, affixing a leaf thereto for a sail, and with the motive power of their lungs blew the small craft across a convenient puddle; but certain it is that boating, both as a vocation and an avocation, extends far back into the infancy of the world. And from the time the old Viking, Lief Erickson, battled and sailed his craft across to the shores of New England, down to the latest speed feat of the small gasoline auto boat of today, boating has held the interest of the human race.

Large yachts, both steam and sail, have always been the luxury of the classes rather than the masses, and even up to a few years ago the small power boat could not be indulged in except by men of means. The motor boat of twenty years ago was either a miniature steam ship or a naphtha launch, and both classes were expensive in the intricacy of their propelling machinery, and the latter at least was expensive in motive fuel.

The advent of the so-called gasoline engine has materially changed the aspect of these conditions, and boating under power has now been put within the reach of the man of moderate means. This has been accomplished by the gasoline engine operated by the explosions of a mixture of gasoline vapor and air, and these engines have now gotten down to a price well below \$100 for even a 6-hp. This, together with the fact that good gasoline can now be purchased at an average price of 15 cents per gallon, has placed the sport of motor boating upon a basis within reach of the lean purse. As was the case with bicycles and automobiles, the first gasoline propelled motor boats were rather costly affairs and were purchased sparingly, but the price on both hull and engine has been appreciably reduced year by year, until now a really fine motor boat 20 ft. long, fully equipped with engine and boat fittings, all ready to run, can be had for as low as \$200. And this reduction in price has resulted in the most remarkable increase in the sport, and statistics show that motor boating is becoming a veritable craze.

Unlike automobiling, this sport is of course restricted to communities near bodies of water, but almost all of our large cities are adjacent to some stream, lake or bay that is well adapted to the enjoyment of this healthful recreation.

For some time the Atlantic seaboard cities have indulged in power boating quite extensively. From Maine to Florida, the "chug-chug" of the gasoline motor has echoed along the bays and harbors; and all of the principal northern cities, like Boston, New York, Philadelphia, Baltimore, etc., have large motor boat clubs.

But in the inland cities of the north the increase has been most rapid recently. Such towns as Buffalo, Cleveland, Toledo, Detroit, Chicago, Milwaukee, Duluth, etc., situated on the Great Lakes, with magnificent facilities for this class of boating, are now advancing by leaps and bounds in the use of motor boats, and the industry and sport has increased with almost mushroom growth. Every one of these cities has its motor boat club with healthy membership enrollment, and one and all of the clubs are in the most flourishing financial condition.

A typical instance of this great growth is shown in Detroit, Mich. Probably to a greater extent than its sister cities, it is endowed by nature with splendid boating

BAY CITY BOAT MFG. CO.



No. 47—40x10 ft. Cabin Cruiser, MILLINOCKETT. This is an ideal cruiser for any kind of weather, built by the

Bay City Boat Mfg. Company

BAY CITY, MICHIGAN.



Our Special 18 ft. Launch No. 26—Equipped 2 H. P. Engine, Reversible, \$135.00

Knock-Down-Frames and Patterns for over 60 different Boats and designs. Set up and fitted. No moulds needed to build from our K-D-Frames, excepting Row Boats.

GUARANTEE

1st. That our patterns are perfect and that you can build a perfect boat from them.

2d. That our K-D-Frames are set up, fitted, beveled, bored—some parts fastened, parts numbered and perfectly crated.

3d. That you will receive our goods in first-class condition and of the best material, or money refunded.



No. 61—30x8 ft. Cabin Cruiser, LOTTIE S.

UP-TO-DATE AND HIGH GRADE. Testimonials by the score if desired. A few in Catalogue.

BUILD A BOAT

By the

**Weatherwax
Method**

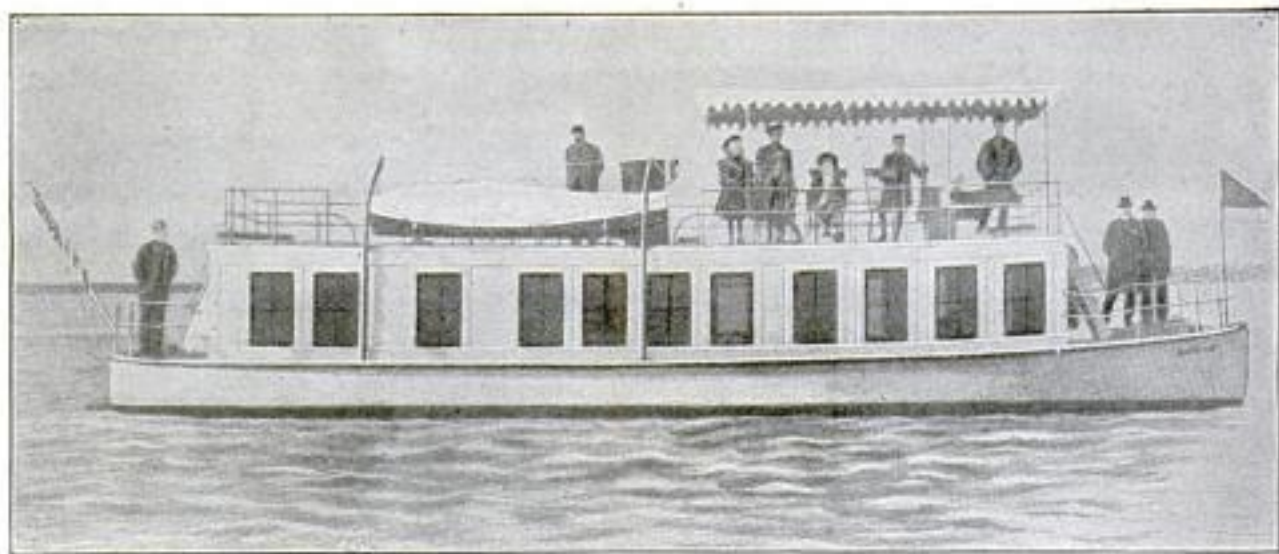
100-Page Catalog 8.
10c.

60 designs of Cruisers, Launches, Sailing Boats, Tenders, Skiffs, Row Boats, Duck Boats and Canoes.

BAY CITY BOAT MFG. CO., BAY CITY, MICH. U. S. A.

Please Mention Popular Mechanics

Copyrighted material



Cruising House Boat—Speed 8 Miles an Hour

facilities. The very fact that it is not upon the actual shore of a lake is in its favor, because the boat of less than 25 ft. length is uncomfortable in a choppy lake sea. The Detroit River is acknowledged to be one of the most beautiful and finest waterways in the world, and its facilities are taken advantage of to the full by the motor boat enthusiasts of the city. It was just a few months ago that the first motor boat club was organized, and at the present writing the membership is well over 300 and bids fair to become 500 before another twelvemonth has rolled around. Every member is the owner of a boat, and all are enthusiastic in promoting the sport; and, in addition to this, it must be remembered that there are hundreds of owners of motor boats in Detroit who have not as yet joined the club.

It is within the bounds of conservatism to estimate that there has been 100% increase in motor boating in the city of Detroit alone during the past year. The lake cities are dotted with boat manufacturing establishments and marine engine manufacturers are to be found in almost every town.

To a lesser degree some of the other large inland cities are taking up motor boating with wonderful increases. For instance, Cincinnati, St. Louis, Pittsburg, Minneapolis, St. Paul, New Orleans, etc. These cities labor under the disadvantage of having water facilities not so fine as the lakes, inasmuch as their rivers as a rule have rather stiff currents, and backing a current like the Mississippi at St. Louis, with a small horsepower engine, is not conducive to exciting speed thrills.

One of the most significant phases of the motor boat growth in the United States is to be found on the Pacific Coast, extending all the way from Vancouver to San Diego. Puget Sound boating enthusiasts have organized into a splendid club and the marine engine and boat manufacturers report a remarkable increase in their sales for that country. Tacoma, Seattle, Salem, San Francisco and Los Angeles are following suit; and the beautiful bays on the Pacific Coast line are unfolding their beauties to new eyes.

Then there is the speed crank. It is the same type of "bug" that yearns to drive a racing car at 100 miles an hour that is now rushing his long, slim, rakish-looking speed hull through the waters at a rate of 30 miles an hour. This speed has actually been attained by at least two gasoline propelled racing craft, one of which is the "General," of Bay City, Mich. Practically every motor boat club in the country holds at least one regatta during the season, and the marine publications are filled during the summer months with accounts of these races.

The commercial side of it has not been neglected. The gasoline engine is now the motive power in a large number of commercial craft, ferry launches, fishing boats, etc. Special engines designed for this kind of usage are being built by a large number of the marine engine manufacturers of the country, and for hard work and economical consumption of fuel, they are giving the greatest satisfaction.

The gasoline engine has come to stay.

HOUSE BOATS.

The rivers in England, especially the Thames, swarm with house boats, and during the season hundreds of these craft may be seen anchored in pleasant places along the banks or changing locations by being towed to a new spot. Some are quite elaborate, the larger number less pretentious, but all the home of jolly parties which divide their time between life on the water and strolls on land.

The house boat is now becoming more common in this country, though confined chiefly, as in Europe, to use on rivers. Many have been built by their owners, for the ordinary house boat is nothing more than a simple house

on a scow. Others are built to order at boat yards, and often assume considerable size and the elegance of interior finishing runs the price up into the thousands. In fact, there is opportunity for almost unlimited expenditure if one desires plate glass, lace curtains, elegant bath rooms and furnishings on that order.

The earlier house boats made no attempt at power on board, not even a sail, but in these days few are built without a gasoline engine for lighting, which also supplies sufficient power to move the boat at five or six miles an hour. The house boat illustrated has all the conveniences of a modern home, containing two staterooms, galley, living room, upper deck, etc. It is 50 ft. long, draws only 16 in. of water and has a gasoline engine which gives it a speed of 8 miles an hour.

Quite a good many floating house boats have been built on the northern rivers tributary to the Mississippi, and floated all the way to New Orleans, where they have been sold in most cases for about what they cost to build, the occupants returning home by rail. In some cities house boats are made by purchasing a small scow and using an old street car body—which can be bought for a few dollars—for the house.

GASOLINE LAUNCH HAS BRICK FIREPLACE IN MAIN CABIN.

One of the trimmest and fastest gasoline yachts of the 75-ft. over all class on Puget Sound was recently launched at Everett, Wash., for J. C. Marmaduke, of Seattle. The yacht, which bears the name "Davy Jones," is 75 ft. long, 12 ft. wide, and carries a 6-cylinder gasoline engine of 100 hp.

The interior finishings of the cabins are of hardwood, with deep velvet carpets and a large number of soft seats. The feature of the furnishings is the brick fire-



Gasoline Boat with Fireplace

place in the main cabin, on which a log fire will be kept burning during the chilly hours met with on a cruise.

The builders guarantee the yacht to be fit from stem to stern for the hardest kind of a cruise, and claim that a run from Seattle to Vladivostock could be made with absolute safety.

GASOLINE LAUNCH IN ARCTIC OCEAN.—What is believed to be the only gasoline launch navigating the Arctic ocean is owned by Alexander Allen, formerly of Rochester, N. Y., who loads it with everything from toys to harpoons and makes long trading cruises among the Eskimos during the open season.

Build Your Own Boat Brooks System

Build Your Own Furniture BY THE System



I CAN sell you a boat for one-fourth of what a factory would charge. I can sell you furniture for one-third of what a dealer would charge.

I will sell you 100 cents' worth of actual value and results for 25 or 35 cents. Is it worth considering?

I cannot tell you my whole story here, but if you will send for my catalogues, they will prove what I claim. Give me a chance—right now, today. Read my guarantee—it means you take no risk.

You Can Save Two-Thirds to Three-Fourths

I have revolutionized the boat-building business. I have spent the last twenty-two years in building or sailing boats, and am a practical boat man.

Seven years ago I originated the Pattern System of boat building. Today my customers are found in every civilized country on earth.

Over 50,000 boats (more than the combined output of all boat factories) have been built from my system, mostly by inexperienced men and boys.

Over half of these have built several boats—a large number have established themselves in the boat-building business.

Boat Patterns \$1.50 and up



A Set-up Frame



A Semi-Speed Model

not fail to build as good a boat as the professional boat builder.

My boat catalogue shows all kinds of boats and tells how anyone can build a boat from them.



ROW BOAT



MY GUARANTEE.

Whether you buy boats or furniture of me, I absolutely guarantee that you will be satisfied. I will instantly refund your money if you are not. I stand back of every statement made in this advertisement. I have made them as strong and convincing as I know how. The goods warrant it. C. C. BROOKS

price than you would pay for suitable raw material.

All parts of my knock-down frames are accurately shaped and machined, ready to put together.

I also send free with each frame the patterns and complete illustrated instructions needed to finish the boat. I can save you (1) boat-builder's profit, (2) labor expense, (3) big selling expense, (4) seven-eighths freight. You can figure this out yourself.

Knock-Down Furniture

I have adapted to furniture practically the same idea that made my boat business such a success, and it is revolutionizing the furniture business. My high-grade, heavy art furniture is fast taking the place of the expensive factory product.

I have been selling this furniture for three years. Every customer is enthusiastic about it.

All pieces are of solid oak and are machined, smoothed, fitted, all ready, so any one can put them together. You can make a beautiful Mission or Arts and Crafts chair, davenport, table or bookshelf in a few minutes. Apply the stain (only one coat—no rubbing) and you have a solid and handsome piece of furniture. Every piece and every result is guaranteed to be satisfactory in every way or money refunded.



Height 35 in.
Depth 27 in.
Width 29 in.

You save (1) in the factory cost, (2) in the factory profit, (3) all dealers' profits, (4) two-thirds of freight, (5) finishing expense, (6) the expense of crating and packing—making a saving of two-thirds or three-fourths, according to the piece.

\$4 buys this chair (shown in cut) without cushion. Settee same style **\$7.00.**

By the Brooks System you can own \$14.00 chairs for \$4.00; \$25.00 davenports for \$7.00; \$12.00 porch swings for \$4.00; \$25.00 tables for \$8.00, etc.



As she received it

Knock-Down Boat Frames

Many people prefer to buy my knock-down frames (all ready to put together) for their boats, instead of working up the rough lumber.

Owing to my immense factory facilities, I can in many cases supply knock-down frames at a lower



Type E.
\$65.00

SPECIAL ENGINE OFFER

Here is an engine I know is all right. The "Brooks' Special" has copper water jacket, complete marine and electrical equipment, ready to install—3 h. p. Weighs 53 lbs. Will supply this engine together with special 15½ foot K. D. launch frame built especially for it for \$70.00.

Don't buy before you investigate this. Send for my engine catalogue—it's free. Save money by getting our special combination prices on all sizes of engines and frames when purchased together.

See our other page advertisement in this issue.

\$6.00 Buys This Morris Chair



Width 33 in.
Height 40½ in.

My catalogue explains everything Mailed free. It shows why no skill is required, why you take no risk. Identify your home for very little money.

Write me personally for my boat, engine or furniture catalogue. Sent free. C. C. BROOKS, President.

BROOKS BOAT MFG. CO., 3704 SHIP ST.,

BROOKS MFG. CO.

(Originators of the Pattern System of Boat Building)

SAGINAW, MICH., U. S. A.

(Originators of the Knock-Down System of Home Furnishing)

Please Mention Popular Mechanics



"Gray No. 6"—A Racer

SHOOTING THE RAPIDS IN A MOTOR BOAT.

One of the most perilous and difficult trips ever taken by a motor boat was carried to a successful end recently when Dan Thorpe, an adventurous motor boat enthusiast, shot the 5-mile rapids of the Columbia River at Dalles, Ore., in his 24-ft. 5-hp. gasoline launch. He covered the mile stretch through the worst of the rapids in 2½ minutes, despite the warning of friends that he was tempting fate to an alarming degree, and that should the least mishap occur while making the run he would be dashed to pieces on the rocks.

After pulling himself together for the start, Thorpe jumped into the boat, turned on the power, and almost instantly started down the course of rushing water. Down through the spray and swirling waters the little boat sped, cutting through the mighty whirlpools and dodging projecting rocks. Had the man at the wheel lost his nerve for a moment, man and boat would never have been heard of again. Spectators predicted that it would be his last ride, but he made the trip unharmed, save for a thorough drenching from the spray and the water which dashed into the boat.

It is said that Mr. Thorpe is the third white man who has ever successfully taken the perilous ride in any kind of a craft. The trip was not alone inspired by daredevilry, however. Mr. Thorpe desired to operate his boat on the lower river, and rather than load it on a car, he shot the rapids.

It is now in order for some foolhardy motor boat enthusiast to build a craft for the express purpose of shooting the rapids and whirlpool below Niagara Falls.

ATTRACTIVE 21-FT. LAUNCH.

This graceful boat is 21 ft. long, 5 ft. 6 in. beam, and seats 14 people. It draws 20 in. and has a 5-hp. engine which drives it at 8 miles an hour; weight, 1,800 lb. It



Courtesy of Detroit Boat Co.

A Favorite Model—21-Ft

will stand a heavy sea, and makes an ideal family boat. It is strongly constructed and will carry a 10-hp. engine if desired.

PRODUCER GAS FOR BOATS.

The economies of producer gas for gas engines naturally led to experiments in adapting the process to boats. The first attempt was made on a small freight boat on the Rhine River about two years ago. Since then some progress has been made, but the system has not yet come into anything like general use, although producer engineers and

experts predict the day when all our battleships and ocean liners will cease to leave a cloud of smoke in their wake.

In this country one yacht was recently equipped and reports state the cost of power was only 6 cents for 9 miles. This was for a cabin cruiser 50 ft. in length. The producer generators, however, have not yet been brought down to sizes suitable for small boats, and are not yet recommended for less than 20-hp. Gasoline will continue to be the approved fuel for some time to come, although only small alterations are required to make almost any gas engine work on producer. For ordinary boat use, producer may be said to still be in the experimental stage.

A MYSTERY SOLVED.

"What is the Navy sailing for?" quoth I to Captain Binks. "I do not know," the Sea Dog said. "But this is what I think: Bob Evans wants to teach the Japs the game of Tiddledywinks."

I put the question next unto our doughty Admirall. "I do not know," said he, "and if I did I wouldn't tell." I thought he muttered something else that bade me go to thunder.

The Secretary next I sought. "O Mister Sec.," said I, "Why is the Navy sailing West?" He straightway made reply: "Because it isn't sailing East."—And shook my hand good-by.

I went to Loeb. "O William Loeb, pray can you tell to me Just why the Navy's going West to the Pacific sea?" "Why, is the Navy going West? Who told you so?" said he.

At last I asked the President, "Please tell me why you risk The Navy sailing round the Horn?" He answered sharp and brisk: "Because the sailing is so bad from Omaha to Frisk." —Carlyle Smith, in Harper's Weekly.

PLEASURE LAUNCHES CARRY PRODUCE TO MARKET.

The farmers living on the logged-off island lands of the state of Washington have made the growing of small fruits and vegetables profitable by the use of pleasure



Pleasure and Profit

launches to carry the produce to market. The illustration shows the launch which D. J. Layne, a farmer living on an island separated from the mainland by the waters of Puget Sound, uses for this purpose.

"The gasoline launch is a great thing for the island farmer," says Mr. Layne. "We can load up our produce, take all the family aboard, and away we go on a pleasure trip to market, with a cost of about 1 cent a mile."

WHEN HE WENT ICEBOATING.—"Sure, I've been ice-boating—once."

The Detroitier to whom the inquiry was addressed, having served notice that the sport was not entirely unknown to him, proceeded to leisurely light a cigar and send a few rings of smoke into the air of the club room before he vouchsafed further information on the subject.

"Used to own an iceboat—once," he continued, at length. "Punny experience, that. Some years ago I had a hunch that I was cut out for the skipper of one of those ice-skimmers. About the same time a friend of mine began suffering from a similar belief regarding himself. We used to ride out to Grosse Pointe, stand around in the cold and watch the fellows clip off miles in a manner to make an express train look as if it were backing up, and figure how much pleasure there must be in the game. The germ had us right, so we pooled issues, laid in a stock of lumber, consulted one of those self-helps to carpentry and got busy. All our evenings and what time we could spare besides were given to constructing the craft. We had gathered a lot of pointers from watching others, and incorporated a number of improvements that we felt certain would enable us to throw snow in the face of any rival.

"After weeks of toil, during which we spoiled more lumber than we used, battered our fingers and did numerous other things not mentioned in the self-help book, the boat was finished. It surely looked good, with its graceful lines, and its every indication of great speed. We hadn't confided our plans to a soul, preferring to spring a sur-

TWO SPECIAL "BROOKS" BARGAINS

KNOCK DOWN LAUNCHES WITH MOTORS

When I determined to bring out these two special bargain boats, I had the readers of Popular Mechanics in mind. I selected the two most popular sizes and designs and made them so simple to construct that any bright boy or man will find the building of them "good sport" that is both instructive and fascinating. I furnish the K. D. boats with either the strip or regular planking. This strip planking makes what was the hardest, now the easiest part of boat-building. Either one of these boats is the greatest bargain in the boat line ever offered. Both the motors are just as high-grade as can be built; both include full marine and electrical outfit, even to the wiring. I will send you a full description of both boats and motors on request. Remember, I absolutely guarantee every claim I make—perfect satisfaction or your money instantly refunded.



PRICES, LAUNCH 233

Patterns, \$3.00

Knocked Down Frame and Patterns.....	\$12.00
Bent Coaming	2.50
Dressed Planking and Decking (the regular lumber or the strips)	10.00
Hardware, black iron (the nails, screws and bolts) ..	1.35
Fittings, Fuel Tank, Rudder, Tiller and Outboard Shaft Support	8.00
Knocked Down Boat, complete as above.....	\$33.85
For Galvanized Hardware for Salt Water add.....	.50
For Copper and Brass Hardware for Salt Water add.	3.40
For Galvanizing Rudder, Shaft Support, etc., for Salt Water add50

C. C. BROOKS

DIMENSIONS, LAUNCH 233

Length	15½ feet
Beam	48 inches
Depth at Bow.....	36 inches
Depth Amidships	24 inches
Depth at Stern.....	16 inches
Draft of Water.....	16 inches
Length of Cockpit.....	10 feet
Seating Capacity	4 persons
Should be equipped with a 2½ to 3 H. P. Motor.	
Speed 7½ miles per hour.	

SPECIAL OFFER, LAUNCH 233

We will sell you the \$12.00 K. D. frame and patterns and our \$65.00 3 H. P. type E motor for \$70.00.

We will sell you the \$33.85 K. D. boat and our \$65.00 3 H. P. type E motor for \$90.00.

We will sell you the finished hull, painted and varnished, equipped with all deck fittings as listed, fuel tank and rudder outfit, ready to install the engine, for \$75.00.

We will install our type E motor and ship you the launch all ready to run for \$125.00.

We fasten these boats with galvanized nails and bolts for use in either salt or fresh water.



PRICES, LAUNCH 234

Patterns, \$5.00

Knocked Down Frame and Patterns.....	\$24.00
Bent Coamings	3.50
Dressed Planking and Decking (either regular lumber or the strips).....	18.00
Hardware, black iron (the nails, screws and bolts) ..	1.75
Fittings, Steering Wheel, Fuel Tank, Rudder, Tiller and Outboard Shaft Support.....	15.80
Knocked Down Boat, complete as above.....	63.05
For Galvanized Hardware for Salt Water add.....	1.00
For Copper and Brass Hardware for Salt Water add.	6.00
For Galvanized Rudder, Shaft Support, etc., for Salt Water add50

SPECIAL OFFER, LAUNCH 234

We will sell you the \$24.00 K. D. frame and patterns and our \$95.00 6 H. P. type D motor for \$108.00.

We will sell you the \$63.05 K. D. boat and our \$95.00 6 H. P. type D motor for \$145.00.

We will sell you the finished hull, painted and varnished, equipped with all deck fittings, fuel tank, steering wheel and rudder outfit, as listed, all ready to install motor, for \$145.00.

We will install our 6 H. P. type D motor and ship you the launch all ready to run for \$230.00.

We build these boats with clear oak frame and clear cypress planking, and fasten them with galvanized nails and bolts for fresh or salt water use.

DIMENSIONS, LAUNCH 234

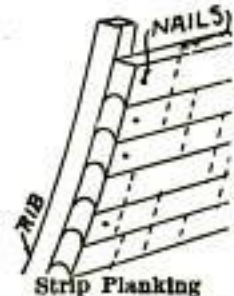
Length	22 feet	Draft of Water.....	22 inches
Beam	56½ inches	Length of Cockpit.....	15 feet
Depth at Bow.....	41 inches	Seating Capacity	12 persons
Depth Amidships	28 inches	Should be equipped with a 6 H. P. Motor.	
Depth at Stern.....	21 inches	Speed 11 miles per hour.	

STRIP PLANKING

Made in straight, narrow strips and will easily bend to place without steaming. Made "hollow and round" on the edges insures a tight joint without the necessity of beveling the edges as with the ordinary plank, even when rounding the bilge. No caulking.

We furnish the strip planking (all ready to put on) for all our launches except the Dorics. We do not furnish the strip planking for sailboats, rowboats or canoes. The price of the Strip Planking is the same as that of the regular planking lumber as listed.

With every launch pattern we send full instructions for the strip method of planking so that when it is a saving of money or time, you may have the strips made at your local planing mill.



Strip Planking

See Our Other
Page
Advertisement
In This
Issue

BROOKS BOAT MFG. CO.

(Originators of the Pattern System of Boat Building)

3704 SHIP STREET
SAGINAW, MICH., U. S. A.

Please Mention Popular Mechanics



16-Ft. Family Motor Boat

THE SMALL MOTOR BOAT.

prise that would be worth while. One cold morning we loaded the boat on a truck before daylight, and started for an up-river point to give it a tryout before announcing our achievement. The boat had set us back a pretty sum, but all that was forgotten in anticipating the pleasure that was to be ours. We didn't even notice the cold, until when our destination was reached Bill found he had a pair of frosted ears.

"We selected a spot in the lee of an immense lee house above Owen park, and while Bill rubbed snow on his ears to thaw them out I rigged up the spar and sail so everything would be in readiness for our trial spin. Then we hoisted the sail, pulled down our earmuffs, buttoned up our coats and began speculating on how quickly we could reach Windmill Point, the lee along shore being like glass, although farther out there was open water.

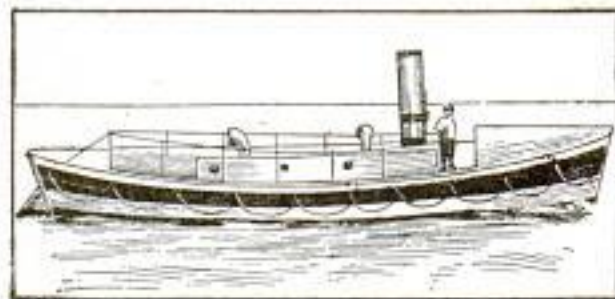
"With a mighty tug and a push we slid the boat off the bank and out on the ice. Quick as a flash the wind, which was blowing a gale, caught that sail and it belled out with a snap like a whip.

"Stop it," yelled Bill.

"Stop it," I echoed.

"But it wasn't any use. Away that boat went like a shot out of a gun. Travel? Say, it was just a streak of white. Straight for the open water it went, with Bill and I standing on the shore conjuring up new expletives appropriate to the occasion. On it went. There was a splash, as the pride of our hearts plunged into the open and slowly settled from view.

"Yes, I've been iceboating—once; that is, almost. I also owned an iceboat—once. That's all. But every time anyone mentions the subject I can see the look that came over that truckman's face that winter's morning when Bill slipped him an extra five-spot, and told him to forget all about what he had seen."—Detroit Free Press.



HYDRAULICALLY PROPELLED STEAM LIFEBOAT.

The steel lifeboat "President Van Peel," which rendered such great service in connection with the disastrous wreck of the "Berlin" off the Hook of Holland a year or so ago, is hydraulically propelled by machinery pumping two jets of water from tubes astern. The water is pumped in through tubes in the bow of the boat and driven out through tubes in the stern. It is the pressure of the water forced out and the resistance it meets with from the water outside that drives the boat ahead at a moderate speed—in this instance 3 miles an hour.

The engine which drives the centrifugal pump has no reversing gear, but is always running one way, the direction of the boat ahead or astern being controlled by valves in the discharge pipes. The controlling valves can be worked either from the little engine room or by the coxswain at the steering wheel. By moving one valve, only, the boat can be made to turn around on her center, and can always be steered independently of the rudder.

These are the safe, speedy, serviceable small boats that in summer dot the surface of lakes and rivers where people are really getting the fullest quota of enjoyment from their outing; so simple in operation that children can run them, and yet possessing speed and power enough to make them equally a joy to the dignified business and professional man. In fact, their utility is such that no one in these days thinks of owning or renting a summer cottage on the water without providing himself with this enjoyable means of sailing and getting about. Squalls and sudden storms have no terrors for the little motor boat, which can always run to shelter in a few minutes, and on hot days when there is no wind for the sail boats, the motor boat is in greatest demand, making its own breeze for its passengers, who, comfortably seated on soft cushions or in chairs, find the coolest spot is beneath its bright colored canopy.

These boats range all the way from the 10-ft. fishing and hunting boat, accommodating two or three passengers and costing only \$85 up, to the 30-footers which have seating capacity for 20 or more people and drive through the water at 15 miles an hour.

The boat illustrated is 16 ft. long, 4 ft. 6 in. beam, draws 16 in., seats 8 people; speed, 6½ miles an hour; has a 2-hp. engine, which also pumps the bilge water; weighs 1,000 lb. and costs only \$250.

CHAMPION MARKSMAN OF U. S. NAVY.—Pierce L. Shannon, who does his shooting with 13-in. guns, is the champion marksman of the U. S. navy, although but 21 years old. During the four years he has been in the navy he has probably annexed more honors than any other young man of his years ever attained in so short a time. He holds the world's record as a gun pointer for 13-in. guns, and while on the "Alabama" during the last target practice for world records, which was held April 28 off Cape Cruz, Cuba, he wrested the record from the "Wisconsin" by firing 11 shots and making 11 hits in 3 min. 20 sec. Each shell weighed 1,100 lb. The record the "Wisconsin" held was for 11 shots in 5 min. 40 sec.

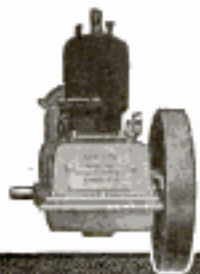
Shannon has had a remarkable career. He is heavy gun pointer, first class, and is one of 14 men in the entire navy, including officers and men, who has attained to the rank of expert marksman. This is a new rank recently created and when the medals for it have been cast Shannon will receive one. He was also one of the navy team of 16 men which won the national trophy for marksmanship contested for at Camp Perry recently.



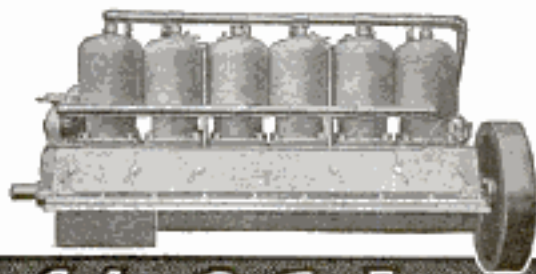
SEA-GOING CABIN DORY.

This type of power boat has done more probably than any other to popularize the sport of yachting. It is seaworthy, light of draught, inexpensive, and comfortable for any kind of cruising or knocking about. The illustration shows the "Magnolia" with her tender securely strapped on top of the cabin.

SCRIPPS



MARINE MOTORS



4 Cycle - from 1 to 6 Cyl.

The Six Points of Superiority

1st—Speed

A 4-cylinder, 15-20 horse power Scripps drove our speed boat "Ecce" nearly 21 miles an hour; and the 32-foot semi-speed boat, "P. D. Q.," over 17½ miles per hour.

2d—Power

We guarantee the Scripps Motor to develop more power and continuous hard work per pint of fuel than any other motor on the market (and our complete factory stands back of the guarantee). **Even running normal R. P. M.,** every engine we build **must** develop more horse power than rated before leaving the factory.

3d—Fuel Economy

The fact that a 4-cycle motor uses less gasoline than a 2-cycle of the same size is unquestioned. The Scripps uses less gasoline than the average **4-cycle** engine.

4th—Ease of Operation

Primarily built for the novice as well as the expert. So simple your wife or boy can run it. Starts without cranking.

5th—Appearance

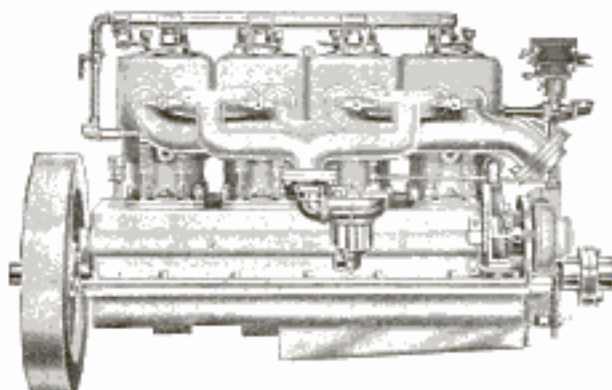
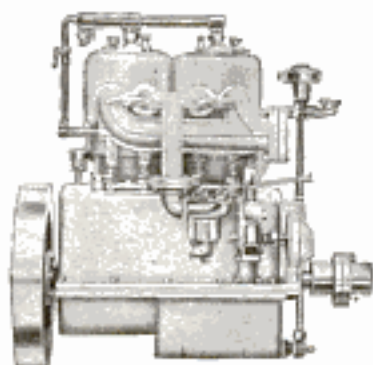
Positively the handsomest motor on the market at any price—**none excepted.** Highly finished castings and all trimmings polished brass.

6th—Cost

The Scripps is not "cheap" in a money sense; but fuel-saving and long life considered, it really costs less than any other engine on the market. It will outlast your boat.

—Write today for 1908 Catalog—

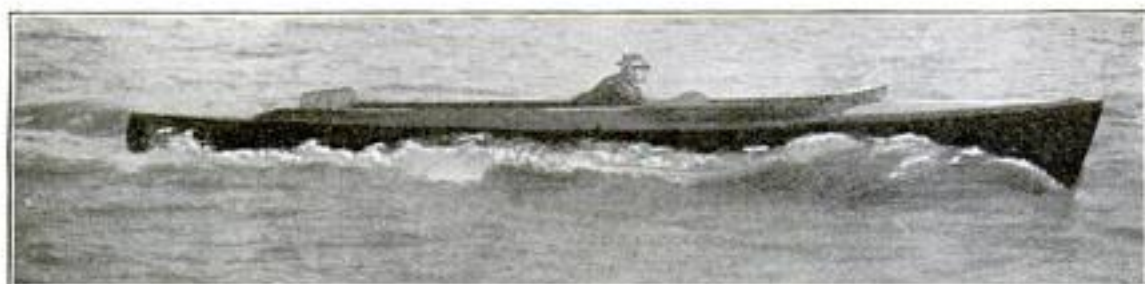
Scripps Motor Co. 602 Trumbull Avenue . . **Detroit, Mich.**



Please Mention Popular Mechanics

BUILDING BOATS FROM PAPER PATTERNS.

It is as practical for one handy with tools to build a boat from a set of paper patterns, costing only a few dollars, as it ever was for a small boy's mother to build him a suit of clothes from patterns bought at the store. In fact, the chances are all in favor of the completed boat being a handsome and first-class job—which the school garments not always were.



The W. E. Scripps Racer

The boat paper patterns are so complete, covering every piece of timber in the craft from keel up, and the directions are so simple and plain, it is no wonder boat builders by the hundreds have sprung up all over the country. The directions tell what material each piece requires, and what the dimensions of the stuff should be. The pattern is then laid on the board or timber, and sawed or cut to the shape and size of the pattern.

All the work can be done by hand with ordinary tools, and in few cases do the completed boats cost as much as

SPEEDY MOTOR BOAT RACER.

The racing boat shown in this illustration, built for W. E. Scripps, of Detroit, has a record of 20.9 miles per hour, made in the Detroit Motor Boat Club races last August. The boat is only 30 ft. 6 in. long, and 4 ft. 4 in. wide, equipped with a 4-cylinder 20-hp. engine. Twenty miles an hour is an exceptionally good showing for a boat of such small power.

WILL CRUISE IN BOAT CONSTRUCTED OF NEWSPAPERS.—George W. Johnson, a former Harlem river oarsman, is collecting newspapers, both white and pink, from all parts of the country, with which he proposes to construct a cruising shell in which he will attempt to row from St. Augustine, Fla., to New York, some time this spring. The boat will be 20 ft. long, 6 in. deep, and will have a 20-in. beam. It will be formed in a mold, about 20 thicknesses of the newspapers being compressed to form a hard and strong hull.



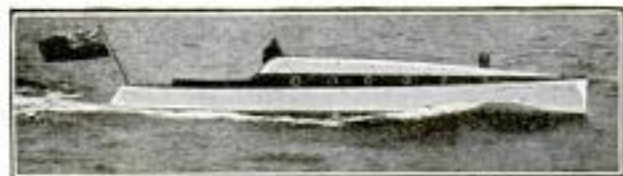
Courtesy Atlantic Boat Co.

Motor Boat for Salt Water

the freight charges alone would be for shipping a ready-built boat, say, 200 miles. In many instances the builders are abundantly able to pay for whatever they want, but the splendid satisfaction which comes to one who has actually fashioned something useful and creditable with his own hands is a reward which money can never purchase. For those who are in a hurry, or who do not care to do as much manual work, the sawed-out parts can be bought, which reduces the work to that of assembling, finishing and painting.

For those who build motor boats—and lots of young men are building their own motor boats now—all the hardware, engine, propeller and its gearing can be bought from any one of many first-class manufacturers, who furnish complete directions for installing.

Build a boat, and make something worth while.



ENGLISH MOTOR RACING BOAT.—The "Gray Witch," shown in this illustration, is one of the finest types of English motor racing boats. It is equipped with a 100 hp., 16-cylinder motor.

WIRELESS FROM NAVY HOSPITAL SHIP.—The captain-surgeon: "What's all that excitement on deck?"

The interne: "A seaman fell overboard, sir. But his comrades got him out."

The captain-surgeon: "Who is the man?"

The interne: "His name is Daniel Riley, sir."

"Daniel Riley, eh? Let me see my order book. Yes, yes, Daniel Riley will have to be disciplined."

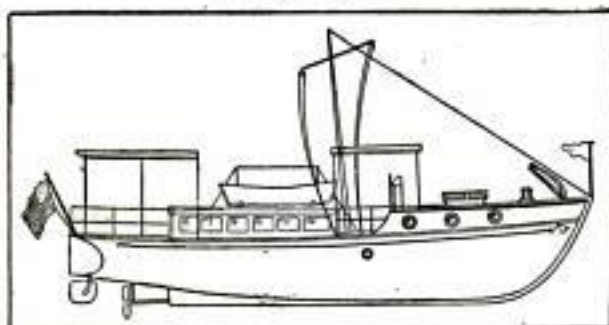
"What has he done, sir?"

"I ordered him not to take a bath until eleven o'clock"

—Marine Review.

MOTOR BOAT PATTERNED AFTER U. S. TORPEDO BOAT DESTROYERS.

The special Gurnet dory shown in this illustration was patterned after the type of boat adopted by the U. S. navy for torpedo boat destroyers, and has created a favorable impression. This type of boat easily weathers the roughest waters, and is built in 20, 22 and 25 ft. lengths. Used chiefly in salt water.



CRUISING CABIN LAUNCH 40 FT. LONG.

The trim-looking motor boat shown in this illustration is a cruising cabin launch 40 ft. over all. Her beam is 8 ft. 9 in., and draft 3 ft. The power equipment is a 20-hp. 4-cylinder engine, located forward. The engine room is reached through a sliding hatch. Among the fittings of the engine room are two pipe berths.

The main cabin is finished with mahogany on the outside and with white enamel and mahogany trim on the interior. It is separated from the galley and owner's stateroom by curtains of green raw silk. The galley is equipped with a 2-burner oil stove, a galley pump, and a large refrigerator under the after deck. A 9-ft. canvas dory is carried on davits over the cabin just back of the military mast.

Pioneer Perfect Frames



are the Standard
of Knock-Down
Construction
the World Over

YOU can build a boat like this yourself with Pioneer Perfect Frames—the only frames in which every rib is bent to exact shape and beveled for planking, stem and

stern post rabbeted; keel, skeg and pipe log furnished complete, bent and permanently fastened; the whole set up, trued and tested by our skilled boat-builders before being knocked down for shipment to you.

Pioneer Perfect Frames save you all of the *hard part* and *two-thirds* of the boat-builders' price for a *similar, complete* boat. Remember, that with every set of frames we furnish, *absolutely free*, plank patterns and detailed instructions for completing your boat. Each piece is marked where it should go. *You have merely to assemble it to make your lines and model perfect*—no problems of fitting—no chance for mistake or failure. No boat-builder can furnish you a better boat than *you can build yourself from Pioneer Perfect Frames* at a cost less than that of a "cheap" completed boat, though it is not fair to compare "Pioneers" with something you don't want at any price.

Now, to get your boat in the water early next season, you should order your frames *today*—on the *easy-payment plan* if you like. Set it up—see the *simplicity* of the Pioneer system. Then, if you have not time or inclination, if it seems too much labor to buy the rough lumber to finish your boat with the full-size patterns which accompany Pioneer Perfect Frames, or, if you do not want to complete your boat entirely by yourself, write us regarding planking, decking and fittings necessary, also hardware and engine—everything necessary to complete the boat, just as *perfect* as our frames, and at the same *low price*. *You can do it all or let us help you*. It all *depends* upon your *time* and *inclination*. By securing the frames on the *easy payment plan* you *pay for your boat as you build it*. Write **at once—TODAY—for FREE** booklet telling how to build your boat either from Pioneer Perfect Frames, Plankings, Fittings, etc., or from Pioneer Perfect Full-Size Patterns of every part. Or, send 25c for big 104-page 9 x 12 boat-builders' book, over **300 illustrations** and all you want to know about boats, engines, etc. Money back if not satisfied.

Pioneer Boat and Pattern Co.

Originators of the
Boat Pattern System

Wharf 224, Bay City, Mich.

Please Mention Popular Mechanics

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STEERING AND SAILING RULES.

When meeting end on or nearly so, alter course to starboard and pass on port side of other vessel. Follow this rule at night whenever both side lights of another vessel are visible forward of the beam.

When crossing, the vessel having the other on her starboard side shall keep out of the way of the other.

A power vessel shall keep out of the way of a sailing vessel.

In narrow channels do not overtake and pass another vessel.

In all weathers, except as specified, the following whistle signals shall indicate the courses required herein. When receiving a signal, answer with the same signal.

One blast means: I am directing my course to starboard.

Two blasts mean: I am directing my course to port.

Three blasts mean: My engines are full speed astern.

mitted. It is diagonally planked in two layers with canvas between, and is self-bailing and self-righting. It is divided into 8 water-tight compartments below the deck, filled with 82 copper air-cases.

A 40-hp. 6-cylinder gasoline engine, installed in the after-end compartment, gives a speed of 9½ miles per hour, with 650 revolutions. The controls are so arranged on the outside of the compartment bulkhead in recessed boxes that the motor can be readily managed from the outside when the compartment is closed water-tight. A fuel tank of 135 gal. capacity is located in the lower hold just forward of the centerboard trunk, and an auxiliary fuel tank, holding 25 gal., is placed under the turtleback deck of the forward compartment, into which the fuel is pumped from the main tank as required.

The boat is steered by a wheel, which can be instantly detached from the rudder head in case the steering oars are to be used in bad weather, and the rudder triced up. The boat is also rigged with foresail, mainsail and jib.



Courtesy Oshkosh Boat Wks.

Commodious Cabin Cruiser

Never sound a reverse or cross signal. If inadvisable to accept any signal, or if the same is not understood, sound not less than four short and rapid blasts of the whistle. In this case both vessels shall, if required, reduce speed or stop, or reverse, until proper signals are given and understood.

When approaching a bend in a channel sound one long blast.

Give whistle signals only when in sight of signaled vessels by day or night.

In thick weather or fog conditions, give fog signals only.

Distress signals to be given when assistance is required from other vessels or from shore.

In the daytime, a continuous sounding with any fog signal apparatus; firing a gun; or distance signal consisting of a square flag and either above or below it a ball, or anything resembling a ball.

At night, flames on the vessel; continuous sounding of any fog signal apparatus; firing a gun; rockets or shells fired one at a time at short intervals.—Courtesy of Mr. Hugh S. Gambel, Secretary National Association Engine and Boat Manufacturers.

BROAD-BEAMED 55-FT. CRUISER.

The "Floretta" is a 55-ft. cabin cruiser, which in design, construction, and in appointments shows a high standard in motor boat building. Her beam is 12 ft. and the power equipment is a 6-cylinder 60-hp. engine. The generous sized engine room, shown in the illustration, is located forward. The interior arrangement provides also a large and comfortable salon. The joiner work in the cabins is a splendid example of boat construction, being finished throughout in quarter-sawed oak and mahogany. The cabin is attractively furnished and is lighted by dome-lights. The steering gear is handled either from the bridge deck or from the forward cabin, speaking tubes connecting both points with the engine room. The equipment includes an electric light plant, shown on the left-hand side of the engine room illustration. The tender is carried on davits. The Floretta is owned by J. R. Veitch and J. N. Tittmore, of the Minneapolis & St. Louis Railway.

SHIP'S STOKER COUSIN TO KING.—The captain of a steamer plying between Marseille and Africa tells the following story on the new King of Sweden:

It happened on one of Gustav's periodical trips to Egypt, where the crown princess, now Queen Victoria, used to spend her winters. They were traveling incog, but I recognized him as the crown prince admiral, and said to him one day:

"You are quite young to be an admiral."

"Pshaw!" he replied, "age of service has nothing to do with my nautical rank. I was made an admiral on account of my name. I am called 'Bernadotte,'" he added quizzically.

"Bernadotte? Maybe you are a relative of the great marshal."

"He was my great-grandfather; I am a Prince of Sweden."

"Indeed! And do you know that you have some relatives in the neighborhood of Marseille?"

"I know, and will look them up some day. Strange to say, I never met a cousin or aunt in my numerous visits to Marseille."

"Would you like to see a cousin right now?"

"Nothing would give me greater pleasure."

The captain went to the speaking tube and called down into the engine room. "Bernadotte, come up quick, and do not be all day about it."

Half a minute later a tall, soot faced fellow, naked to the waist, popped out of one of the hatchways.

"Attention," thundered the captain. "Bernadotte, allow me to introduce his royal highness, the Prince of Sweden, your cousin."

Rufus Choate once tried to get a Boston witness to give his idea of absent-mindedness. "Well," said the witness, who was a typical New England Yankee, "I should say that a man who thought he'd left his watch to him, and took it out'n his pocket to see if he'd time to go him and get it, was a little absent-minded."



Canadian Motor Life Boat

MOTOR LIFEBOAT FOR CANADIAN SERVICE.

The Canadian Life-Saving Service has adopted the motor lifeboat shown in the illustration because of its advanced and practical qualities. It is 36 ft. over all, has an 8 ft. 1 1/3 in. beam, and was built almost entirely of mahogany, fastened with gun metal and copper, no iron being per-

THE POWER

Behind the Superintendent



How often you have looked at the Superintendent or Agent and wished you had his authority—and salary. But wishing didn't get the position for him, and it will not get a similar one for you. There must be something behind the desire—something stronger—something which will not only help you to get the position, but will enable you to hold it when obtained.

Good, sound, practical knowledge is what you need. It's what your "boss" has—it's what you can have by devoting a few of your spare moments each day to the study of the

CYCLOPEDIA OF TEXTILE WORK.

Seven large volumes; bound in half red morocco, compiled especially for the Textile Manufacturer, Superintendent, Selling Agent, Designer, Overseer, Second Hand and Clerk—3,000 pages, 7x10 inches, devoted entirely to good, sound practical textile information—printed on fine quality paper and indexed for ready reference—2,000 illustrations, diagrams, formulas, etc., to simplify and thoroughly explain the text. It covers every process in connection with textile work, from the raw fibre to the packing case. The simplest and most complete textile work yet published.

Special Price, \$19.80—Regular Price, \$42.00

Free for Five Days' Examination. We pay the express. Send \$2 cash within five days, and \$2 a month until you have paid \$19.80, the special 30 day price, providing you care to keep the books. We send for them at our expense if they do not meet your needs.

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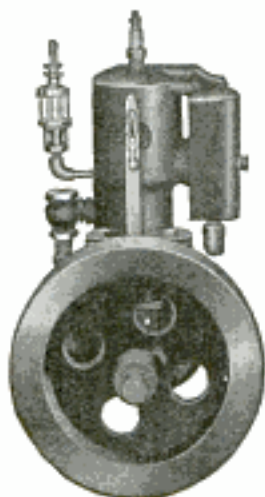
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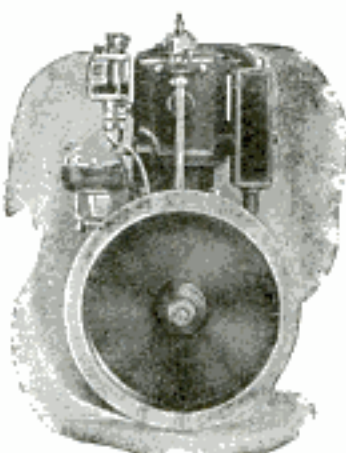
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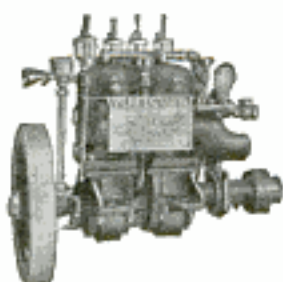
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SECTION MAN A HERO.—Wesley Jarrett, a railway section man of Marion, N. C., gave up his life to save a passenger train from a wreck and probably death and injury to the 200 passengers on board.

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When the train was almost upon them all the crew, except Jarrett, fled for their lives. Jarrett threw himself in front of the engine and succeeded in unloosening the jack, which rolled down the mountain. The train sped over him, crushing him to death beneath its wheels.

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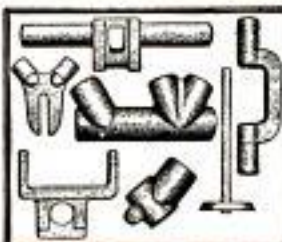
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MARE ISLAND RATS TO BE EXTERMINATED AT COST OF \$40,000.—The board appointed to devise ways and means to drive out or exterminate the thousands of rats which infest the Mare Island navy yard has returned a report recommending a preliminary expenditure of \$40,000 for this purpose. The amount is to provide among other things for wire meshing to fence in the yard proper from the northern part of the island, the purchase of 600 rat traps and 600 garbage cans, and the replacing of wooden flooring with cement. The rats came in the first place from visiting ships.

CLOCK TENDER'S LONG SERVICE AT SALEM, N. C.—In the March issue of Popular Mechanics mention was made of N. T. Shore, who recently celebrated his twenty-fifth year as tender of the clock in a Moravian church. The church is located at Salem, N. C., instead of Hope, Ind.

BEEES IN HEART OF BLOCK OF STONE REVIVE IN AIR.—While workmen were sawing through a block of bathstone at a monumental works in Exeter, England, a cavity was cut into, in which was found a cluster of two or three dozen live bees. There was not much sign of life in the bees at first, but when air was admitted they gradually revived and after a few hours several were able to fly. No vein or crevice was apparent on the surface of the stone, which was later removed to the Royal Albert Memorial museum.



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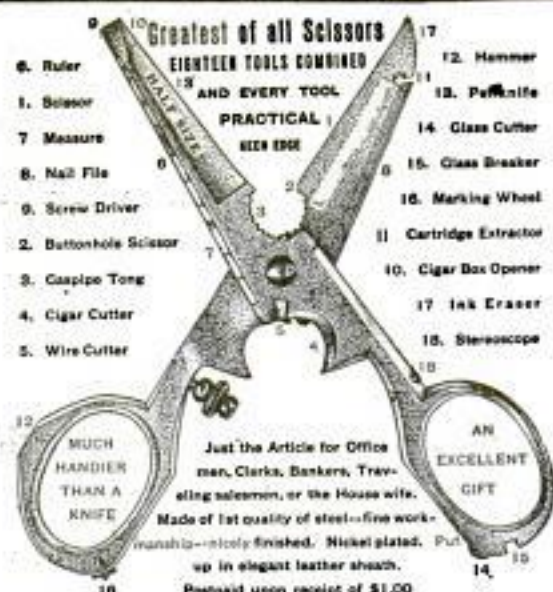
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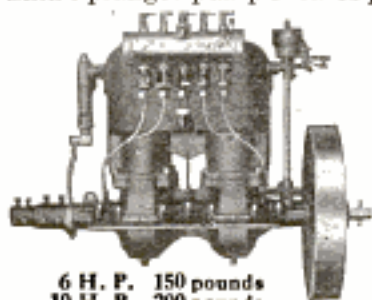
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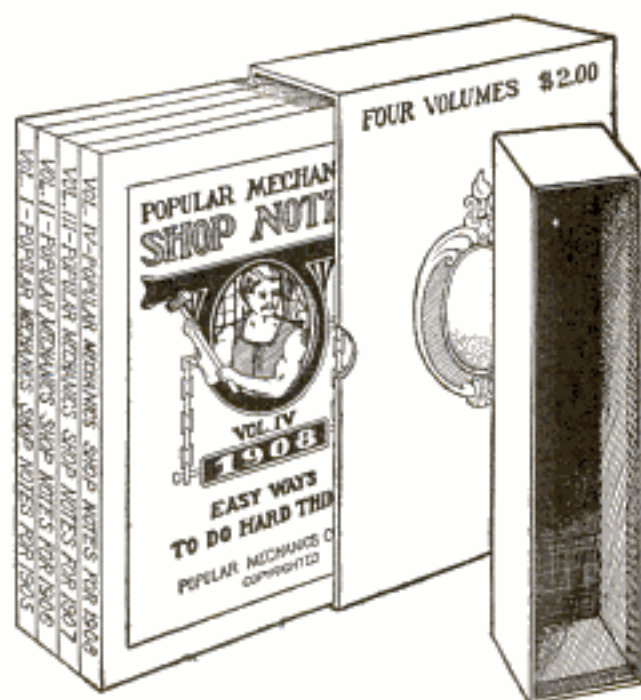
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AUSTRALIA.—The magnificent annual Christmas number of Australia To-Day, published at Melbourne, Australia, has reached this country. The big magazine contains over 300 pages, 11 by 15 in., and several hundred illustrations. Much space is devoted to the industries of that country; the magazine is an up-to-date encyclopedia of that continent, while the paper and printing are of a quality that make it a genuine art number.

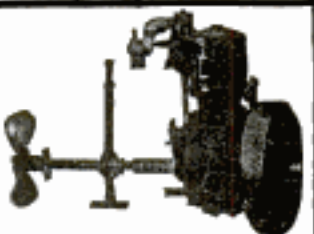
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Detroit, Michigan

TIGER CAT COMMITS SUICIDE.—A big tiger cat, pet of the engineer of the electric light works at Bellefontaine, Ohio, is believed to have committed suicide in a sensational manner as some human beings select when tired of this world. According to the engineer the cat came to him one afternoon and looked up into his face with a somewhat unusual expression in its eyes. A moment later it jumped onto the belt that runs the dynamo and was whirled into eternity. Some 18 hours later when the big engine was stopped the cat was found on the belt pressed out as thin as a sheet of paper.

SIX-FOOT MINCE PIE AND 2,700-POUND CAKE.—A cake 15 ft. high, weighing 2,700 lb., and surmounted by a bust in sugar of William McKinley, recently graced the wedding of an Italian girl in Chicago, whose husband is chef of one of the big hotels. The cake was started 8 months before the wedding day. Not to be outdone, Wisconsin claims the honor of having had the biggest pie, although it only lasted a few minutes, notwithstanding its huge size. The pie, which was of the mince variety, was baked in a pan 6 ft. long, 2 ft. wide, and 3 in. in depth. It was served by Dr. R. A. Sullivan, of Milwaukee, to 100 guests. The presence of the doctor on such an occasion was evidently a wise provision.

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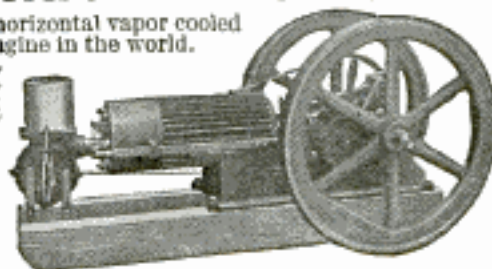
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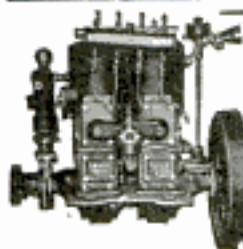
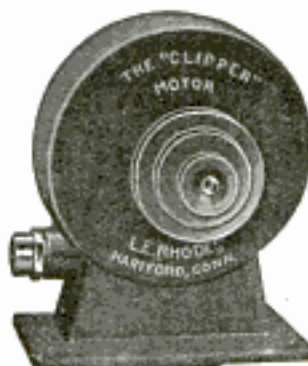
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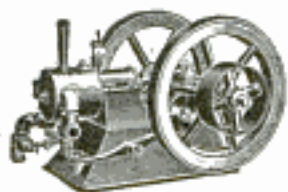
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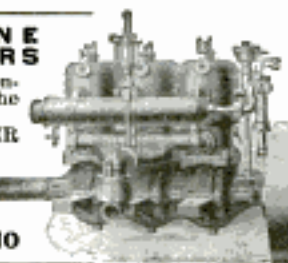
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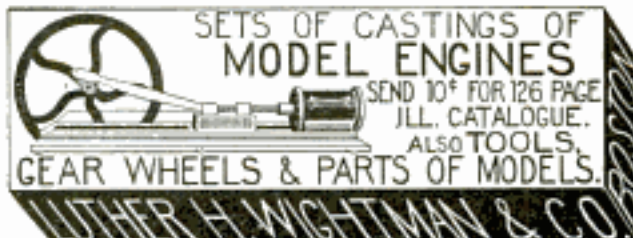
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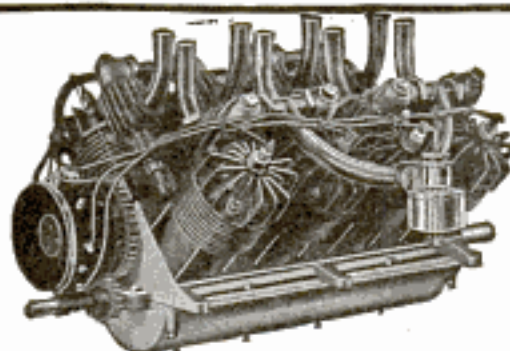
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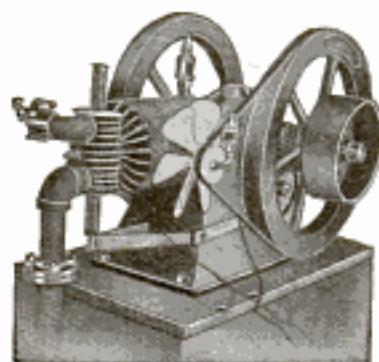
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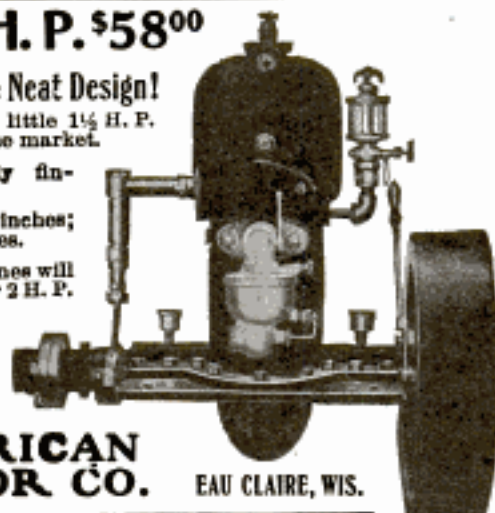
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SHOT DOWN A SMOKESTACK.—The Leaman laundry was the scene of what sounded like a sham battle recently. During a storm a portion of the smokestack of the laundry blew down or rather was partially blown down and hung by a portion of the sheet iron.

Harry Leaman studied hard and long on how to get it down. There was no stepladder in town, and Harry, who is an ingenious sort of a chap, finally hit upon a bright idea.

He went to a gunsmith and secured a 32-calibre rifle and a cartload of ammunition. Then he told everybody to come and shoot. Harry had an idea that if he could shoot enough holes into the iron that held the piece the stack would fall down. Harry's idea was all right, but he did not figure on the poor marksmanship of his neighbors. The first man to respond to Harry's appeal for aid was Joe Strickler, the baker. Joe has a record for shooting ducks with a shotgun, but on rifle shooting he fell down. In all, it is said, Joe shot about 100 shots and he put about 20 where they belonged. Some went high and passed over the stack, others went low and punctured the stack below the break. Joe succeeded in cutting off the stack all but the seam and then he grew tired.

At this stage of the game "Patsy" Kemper came along. Now if there is anything that Kemper prides himself on it is his marksmanship with a rifle. "Patsy" took about 40 shots at the seam and had no better luck than Strickler. At last a shot took effect and down came the piece of stack.

Then it was discovered that the top of the remaining stack was perforated with a large number of bullets and the stack looks like a sieve, and the smoke poured forth out of innumerable small holes. It isn't a neat job, but it was effective. Harry is happy, but the reputation of local rifle shots has been inevitably blasted.—Canton, Ill., News.

THOMAS ALVA EDISON, Sixty Years of an Inventor's Life. By Francis Arthur Jones. Illus., 370 pp., 12mo., cloth. Price, \$2.00. An important biography of one of the greatest men America has produced. The work contains enough of the personal element to give it distinctive interest. All Mr. Edison's great inventions are described, as well as his earlier ones, yet the book is at no time beyond the average reader's ability to understand and enjoy it. Thomas Y. Crowell & Co., New York.



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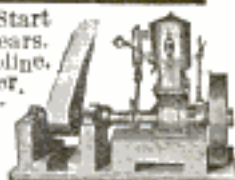
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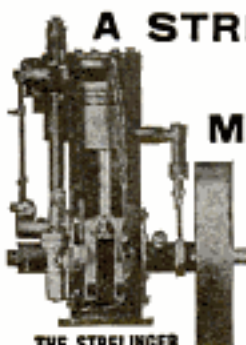
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SOCIETY TO KILL RATS.—A new association has been organized in London, England, to wage a war of extermination against rats. It is to be called the "Society for the Destruction of Vermin," and has among its supporters Lord Avebury, Sir Lauder Brunton, Surgeon General Bradshaw, Sir Harry H. Johnson, Sir Gilbert Parker and Sir James Critchton Brown. Since the first rumor of its organization the society has been showered with offers of poisons, traps, virus and other infallible specifics for destroying rats.



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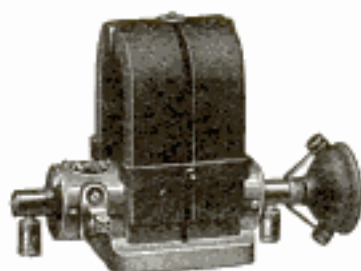
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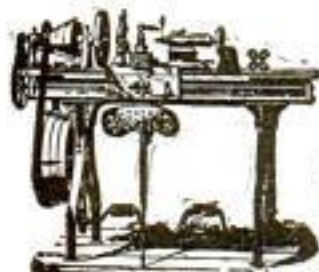
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The American and English built motor boats do not only predominate in American and English waters, but in every part of the world. Among the places where both countries are well represented are Shanghai, Venice, Stockholm, Finland, and on the Rangoon. At Shanghai about 30 motor boats are in use at the present time, and of the few which were imported complete are two well-known American makes. Frequently the engines are imported and the boats built on the spot.

In Venice, the city of canals, the motor boat is slowly but surely gaining its place, although the Venetians are rather antagonistic against any kind of craft likely to displace the gondola. At present there are only 35 or 40



Missionary Launch—Rangoon

motor boats threading the canals of Venice, three of which are American. In Finland five or six American manufacturers of motor boats and gasoline motors are represented and doing well. In Stockholm, sometimes called the "Venice of the North," only two American motor boat and engine manufacturers are represented, but the boats are rapidly growing in favor, and next year will probably find a greater number in the field.

The illustration shows a missionary's motor launch in the Rangoon district, India, in which the chaplain of missions to seamen makes his daily rounds. This boat was built by an English firm.

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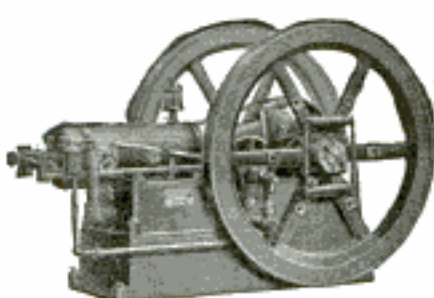
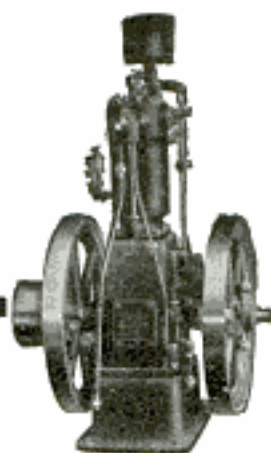
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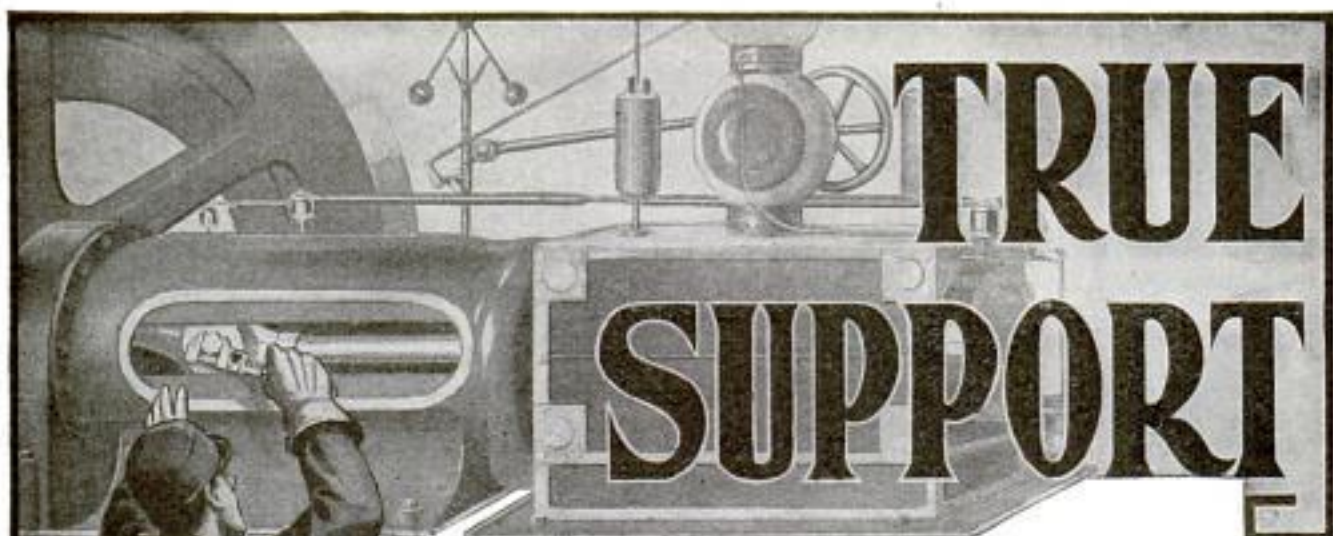
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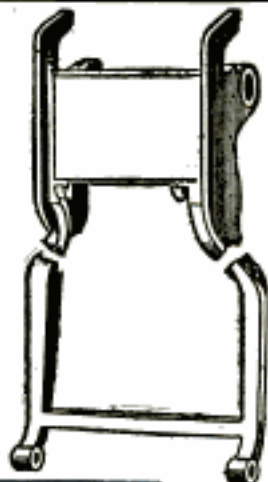
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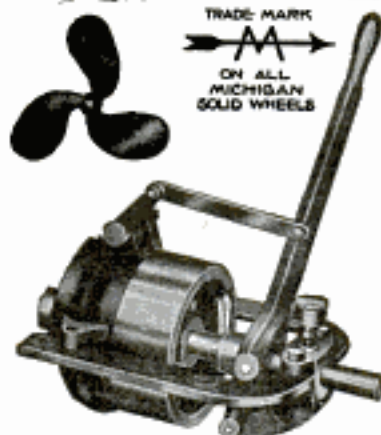
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"Next day along about time when she comes, the old bell rings to beat the band on four, and there he was with a letter that he had to put in the mail box. It looked funny to me, 'cause other times he'd give me any letters he had to mail. She was waiting on first when I got down. 'Wait a minute until I drop this in the box,' says he to me. I got wise. The mailing the letter was all a fluke. It was the same way next day. You see, he'd look out of the window until he saw her coming and then mail his letter.

"Things went on that way for a while and he didn't seem to make any progress. Then he comes to me. 'Say,' says he, 'can't you help me out?' and he give me another cigar—a good one. That noon they happened to get on the elevator together, and I did the introducing act, and they walked up the street together.

"Well, sir, you know those two were just made for each other. She'd go out to lunch with him, and every once in a while I'd see them down stairs at the show from my perch in the gallery. She wouldn't look at another fellow and he wouldn't have anything to do with other girls. Say, it was fine.

"Well, a little over a year ago the lumber company he was with laid off over half of their men, and he was one of them. He walked home with his Ella the same as usual that night. She told me a couple of weeks later that he had gone South. She heard from him regular for a while, but the other day she told me she hadn't heard from him for over six months. She won't look at other fellows even now. She says he'll show up yet one of these days and everything will be all right. If I was a girl and had a fellow like that I'd throw him over. That's all I can tell of my story now."

(Concluded on Page 138.)

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Mr. Parker on November 1, 1903, after having been a member of the Examining Corps of the U. S. Patent Office for over five years, resigned his position as Examiner to take up the practice of Patent Law.

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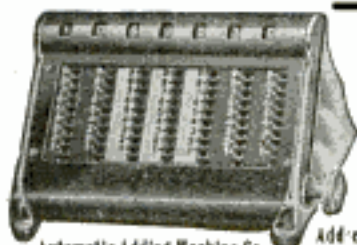
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(Continued from Page 136.)

About a week later I had occasion to visit the same office building. "Say," said the elevator boy, "right after you left, the bell rung for all that was out, and when I got down who should be there but the guy that used to work on four. He jumped in and asked, 'Is she here yet?' 'You're a peach,' I said; 'why didn't you let her know where you was?' 'Never mind, hurry up,' and he grabbed the crank out of my hand and put her up like a rocket to six. In about fifteen minutes out they both came, happy as could be. 'Get the janitor to run the elevator for a while,' said he, 'we want you to come with us and be witness at our wedding.' I don't know whether witnesses usually get paid, but he give me this twenty. Seems he went down to South America and struck something rich in the hardwood line. One of his letters got miscarried, or something of the sort, and that threw the whole thing out of running.

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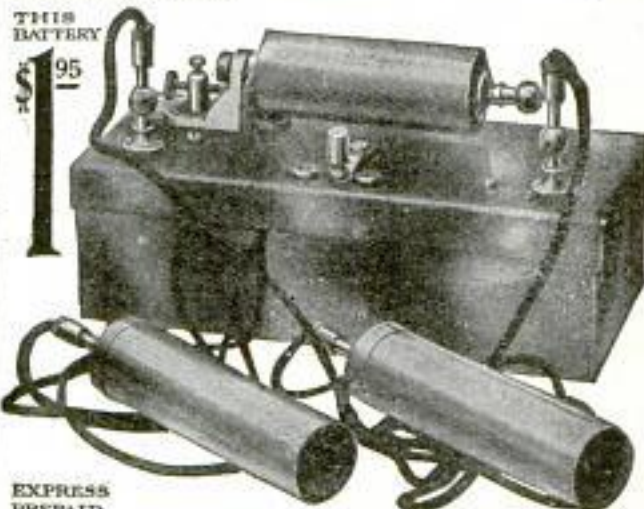
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The objects as set forth in the constitution are to promote interest in and encourage the study of aerial science among young people and to hold exhibitions and contests of apparatus designed for the purpose of aerial locomotion, voluntary or involuntary, made or owned by its active members.

It is the intention to hold club, national and, perhaps, international contests at such dates as may be possible. The first is expected to be held on May 30, being a national event. A contest for distance is planned between small "pilot" balloons, starting from a convenient location near New York, probably. These will be filled with hydrogen and will carry notes asking the finders to return same to the club. Several prizes will be offered for the balloon making the greatest distance, the one having the most ingenious arrangement for disposal of ballast during flight, etc.

The contest is open to all members of the club, wherever they may be. The fact that they propose to compete, however, must be recorded in advance at the New York headquarters.

Membership in the club is divided into three classes: (a) Honorary; (b) Active members who construct their own apparatus; (c) Active members who own apparatus not constructed by themselves.

(Continued on page 142.)

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If it is found that interest warrants it, talks on scientific subjects may be given by members of various scientific organizations. Debates may be held by members of the club and papers prepared by them. Arrangements are being made for the manufacture of a specially designed balloon to be for sale at prices varying according to the size from 15 cents to several dollars.

It is believed that there are at the present time many young men and boys interested in scientific subjects who have the true inventive faculty and, in their own way, are doing important work, and that these young students and experimenters should be encouraged and such assistance afforded them as may be derived from an organization stimulating interchange of ideas. Advice will be given by experienced constructors and serious efforts made to direct the members' efforts along right lines.

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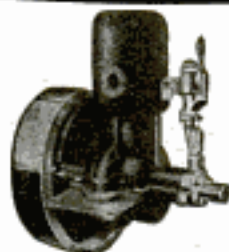
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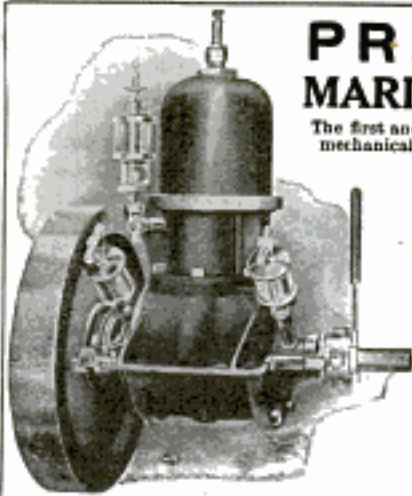
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