

# POPULAR ELECTRICITY

AND THE

# WORLD'S ADVANCE

OCTOBER  
15 CENTS

MOTION  
PICTURES



WHAT IS THE  
AURORA  
BOREALIS?



WORLD'S  
PICTURE  
GALLERY



LIQUID AIR



SHOOTING  
WITHOUT  
BULLETS



SCOTT  
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IN FILMS



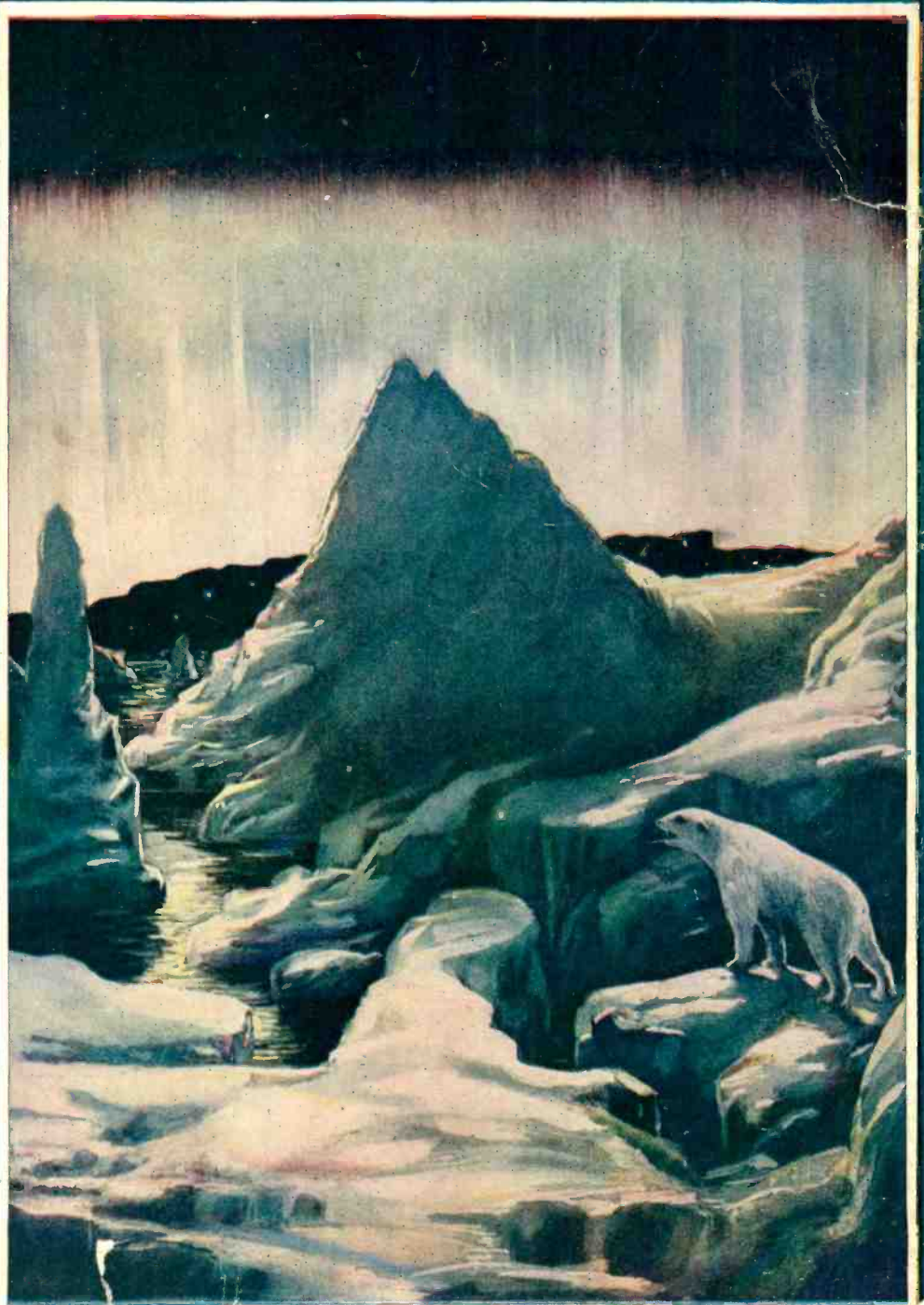
ELECTRICITY  
IN POLICE  
WORK



WIRELESS  
ON THE  
SAND BANKS



200 SUBJECTS AND  
200 ILLUSTRATIONS  
IN THIS ISSUE





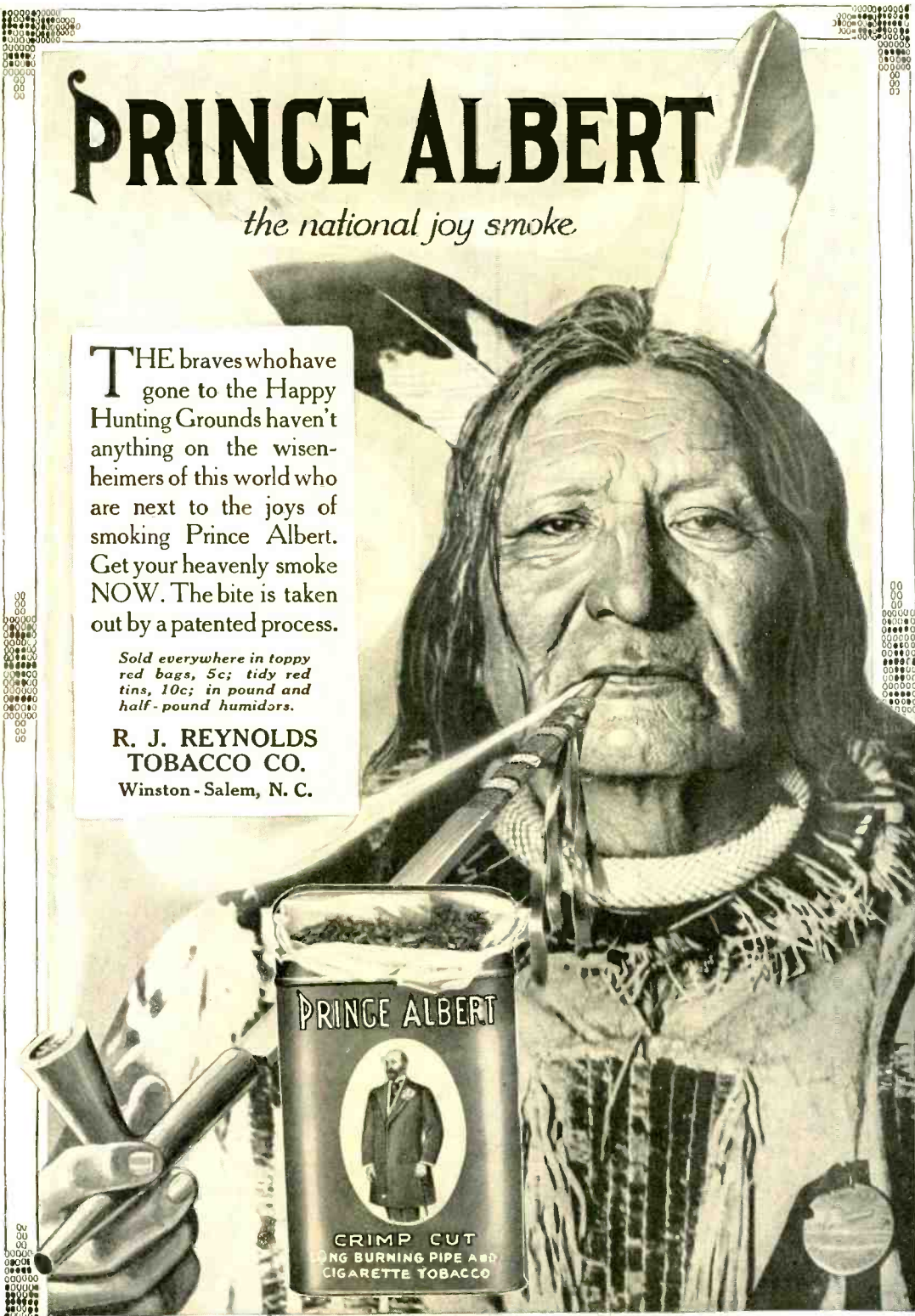
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"You're working in the dark!" said a Western plant manager to his friend who had asked him to visit the latter's publishing offices in an Eastern Ohio town.

"How do you make that out?" asked the publishing man with a little astonishment. "We've had electricity here for five years."

"That may be," said the Western man. "And I don't mean that you can't see your hand before your face. But you haven't really emerged from the dark age. Honest, have you changed your lighting arrangements in those five years?"

The publishing man admitted that he hadn't.

"I thought so," said his frank visitor. "They were pretty poor to begin with, and they're entirely out of date. They're out of date because we're living in an age of really good light. More than half of your floor space is gloomy, partly because you use old-fashioned lamps—the Edison Mazda gives three times as much light with the same amount of electricity that is used in these ordinary carbon lamps—and partly because they are not placed to advantage. You're handicapping yourself and your entire force. You're putting a check on your office efficiency, which is bad business and you're wasting money on old methods which is bad business again. Good light is a big factor—it's efficiency's first aid. It would be worth all it costs even if it cost a lot of money. And yet it's cheaper than ever it was—been going down in price while the cost of everything else has been going up."

The result of this plain talk was that the publishing man got into communication with the local lighting company next day, and found himself keenly interested in the plans laid out by the electrical engineer who called to see him. Seven months later when he saw his friend again he declared: "You put it bluntly about my lighting, but you saved me money. My system now costs me no more, and you wouldn't know the place as it is now. It has put snap into all our work—I think we turn out fully thirty percent. more than we did,

and we do it with fully fifty percent. more comfort. I'm a light enthusiast from now on."

This incident reflects an experience in a certain type of business, but there is no sort of business to which the out-spoken philosophy that stirred this particular manager might not apply with equal force. For manufacturer and merchant, banker, broker or business man anywhere, good light is a basic business factor.

Good light is good business. It brings people into a store, for example, and helps sell goods to those people. It helps the display of goods, and it affects not only customers but the selling force.

It affects equally the brain output and the physical output of every sort of business. It raises the percentage of sheer efficiency in every unit of a force, whether it is a small office force of a dozen or a large force of a thousand. That percentage of increase in efficiency would be considered highly important in a group of machines. It is even more so in a group of men or women.

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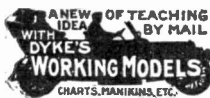


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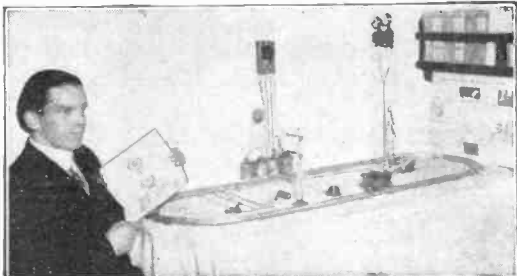
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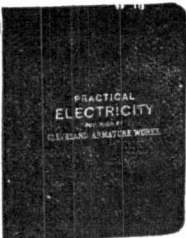
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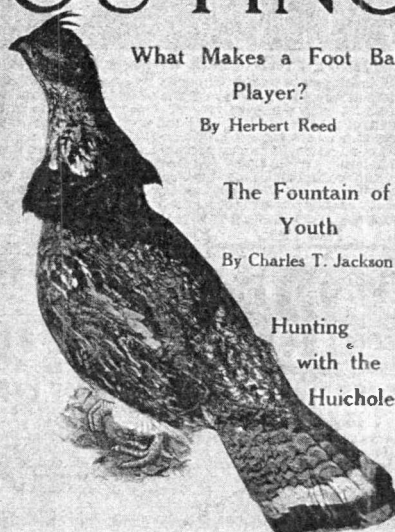
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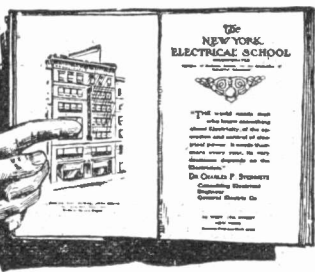
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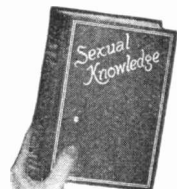
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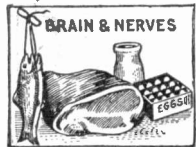
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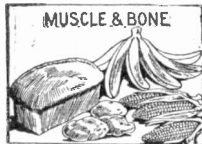
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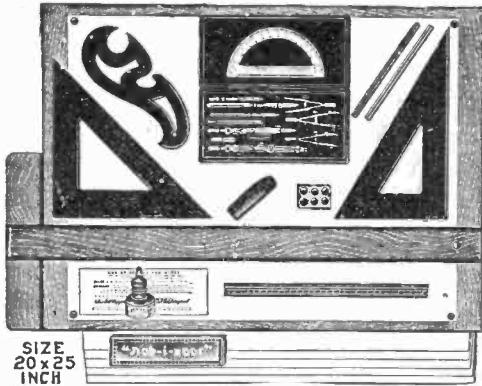
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No. 6

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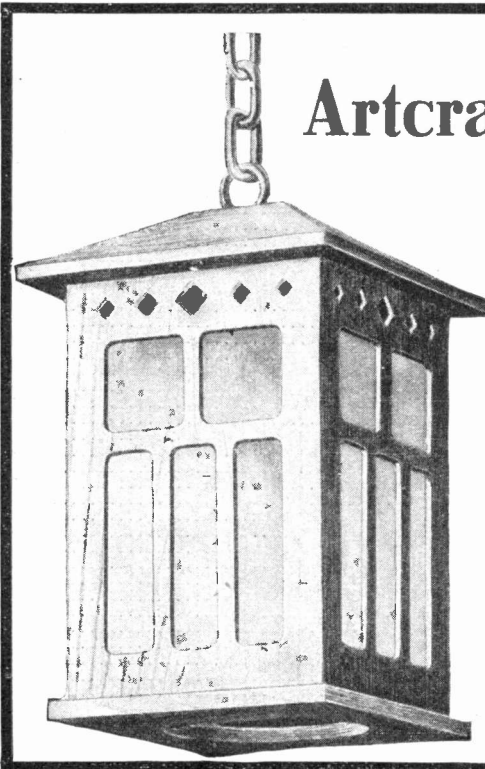
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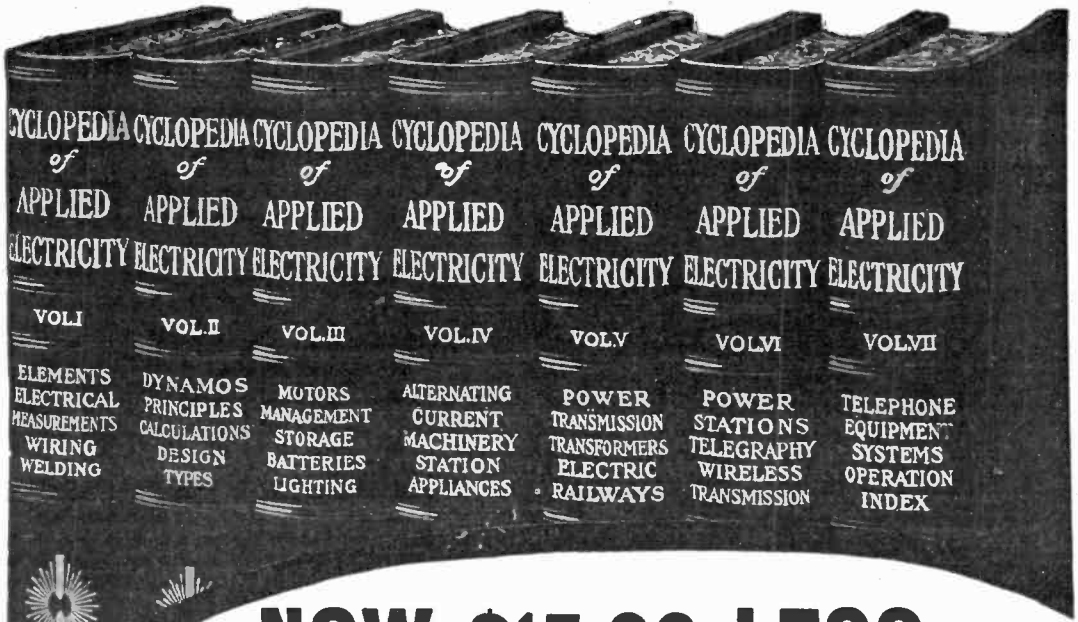
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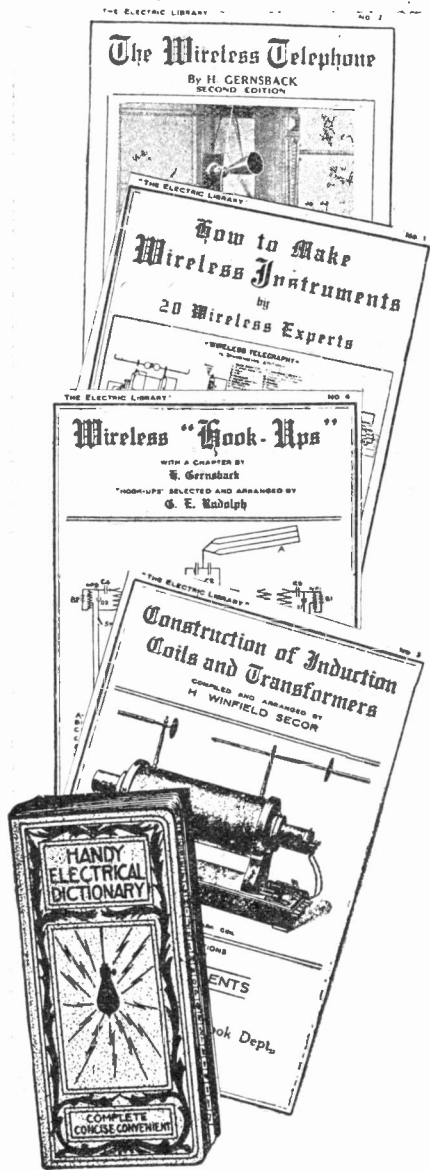
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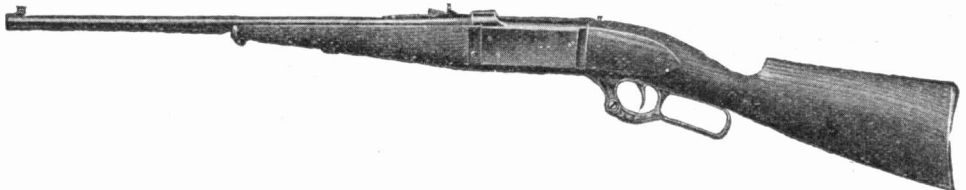
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# POPULAR ELECTRICITY

AND THE

## WORLD'S ADVANCE

VOL. VI

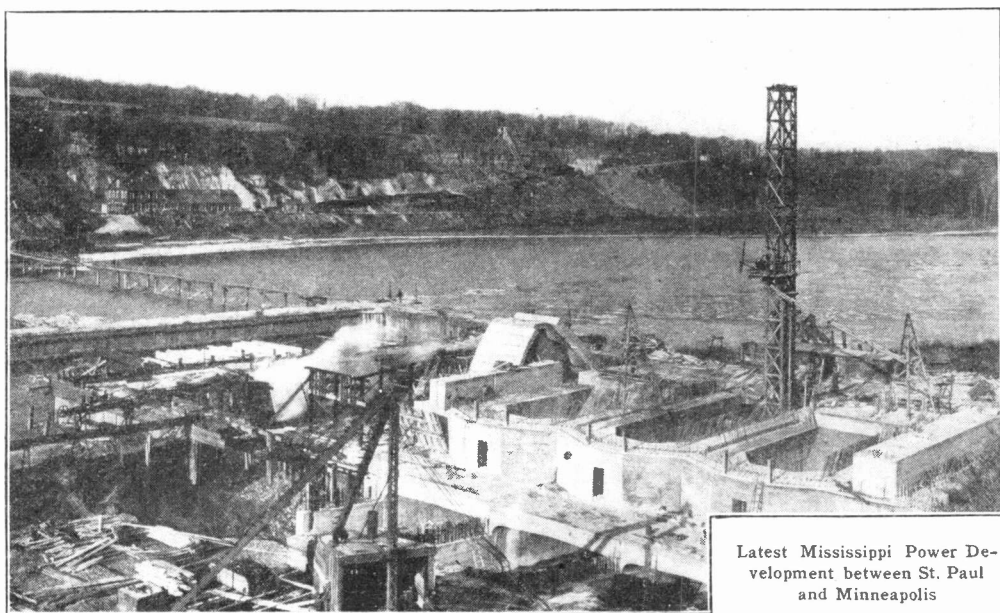
OCTOBER, 1913

No. 6

### MORE MISSISSIPPI POWER

Another power development project on the Mississippi is under way on the upper part of the river. A dam, with lock, is being built between St. Paul and

but that it will be of great industrial importance, and of profit as a revenue-maker for the government, will be seen from the fact that its 15,000 horsepower



Latest Mississippi Power Development between St. Paul and Minneapolis

Minneapolis, primarily to raise the height of water so that the river steamers that now stop at St. Paul may go a few miles further, to Minneapolis. Incidental, however, there will be an electrical development of 15,000 horsepower. The power house is being built by the United States government only to the surface level, the superstructure to be completed by the company to which the government may sell or lease the power rights. The development of this power was added to the original plans as an after-thought,

will be more than one-third of the total power developed at the neighboring St. Anthony's Falls.

#### ELECTRIC CARS FOR SICILY

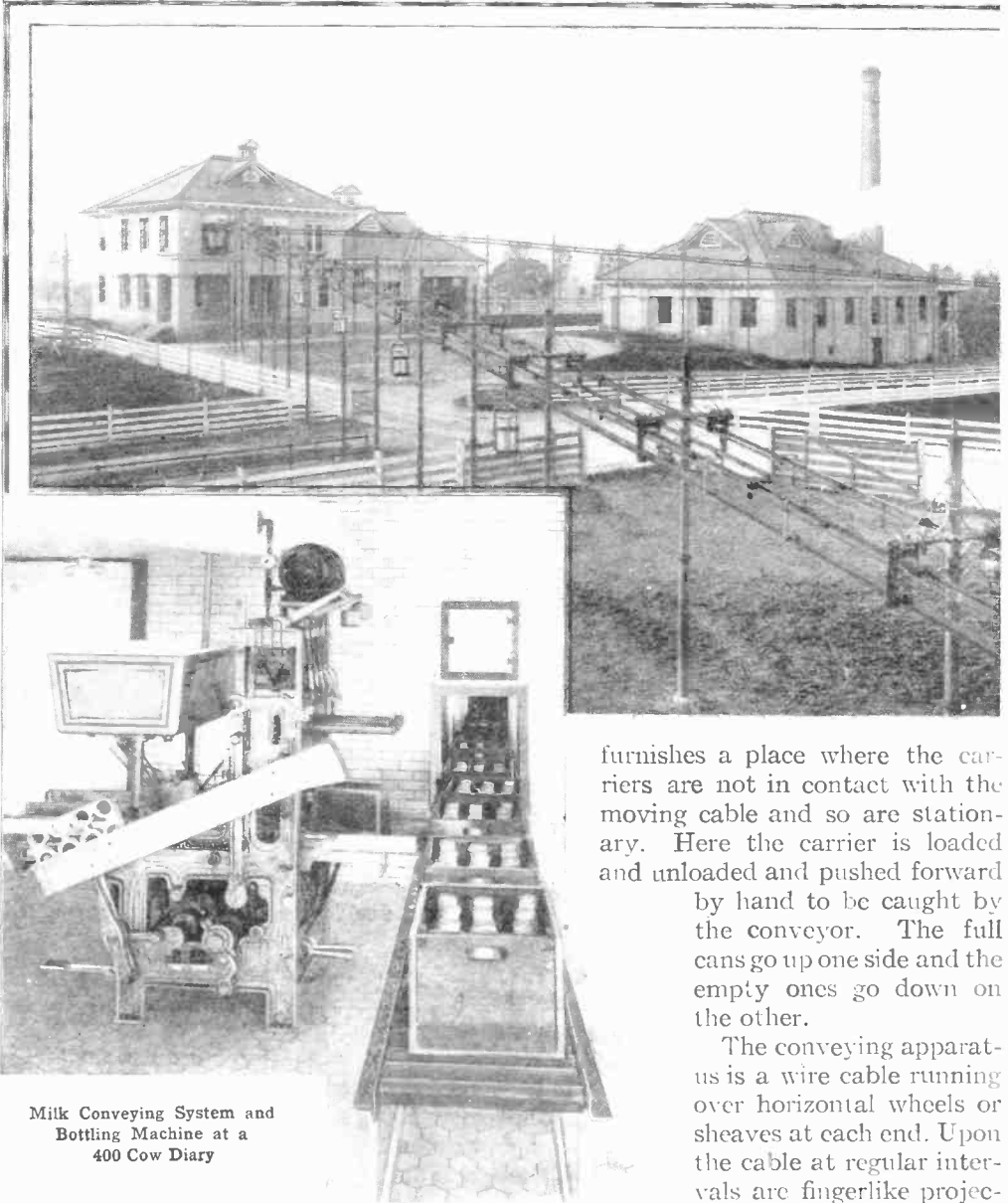
The electric automobile has arrived in Sicily, six cars of the closed coupe type now being registered at Palermo. These are the Italian makes, Fram and Ansonia, and average 35 to 45 horsepower. There are yet, however, no special garages for electrics.

## HANDLING THE MILK OF FOUR HUNDRED COWS

Situated a few miles south of the city of Columbus, Ohio, is a 4,000 acre dairy farm, owned by Dr. S. B. Hartman. About 400 head of cattle, Jerseys and Holsteins, are kept, and this means that

the handling of the milk is no small problem. The accompanying pictures show how electrically operated apparatus accomplishes this.

A near view of a milk conveyor with the cans in their carriers and suspended is shown in one picture. The track is continuous and a loop at each end



Milk Conveying System and  
Bottling Machine at a  
400 Cow Dairy

furnishes a place where the carriers are not in contact with the moving cable and so are stationary. Here the carrier is loaded and unloaded and pushed forward by hand to be caught by the conveyor. The full cans go up one side and the empty ones go down on the other.

The conveying apparatus is a wire cable running over horizontal wheels or sheaves at each end. Upon the cable at regular intervals are fingerlike projections downward from the

cable. These push against the top of the carrier and so convey it to the other end of the line. Six carriers are now in use on each conveyor, the cans being filled and refilled during the milking. The milk is then immediately run through the dairy and bottled without standing in the cans. A conveying system likewise delivers the cases of milk from the bottling machine directly to the cold storage rooms and also to the railroad cars for shipment. A fifteen horsepower electric motor is the driving power.

### EMERGENCY PUBLICITY—A DAYTON STORY

If it's "an ill flood that washes nobody any good" there certainly could not be better exemplification of the adage than that given by a remarkable happening at Dayton, Ohio, at the time of the recent floods. The benefited individual, or rather company, in this particular instance is the Dayton Light and Power Company. People who had used gas or steam have turned to electricity. And the main cause has been the splendid publicity given central station service of electricity by reason of the flood.

Never better was the reliability of public supply undertakings shown. The actual story of the electrical success achieved in the matter of emergency publicity is this: The chief newspaper in Dayton had to stop publication by reason of water in the boiler and press room; the press was then shifted to the street and driven by a motor supplied with current from the Dayton Electric Light and Power Company's mains—this unique installation being protected by a fence on

which the company placed a sign to remind the public that it was electric power "on tap" which enabled the newspaper to run off its editions in spite of the flood.

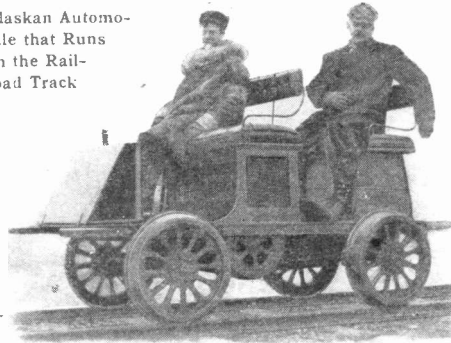
### CROSS-EYED SWEET POTATOES

A Pennsylvania lamp salesman is on the lookout for cross-eyed sweet potatoes in that state. He has heard that the sweet potato crop raised by Mazda light, at the Pennsylvania State College, was a failure on account of all eyes turning toward the light. He wants to find out if cross-eyed sweet potatoes have not some redeeming feature.

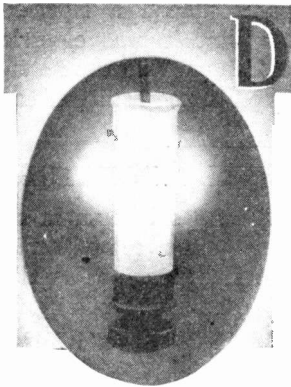
### MOTORING ON THE "NORTH POLE ROUTE"

In the Cape Nome region of Alaska there are practically no wagon roads, but this has not prevented one automobile enthusiast in that out-of-the-way place from enjoying his hobby. On account of the scarcity of wagon roads, if automobiles are used they must be built to run on the railroad lines. The illustration shows a gasoline motor car made for an officer of the "North Pole Route" Railroad, one of the most northerly pieces of track in the world, which extends 90 miles inland from Nome to the gold fields. The car is used by its owner, when weather permits, for making business and pleasure trips from his home in Nome over the tracks of the railroad.

Alaskan Automobile that Runs on the Railroad Track



The jeweler who introduces electric light has to admit that never before has he had such an effective display. Much time is saved in not having to clean tarnished goods. Electric light shows precious stones off to the best advantage.



Slow Combustion of an Arc Carbon in Liquid Air

# Developments in the Industry of Liquid Air

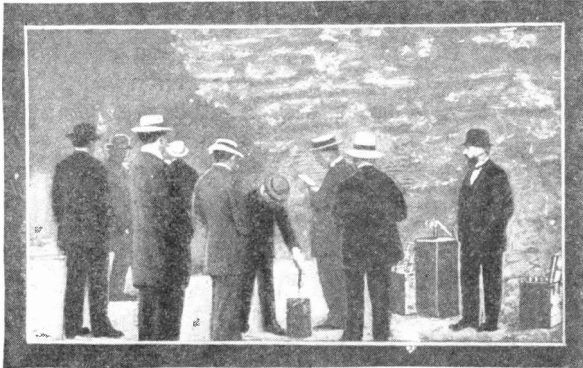
BY DR. ALFRED GRADENWITZ

Air is, of course, a mixture of oxygen and nitrogen. That liquid air has not accurately the same ratio of mixture

as the air we breathe can here be left out of account. The fact is that air at very

not yet sufficient to produce liquefaction: The expanding air cools down to  $-60^{\circ}\text{C}$ . or  $-80^{\circ}\text{C}$ . at the most, which is still far distant from  $-193^{\circ}\text{C}$ . A "cold exchanger" is used to drive cooling to these extreme limits: The compressed air penetrates through a conduit into the compartment where it is allowed to expand; after being thus cooled, say to a temperature of  $-60^{\circ}\text{C}$ ., it enters a tube

surrounding the conduit through which it had been admitted. Traversing this tube in an opposite direction, it yields its cold to the following compressed air, so that this on entering the expansion compartment is already cooled and therefore reaches a somewhat lower temperature, in order to cool even further the compressed air admitted afterwards. As the temperature thus falls more and more, there comes



Experiments with Liquid Air as an Explosive

low temperatures is liquefied in the same manner that steam below  $100^{\circ}\text{C}$ . assumes the form of a liquid. It is true that its temperature of liquefaction is extremely low,  $193^{\circ}\text{C}$ . below freezing point, which of course is very difficult to obtain.

Physicists have been known to overcome the enormous difficulties connected with the production of such low temperatures by causing the air itself to perform this duty. The same as air is heated by compression, its expansion is attended inversely by intense cooling. The air is therefore first compressed and, after carrying away any surplus heat by circulating water about the container, is allowed again to expand.

The cold thus obtained, however, is

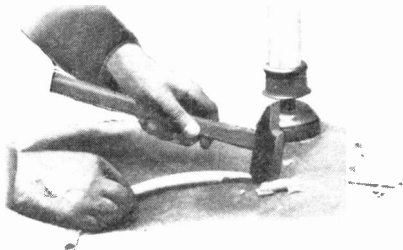


Breathing a Cloud of Liquid Air



finally a moment when, the temperature of liquefaction being reached, the expanded air is liquefied of its own accord.

Liquid air resembles water in outward appearance, though on account of the relatively high temperature of the surroundings, it is in continual ebullition, remaining permanently at its boiling temperature ( $-193^{\circ}$  C.) the same as boiling water always keeps the temperature of  $100^{\circ}$  C. In order, however, to retard as far as



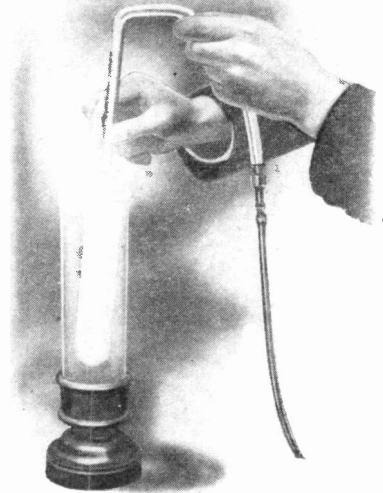
Rubber Hose after a Liquid Air Bath is as Brittle as an Icicle

possible its vaporization, the liquid air is poured out into a double walled glass vessel having a vacuum between the two walls so that no heat arrives from outside by conduction, while the access of radiating heat is prevented as far as possible by silvering the glass walls so that the heat is reflected.

In such a vessel liquid air can be kept for days and its properties watched at ease.

Flowers plunged into liquid air are converted into porcelain flowers which on the slightest contact fall into dust; a piece of rubber hose becomes hard as stone, and sheet metal nearly as brittle as glass. Metals undergo the most striking alterations of their physical properties, e. g., an enormous increase in electrical conductivity.

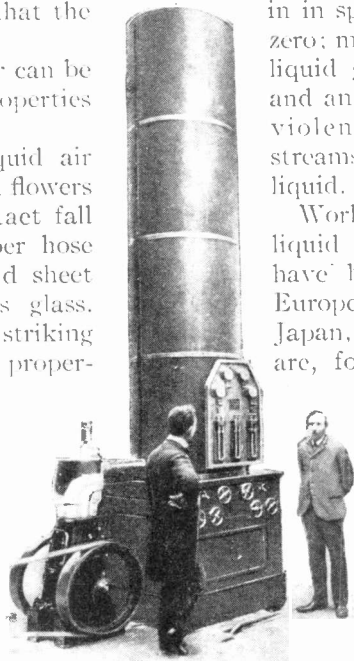
Being composed of two gases of different volatilities — nitrogen and oxygen — liquid air undergoes an alteration in composition on being vaporized. As the



Vaporization and Simultaneous liquefaction of Air

nitrogen comes off preferably in the beginning, the liquid is enriched gradually in oxygen and eventually becomes pure liquid oxygen. This liquid, blue as azure, possesses powerful chemical affinities: carbon and sulphur burn violently therein in spite of its 182 degrees below zero; magnesium plunged into the liquid gives out a dazzling light and an ignited lamp carbon in its violent combustion spreads streams of light throughout the liquid.

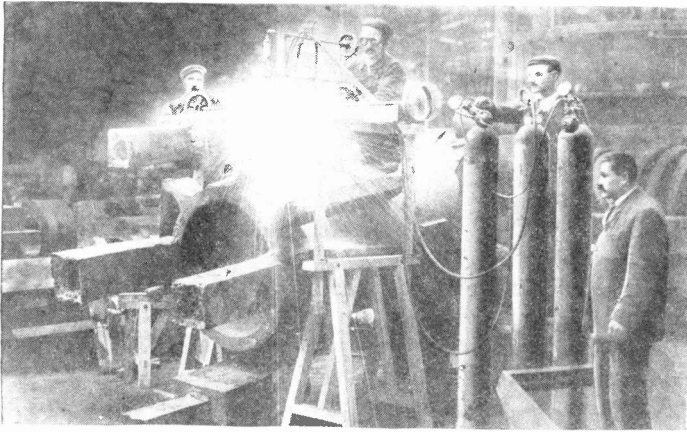
Works for the production of liquid air on the Claude system have been erected in the chief European countries, in Canada, Japan, etc. Most of these works are, for the time being, mainly destined for the manufacture of compressed oxygen (but not liquid) in flasks, which of course finds the most important applications, this oxygen being supplied with a purity of 98 to 99 pct.



Apparatus for Producing 50 Cubic Meters of Oxygen

In other cases it is desired to produce nitrogen of great purity, the purity of the oxygen being a point of less importance. Georges Claude has been able to arrange his apparatus so that the purity of the nitrogen can be driven to 99.8%, and powerful apparatus of this kind, in fact the most powerful in existence, is at work at Terni, Italy, and at Alby, Sweden, for the production of artificial fertilizers (cyanamide).

The larger part of the oxygen at present



If a Jet of Pure Oxygen is Turned upon Red Hot Metal the Latter Burns Furiously - Used in Cutting and Welding

generated is accumulated in steel flasks at a pressure of 150 atmospheres and is mainly used for three purposes: At first there is the autogenous welding of metals (steel, cast iron, aluminium, etc.), in connection with which the enormously high temperatures produced by the combustion of oxygen with acetylene or kerosene are used. The autogenous working of metals already constitutes an extensive industry which not only comprises the manufacture of new parts but the repairing of expensive castings injured in operation or exhibiting flaws. The process at a moment's notice allows teeth to be fitted into toothed wheels, flaws in castings to be filled up, burst steam boilers or automobile cylinders to be repaired, etc. At the exceedingly high temperatures obtained in the oxygen blowpipe alumina is readily melted, and, by the

addition of various metal oxides, is converted into artificial gems—rubies, sapphires and emeralds, the manufacture of which has become an industry of its own.

However, of all present applications of oxygen, the cutting of metals is the most interesting and doubtless the most important. A phenomenon which has long been known, viz., that iron or steel raised to a red heat in oxygen burns with a dazzling light, has found quite an un-

expected utilization in this connection. The iron block having been raised to a white heat at the beginning of the cut to be made, a jet of pure oxygen is made to act on the incandescent place. The combination of iron and oxygen then occurs immediately with such violence that the metal is cut through any thickness, the thin oxygen jet moving with the greatest ease through the thickest armored plate.

The third application is for medical work and for resuscitation.

Whereas oxygen, in spite of its various uses and even more varied possibilities, so far only plays a secondary part in industry, nitrogen, by the manufacture of artificial fertilizers, has assumed a prominent position of late years. It is well known that attempts have long been made to substitute for Chilean nitre artificial fertilizers obtained by fixing atmospheric nitrogen. Now, by heating calcium carbide in a stream of very pure nitrogen, cyanamide—a compound immediately suitable as a fertilizer—is obtained, which on decomposition with water vapor yields ammonia. Works erected in Italy and Sweden already produce sufficient nitrogen to supply 50,000 tons of ammonium-sulphate per annum.

Again, M. Claude, by means of the rare gas neon obtained as a residue in the liquefaction of air, has succeeded in designing a new form of electrical vacuum lamp of remarkable efficiency which yields a diffused orange light and lends itself for many applications.

Much more promising, however, in accordance with the above, are the applications of liquid oxygen. By substituting oxygen for atmospheric air many technical processes may be rendered far more efficient than they are at present. In gas lighting the use of oxygen will greatly increase the luminous power of

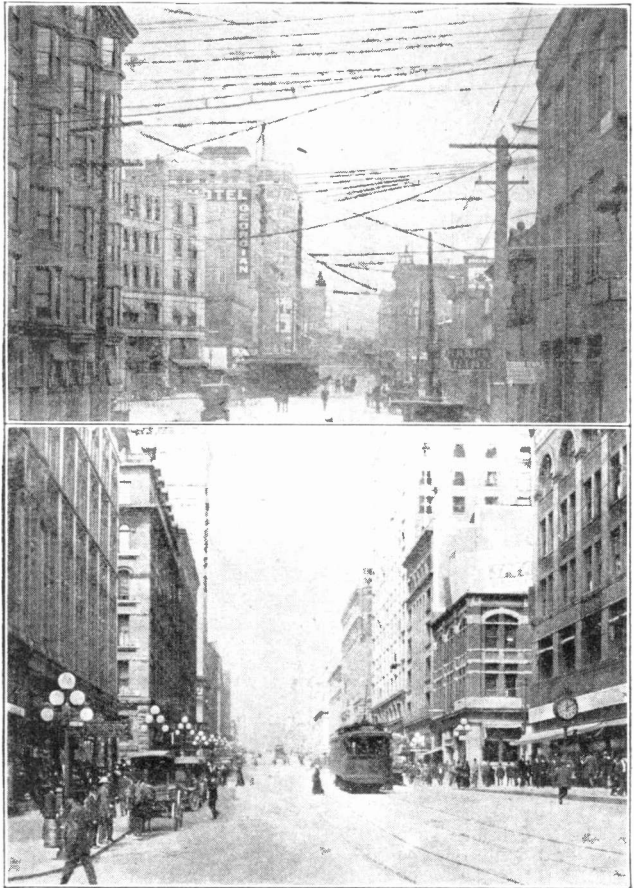
incandescent mantles; in metallurgy the operation of blast furnaces and Bessemer furnaces will be considerably improved by the use of oxygen blasts.

It would take too long here to enumerate all chemical products which, by the use of liquid oxygen, could be produced immediately from their elements; some such applications have already been tried, but the field is enormous and comprises the whole of chemistry, metallurgy and hygiene, the more so as the utilization of nitrogen and the rare gases of the atmosphere should likewise be considered in this connection.

### PUTTING THE WIRES OUT OF SIGHT

When we see photographs "taken before and after," the value of putting electric telephone and telegraph lines underground is at once apparent. A city involved in an overhead network of wires and unsightly poles is anything but handsome in appearance, and also there is always much danger from broken lines, especially during disastrous fires and floods.

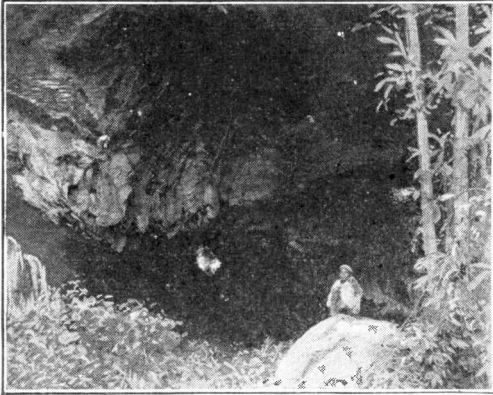
The city of Seattle was compelled to take action toward ridding itself of wires and poles. The town grew so rapidly that it seemed it would be swamped with telephone, telegraph and light wires, which took up much valuable room in the streets and gave the thoroughfares an untidy appearance. The accompanying pictures show what one of the main streets looked like before the wires were placed in conduits and the neat appearance resulting from the change in system.



A Striking Contrast Between Wires Overhead and Underground

## ELECTRICITY IN THE EDIBLE BIRD'S-NEST TRADE

Every schoolboy knows what a great demand there is in China for the edible bird's-nest from which a delicious soup, most expensive of all Oriental delicacies, is made. It is much less generally



Cave where Edible Bird's Nests are Found

known, however, that practically all of this demand is supplied from British North Borneo, and mostly from the Gomanton Caves, near the Kinabatangan River. The nests are a gelatinous secretion of a certain species of swallow which frequent these caves, and the right to collect them for export is farmed by the government to Chinese and Malay concessionaires for a sum in excess of \$200,000 a year.

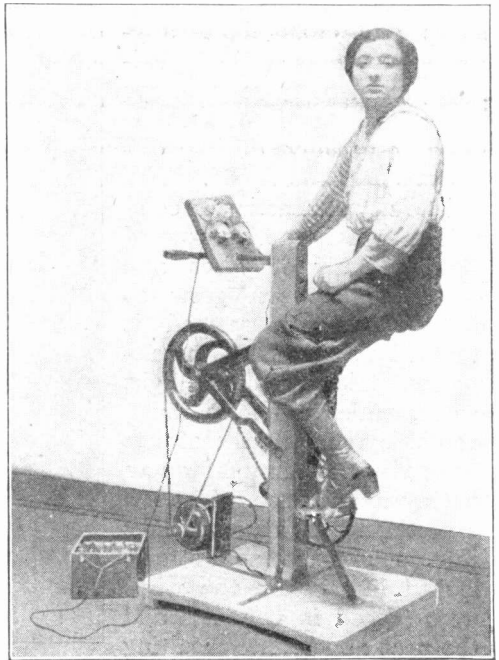
The collecting of the nests has been a most arduous task at all times, but especially so since the government has hedged it about with numerous severe restrictions to minimize the disturbance to the birds. Though the interiors of some of the caves are five or six hundred feet in height, the apertures opening to the light and air are few, and they are, as a consequence, dark and stuffy. Lighting has been the most serious problem from the first, and many a Malay and Dyak, groping in the half light for a foothold, has fallen to his death through inability to see where he was going.

The suggestion of using electricity

came from a moving picture operator who visited the caves a couple of years ago to expose some films for the government, and a subsequent study of the country by an electrical expert from Singapore disclosed the fact that at a waterfall but a mile or so distant several times the amount of power needed for the work in hand could be generated and transmitted to the caves at a comparatively small cost. The contract for the installation has been let in England, and it is expected that another year or eighteen months will see it in operation.

## BICYCLE EXERCISER PRODUCES ELECTRICITY

Two very desirable things, good health and electric light, can be had by the use of the electric home exerciser, the idea of a Parisian, René Champly. The means for doing this are in fact the most simple, for the new device is a bicycle exerciser combined with a small dynamo so as to furnish current for charging a few cells of storage battery. All that is needed in



Bicycle Exerciser Runs a Dynamo



order to have enough current for lighting several small lamps is to work the pedals for about an hour each day, and the fact that the power given by the human motor is not wasted but is stored up for use in the evening will no doubt give an added stimulus to take the exercise.

"Mr. Edison, why don't you use an acousticon?"

"What's that?" asked Mr. Edison.

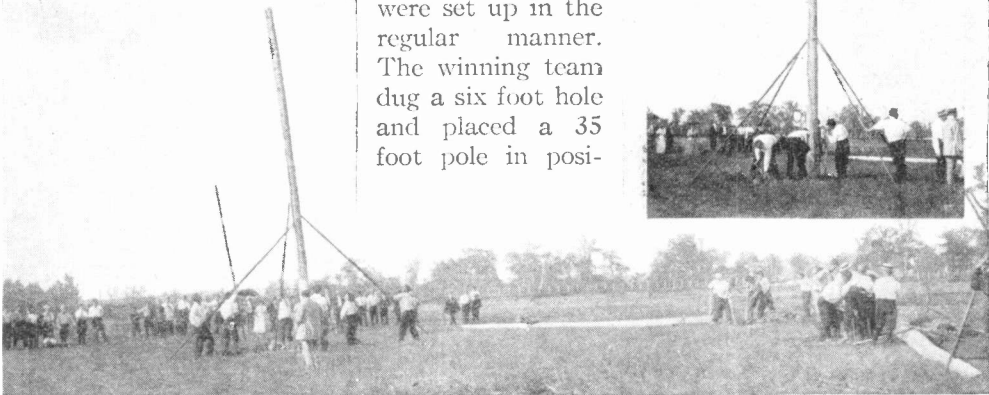
"One of those things that help one to hear better."

"Oh," said Mr. Edison, "I'll tell you. By a carefully conducted series of experiments I have discovered that the gray

### REMARKABLE POLE SETTING FEAT

One of the most interesting events at the Mid-Summer "Field Day" of the Commonwealth Edison Company employees, Chicago, held at the big new Northwest Station, was the pole setting contest. Poles such as are in ordinary use for carrying

overhead lines were set up in the regular manner. The winning team dug a six foot hole and placed a 35 foot pole in posi-



Pole Setting Contest—the Man on the Pole at the Right Rode Up, Fastening the Crossarm on the Way

tion, completely equipped with crossarm, and all in the very fast time of 24 minutes. The man attaching the crossarm was on the pole while it was being raised and settled in the ground, and he was hard at work too.

matter of the average person frazzles out before his voice does."

### EDISON REPLIES TO CHRONIC TALKER

Thomas A. Edison, who is rather hard of hearing, said recently that on one of his rare visits to New York a man was introduced to him who proceeded at considerable length to make suggestions as to the direction in which, for the blessing of mankind, Mr. Edison's inventive faculties might be applied. Then the man switched to the question:

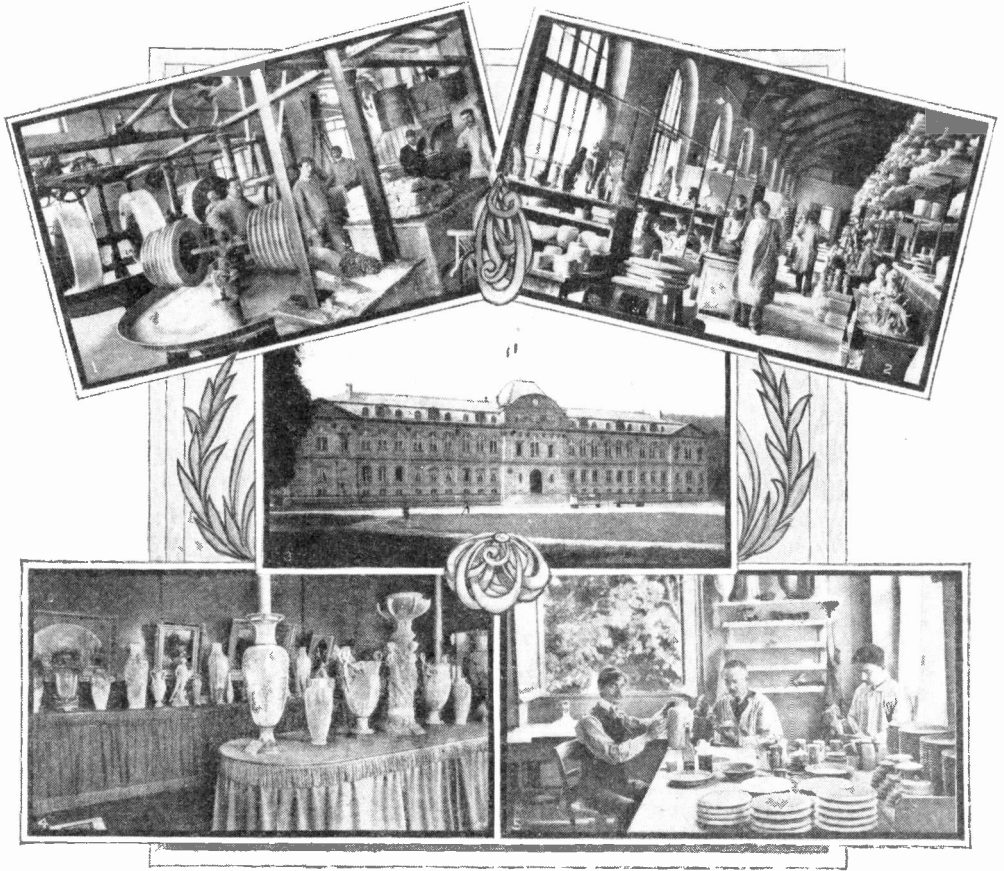
### FARMERS HAVE CITY ADVANTAGES

The rapidity with which the farmers in Southern Idaho are adopting electricity to general uses on the farm has compelled the Great Shoshone and Twin Falls Water Power Company to construct many miles of new line during the early spring. Practically 75 miles of additional new lines are now being constructed or will be built for this purpose. The company has approximately 400 miles of high tension lines in southern Idaho, all of which are situated in a progressive, rapidly growing agricultural community.

## THE PORCELAINS OF SEVRES

The famous Sevres porcelain works, near Paris, date back to 1756. In the present beautiful building are carried out

The collections at the Sevres works are of two kinds, one collection being devoted to museum objects in porcelain and faience from all parts of the world, and this alone occupies extensive rooms and



(1) Grinding Shop for Porcelain and Enamels. (2) Great Modeling Shop. (3) General View of the Main Building of the Sevres Works. (4) Specimens of Modern Products. (5) Decorators.

the numerous operations of preparing the material of the porcelain, such as grinding and mixing, as well as the artistic part of the work, such as modeling of statuettes and decoration of vases, this of course requiring artists of high ability.

Then another part of the works is devoted to the furnaces for firing the porcelain, and many other operations connected with this industry. The whole manufacture and sale of the product is controlled by the French government.

is one of the largest existing. The second collection contains the various Sevres products from the Eighteenth Century to the present time and a visit to these rooms is instructive as showing how the artistic character of forms and decoration has varied according to the taste of the period.

The electric carving table and hot cupboard have been found indispensable in large hotels and restaurants.

## COMBINING BEAUTY AND UTILITY



Artistic Transformer House

The small transformer house of concrete on the grounds of E. W. Reynolds, publisher of Harold Bell Wright's works, is an instance of the modern tendency combining beauty with utility in electrical fixtures.

Instead of the sometimes unsightly sheds of sheet iron, this transformer station is of the same general design as the residence building and the garages

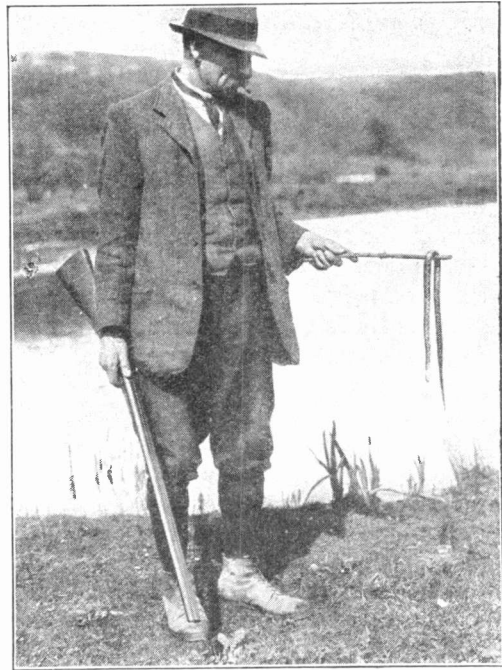
which house the electrical automobiles, and electrical charging stations. All electrical equipment is housed in such a manner as to add to the general architectural idea rather than to detract from the harmony of the grounds. It is even planned that the poles carrying electric wires shall be given a dressing of spattered cement, in keeping with the general color scheme of the place, in white, red, green and blue,—the concrete, the tile roof, the semitropical shrubbery and the azure California sky.

In contrast to this modern expression of electrical equipment, a windmill stands idle across the road from the transformer station, a reminder of the things that electricity has supplanted.

The advantages of electric lighting are many. It is safe, adaptable to all sorts of conditions, perfectly controllable and very economical. No other illuminant can be used in as many different kinds of lamps.

## SNAKE DEVOURS PHEASANTS' EGGS

The popularity of the pheasant as a game bird upon the shooting estates in England is well known. One of the principal enemies, however, of these birds is snakes, as the birds' nests are where these

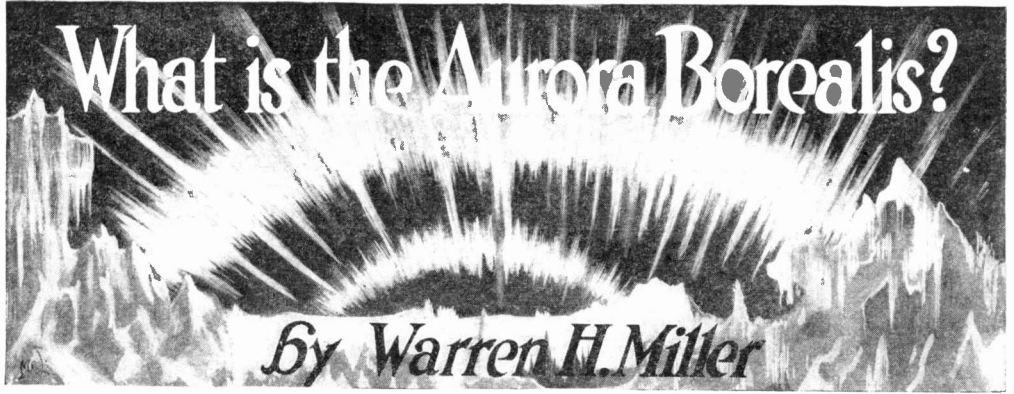


This Snake, with One Other, had just Eaten Fifteen Pheasants' eggs for a Meal

reptiles can readily get into them. The accompanying picture is evidence of a snake's activities and a keeper's vigilance. This snake and its mate were killed after devouring fifteen partly hatched eggs.

## SLOGAN ADAPTED

Several months ago a Dayton company adopted as a slogan the phrase, "If it isn't electric, it isn't modern." So thoroughly has this terse truth since been fixed upon the minds of the local public that the other day when a landlord advertised a dwelling for rent he took pains to add, with a praiseworthy regard for truth, "Modern except electric light."



To-day, one hundred years after Franklin, we still use his theory for the formation of the aurora borealis, in lieu of any better one. The great big "why" that surrounds the whole subject of the magnet and its relation to luminous manifestations is as unsolved as ever. Franklin's theory of the aurora was that it is due to electric discharges in the upper air, in consequence of the differing electrical conditions between the cold air of the polar regions and the warmer streams of air and vapor raised from the level of the ocean in tropical regions by the heat of the sun. It will no doubt be proved to be the correct one, when all the other missing links which now connect the aurora with the periodic eleven year magnetic storms, the diurnal magnetic variations, the sun spots in the sun's photo-sphere, and the production of its luminous streamers have been explained.

Now, the earth, as is well known, is one vast magnet. It possesses a quantity of inherent magnetism due to its vast deposits of feebly magnetic iron ore and the actively magnetic "magnetite" or almost pure ore that has undergone crystallization and therefore retains some of this energy in the form of magnetism.

The earth being round, it is the poorest possible shape for a magnet, and might have its poles almost anywhere were it not for the diurnal rotation constantly producing electrical influences which in a general way yield currents moving north-easterly and southwesterly, the same as

the trade winds and the prevailing climatic breezes. This places the magnetic poles where they are; the north pole not at the true north but 1,000 miles to the southwest, on Bothia Feliz Island, 70° north latitude by 96° west longitude. The south magnet pole has not as yet been located, but there appears to be two points for maximum egress of the magnetic lines of force in the south polar regions, as the compass indicates such to be a fact. The exact line of the magnetic current is probably as much influenced by the distribution of available masses of iron in the earth's interior as in the inductive electric effects of aerial currents.

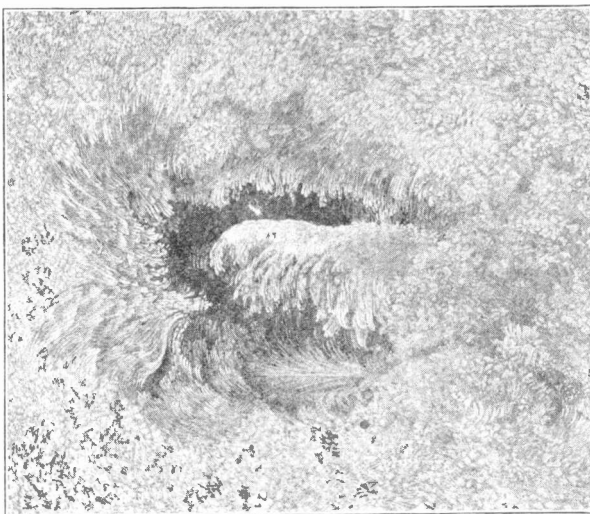
Be that as it may, the surface of the earth is one vast air gap between the north and south magnetic poles, as may be proved by any one by simply holding a compass in the hand. It immediately takes a position pointing towards the north magnetic pole, so therefore it must be in the path of some magnetic current traversing the air on the earth's surface.

Now let us examine a few facts connecting the aurora borealis with the magnetic phenomena of the earth. (1) The aurora is always seen with the center of its arch directly over the magnetic pole. Large ones that have been big enough to be seen in numerous places at the same time prove that the display encircles the magnetic pole. For instance, the great aurora of September 3, 1839, was seen in the Isle of Syke by

M. de Saussure; at Paris by the observatory astronomers; at Astin in Italy by M. Quetelet; in New Haven, Conn., by Mr. Herrick and in New Orleans by scientific men of that city. These observations cover nearly one-half of the polar circle and investigation of the Chinese records would probably complete the circle. (2) The appearance of brilliant auroral displays always accompanies magnetic storms, affecting compass needles and telegraph lines all over the world. (3) The aurora appears with exceeding brilliancy and frequency in  $11\frac{1}{2}$  year periods corresponding to the maximum cycles of magnetic storms and sun spots, and every large aurora coincides with storms on the sun's surface in which the latter is torn by huge sun spots which spots are believed to be tremendous upheavals in the incandescent film surrounding the sun.

The aurora begins with a dingy aspect of the sky in the general direction of north. This gets darker and forms itself into an arc over the magnetic pole. It is called the "dark segment" and looks like a thick cloud if seen before dark. As night comes on the stars can easily be seen shining through it, so it cannot be very dense. Soon appears a luminous bluish arc surmounting the dark segment, which lasts for several hours, waving uncertainly about with its lower edge only sharply defined. This state is followed by the formation of rays, which shoot up to the zenith in a flash of bluish white light. As the aurora grows more intense the rays increase in number and swiftness until the whole arc is shooting up immense flashes of blue, green, rose and purple lights, reaching far over the heavens, passing the zenith and terminating in a point which has been observed and measured to be in the prolongation of the dipping needle to the southeast of the zenith.

Have we anything analogous to the auroral light in the laboratory? If a Geissler tube is exhausted of its air until it becomes exceedingly rarified, and the tube be placed in the discharge of a static machine or a Rhumkorff coil, a strikingly similar luminous action takes place. Instead of the rays we get disks which travel along the tube in much the same way as the auroral rays, and if we could make the discharge in analogous conditions to the auroral one, i. e., from the poles of a sphere, we would probably get



The Aurora at Times Takes on Most Beautiful Grotto Designs

rays all over the sphere instead of disks — a chance for a mighty interesting experiment for some one. A spectroscopic examination of the light of either the rarified air discharge in a tube or the light of the aurora will reveal identical characteristic spectrum lines; besides which its spectrum shows lines not referable to any terrestrial substance yet discovered, and this also is present in the electric discharge through rarified air, showing that there is still plenty of room for further discoveries in chemical science.

We know that high tension electric currents passing through rarified air will, instead of passing a spark as in ordinary dense air, break up into luminous discharges. In view of the fact that there



have been no published experiments as to the action of a permanent magnet without any armature acting in a rarified air bulb, there is nothing to base any theory on as to the direct effect of the earth's continuous magnetic current in producing the light of the aurora. The indications are all in favor of the high tension static electric current.

Ordinary atmospheric electricity is produced by the fact that every charged molecule of moisture which leaves the earth's surface carries a minute charge of electricity on its surface, since a static charge cannot rest in the interior of anything. If half a dozen such molecules combine together to form a tiny raindrop, this drop will have the charges of all six of them on its surface, but the surface will not be six times as great, since the volumes of spheres are to each other inversely as the cubes of their diameters. Therefore the potential of the static charge of the raindrops will grow as the square of the cube root of the number of combining molecules. Suppose eight of these raindrops combine into one big one. It will have eight times the quantity of electricity on one distributed over the surface of the large drop. The potential will, therefore be four times as great. In this way, it is easy for a cloud to form by combination and induction an enormous potential and finally break down the air gap and make a lightning discharge.

Suppose the evaporated particles meet no cold strata and move along with the prevailing tradewinds, until, still carrying their original static charge, they finally reach the colder latitudes where they must condense. Now the higher strata of the air are nearly always heavily charged with positive electricity, increasing from 20 to 40 volts per foot (according to Kelvin) in various measured localities, the lower strata being neutral and the earth itself negative. If therefore we follow Franklin's theory, upheld later by Silvanus Thompson and others, the return of this static charge, continuously carried

off the earth's surface, takes place at the north and south magnetic poles. And, being concentrated and condensed at these points, it causes a luminous "brush effect" in the rarified upper strata of the air, just as in the Geissler tubes. Just why the earth's charge should return at the magnetic poles, and why the aurora is more brilliant during magnetic storms and sunspots if magnetism has nothing to do with the making of the luminous display, is one of the great big "whys" that enter into our present knowledge of the aurora.

To the writer's mind the missing link in the aurora is still pretty wide. Evidently the magnetic current has some yet undiscovered property in the production of a luminous display in highly rarified air, which is similar to that produced by a high tension electric discharge. One would be apt to assume that severe magnetic storms would react to induce a corresponding electrical disturbance in the higher air strata and thus increase the auroral lights, but, if so, such atmospheric disturbances would be noted and recorded every time we have a severe magnetic storm and brilliant lights, but no such connection has been established or noted. Moreover, granting the neutral stratum of lower air, wouldn't this be apt to be stronger in polar regions than in temperate climes, since we never have thunderstorms in winter? Therefore, why should the high-tension, static equilibrium be restored at the magnetic poles instead of some other place, unless there is some property in the magnetic circuit affecting this, just as it does rays of light, the flame of a candle and many other wave-forms of energy? If no such property exists, then the auroral display may solely be due to magnetic phenomena acting on the highly rarified air, for the static charge of the molecule of vapor might be dissipated on reaching polar regions, just as it is with us in winter.

A final theory of the aurora still less open to proof is that of Arrhenius, based on the fact that the sun emits a flood of

corpuseles similar to X-rays, which on approaching the earth are attracted in by the magnetic circuit of the earth and in passing through the rarified upper strata of the air cause it to become luminous. This has, however, many facts militant against it and would require a lot of experiment to prove it. Even at the present day, eminent authorities are forced to admit that the "why" of the aurora is still as unsolved as ever and the solution will bring in its train much that we now do not know about the production of light.

### LIFE-SAVING CREW OF COLLEGE STUDENTS

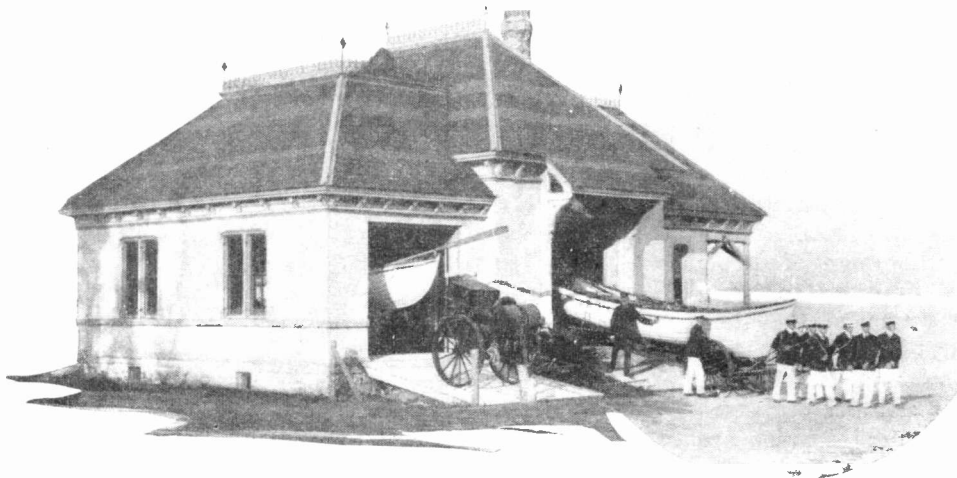
One of the most unique means offered students for earning their way through college is shown in the accompanying

the Boston, 550 yards off shore, and in three trips rescued the imperiled crew of 21 men.

### COULD LIFT TWO LOCOMOTIVES

Electric cranes are keeping step in size and capacity with the other electrical aids to big industry. For the mounting of machinery and equipment on the Vaterland, sister ship of the Emperor, there has been erected a huge electric crane having a capacity of 250 tons. The forward arm of the jib, which has a total length of 315 feet, can be raised to a height of 330 feet above the water.

Two independent lifting appliances, one a crab which can lift 250 tons at a radius of 113 feet, or 110 tons at 175 feet, and a revolving traveling crane, capable of running the entire length of the top of the main jib, are used in conjunction with



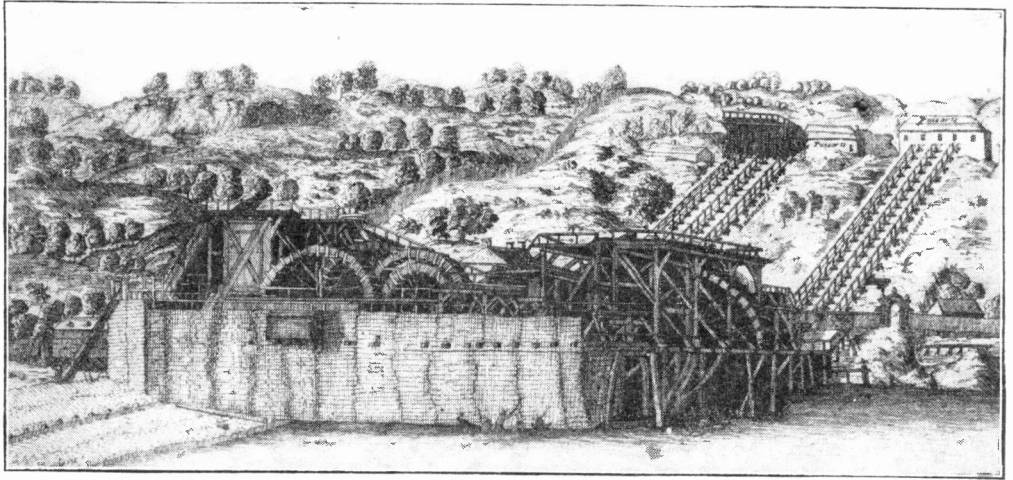
Life-Saving Station on Lake Michigan and the Crew of College Men

picture of the Evanston (Ill.) life-saving crew. The members of the crew, seven in number, are students at the Northwestern University, located in the town.

The hardest real work yet required of the crew came when the steamer Boston grounded off the coast. In the face of a 45-mile-an-hour gale and waves much higher than are often seen on the Great Lakes, the boys fought their way out to

the main purchase. This auxiliary crane can lift ten tons at a distance of 240 feet from the turning center of the main crane.

Electric heating is costly when compared with gas or coal on the energy basis, but when adaptability is considered it has the field all to itself. The heat can be applied just where it is wanted and in any desired degree.



The Old Plant in the Time of Louis XIV

### CURIOUS PUMPING PLANT ON THE SEINE

The great fountains which are one of the attractions of Versailles Park in Paris, as well as the city reservoirs themselves, are in part supplied with water from a curious pumping station on the Seine.

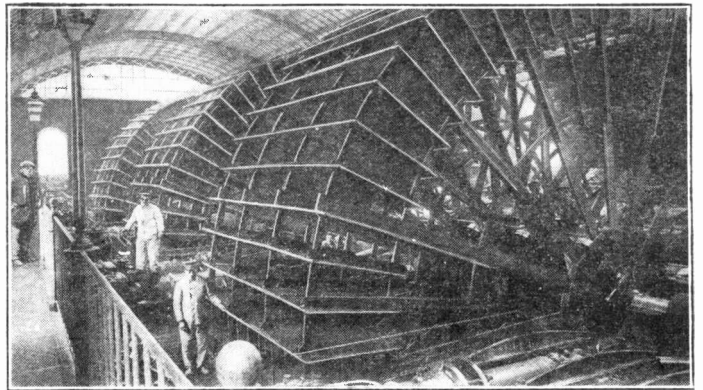
The original "Marly Machine," or water-wheel, was installed during the reign of Louis XIV in order to bring the water to the then new Chateau of Versailles and supply the great number of basins and fountains which are scattered about the grounds in profusion. Nothing remains, however, of the old primitive plant, which must have presented a curious sight, judging from the appearance of the old print reproduced herewith. But even the present water wheels are not by any means new, for they were put in as far back as 1858 under the direction of the celebrated scientist Regnault and are therefore over 50 years old.

The building contains five gigantic

water wheels of 40 feet diameter, which runs unceasingly night and day in order to work the large pumps.

### HINT TO TRAVELERS

Travelers depending upon electric irons



The Present Water Wheels were Installed in 1858

or other electric appliances for a considerable amount of their travelling comfort should not forget to take with them one of the two or three light plugs which may be screwed into any electric light socket. This is a precaution which should be taken in view of the fact that even yet there are many rooms which have only one light socket and no baseboard receptacle.

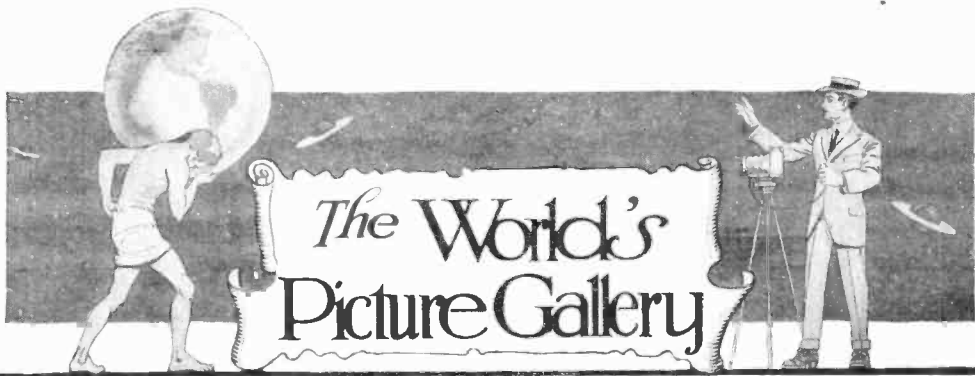


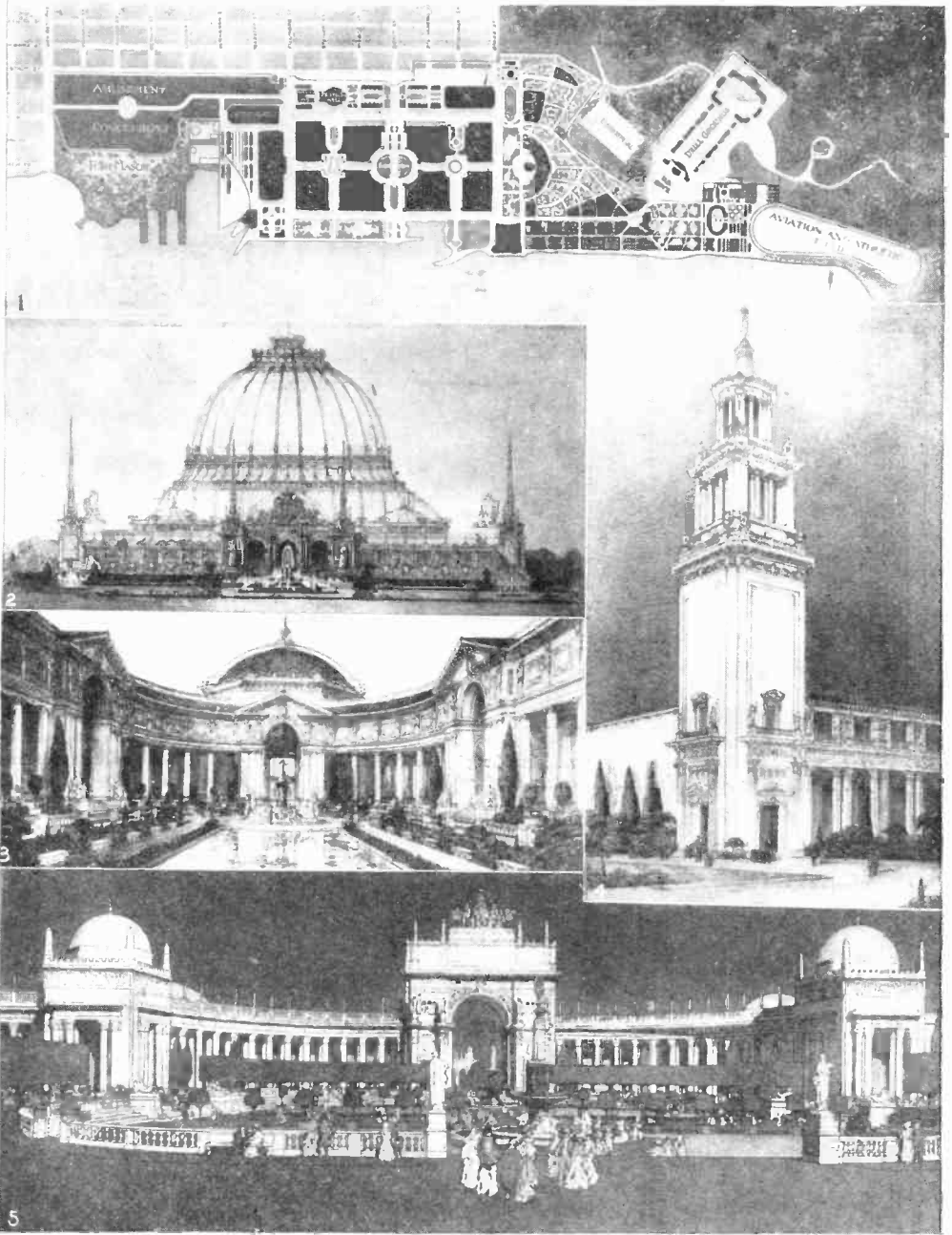
PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.

Largest car barns in the world; built at Lichtenberg by the Berlin Street Railway Co. The barns are approximately 2,850 feet long by 360 feet wide and contain track space for 500 cars at one time.



PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.

King Carlos of Roumania in his motor car, crossing a pontoon bridge erected by his troops and by which they entered Bulgarian territory.

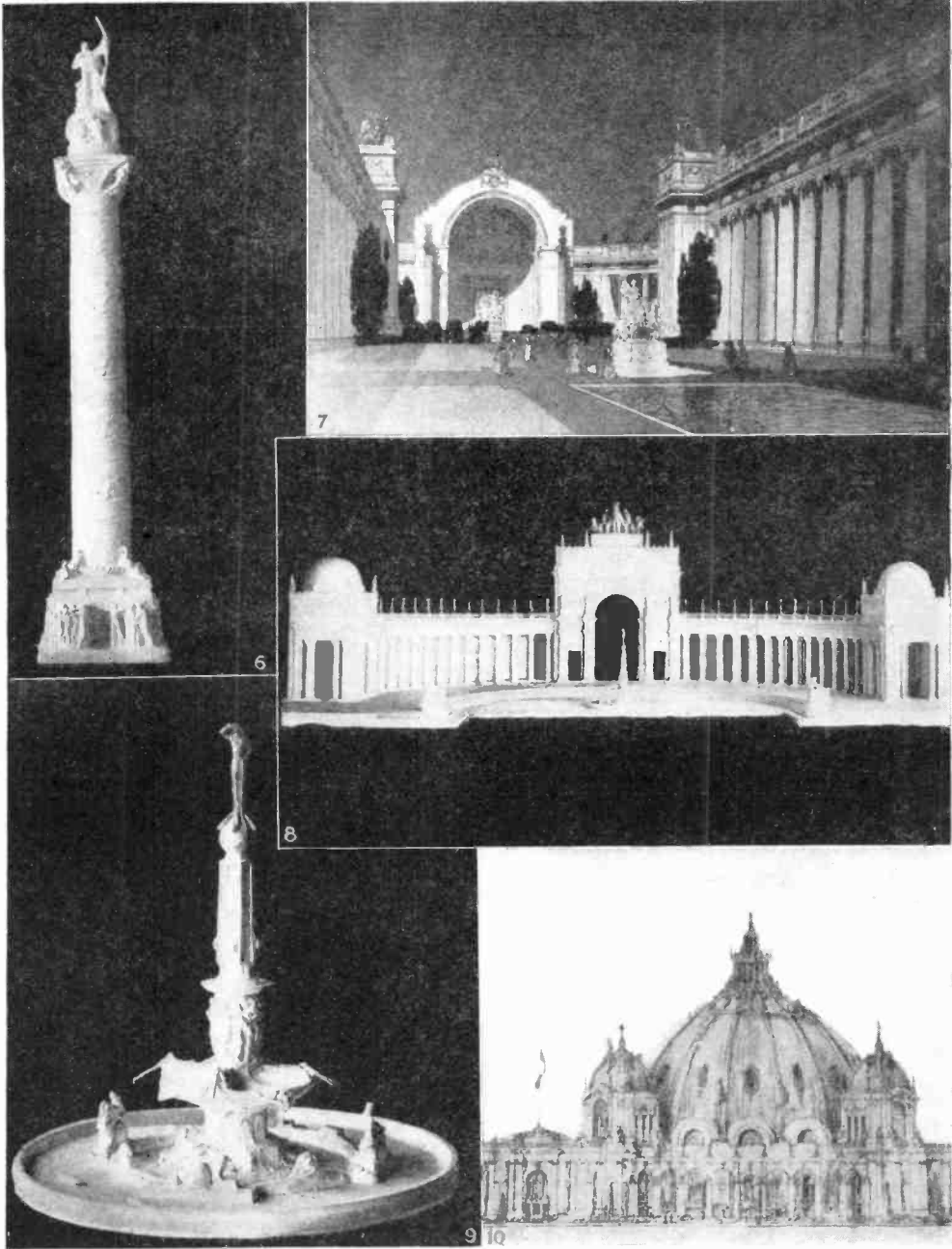


PHOTOS COPYRIGHTED, 1912, BY THE PANAMA-PACIFIC EXPOSITION CO.

**PRELIMINARY GLIMPSE OF THE PANAMA-PACIFIC EXPOSITION**

(1) Block plan of the exposition site. (2) Horticultural Building composed mostly of glass. (3) West South Court. (4) Tower of West South Court. (5) Court of Honor.





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PHOTOGRAPHS FROM THE ARCHITECT'S DRAWINGS

(6) Pillar in the Court of Honor. (7) Court of the Four Seasons. (8) Court of the Sun and Stars. (9) Fountain in the Court of Honor. (10) Festival Hall.



PHOTO BY UNDERWOOD &amp; UNDERWOOD, N. Y.

Introducing Coney Island's animals to the cooling waves in the presence of a throng of amazed spectators

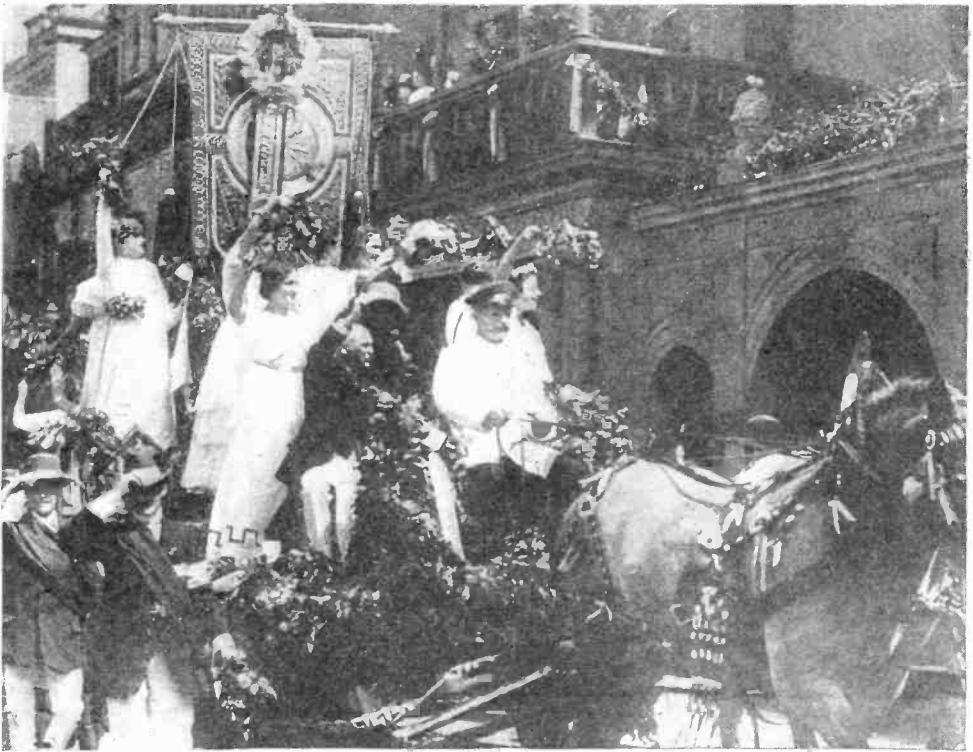
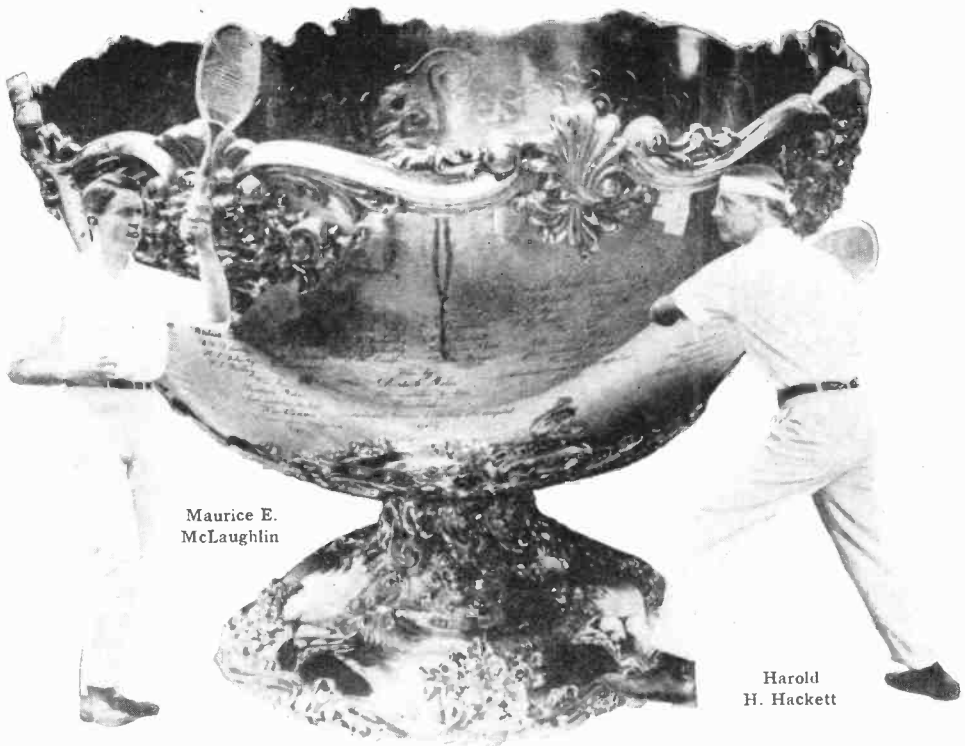


PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

Eleven thousand turners took part in the recent Leipsic Turnfest. The Turnfest Banner, supported by pretty German girls, was a feature of the parade.



Maurice E. McLaughlin

Harold H. Hackett

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McLaughlin and Hackett who won the international tennis match at Wimbledon, England, and the Davis Cup, which now returns to the U. S. McLaughlin also won the singles.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

Miss Adalade Trapp, school teacher commissioned by New York City to inspect bathing houses for girls — back jack-knife dive.

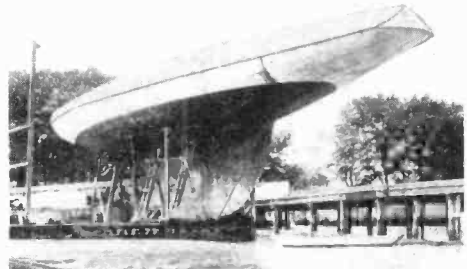
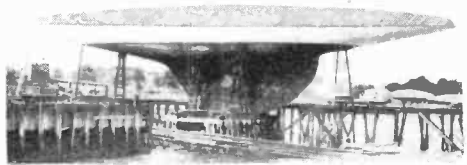


PHOTO BY AMERICAN PRESS ASSOCIATION

How a racing yacht looks out of water. Old cup defenders Reliance and Columbia which may be tried against Lipton's Shamrock V next year.



PHOTO BY BUCK, FROM UNDERWOOD & UNDERWOOD, N. Y.

The New Bureau of Engraving and Printing, Washington, D. C

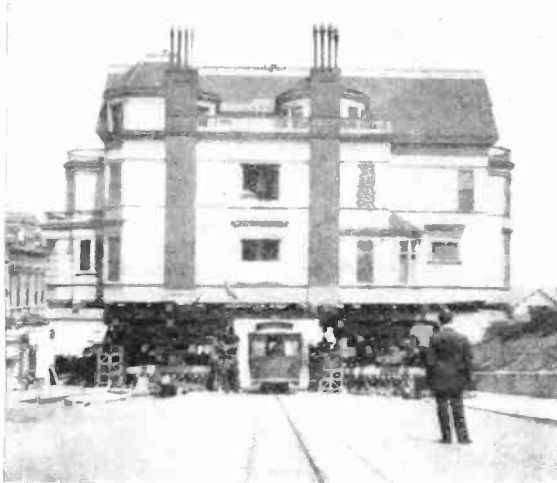


PHOTO BY L. R. PERRY, BERKELEY, CALIFORNIA

San Francisco residence being moved over a cable car line without obstructing traffic.



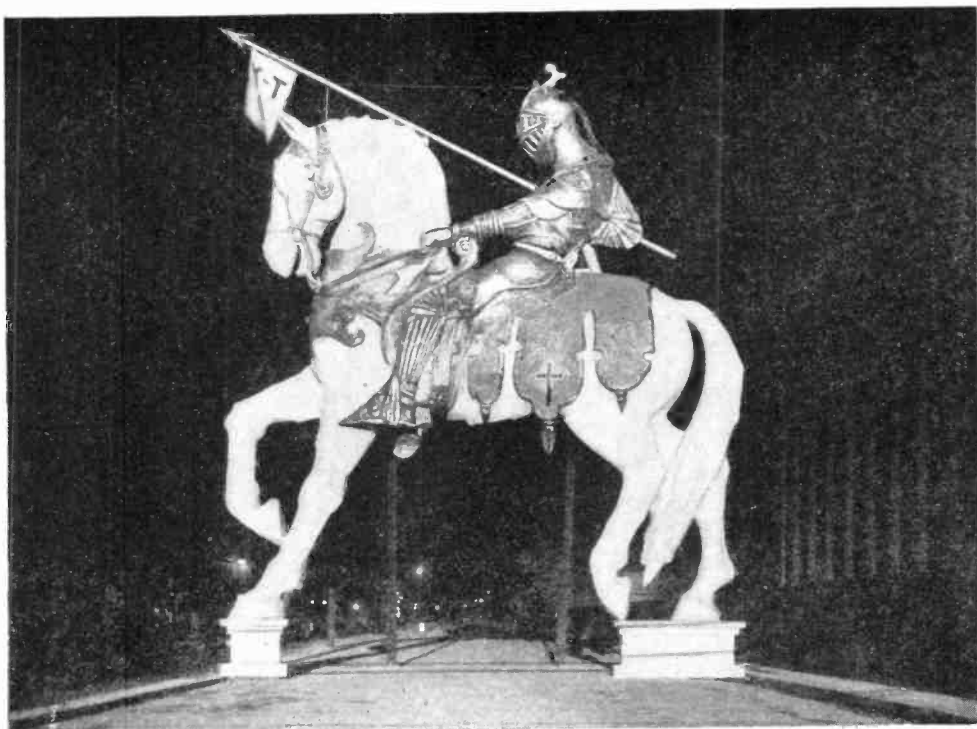
PHOTO BY THE AMERICAN PRESS ASSOCIATION

Dr. Robert Bridges, the new poet laureate of England.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

A lace maker of Ceylon. The beautiful laces from that country are laboriously made by hand in this manner.



Massive street arch erected for the recent Knights Templar Conclave, Denver, Colo.



PHOTO BY UNGERWOOD & UNGERWOOD, N. Y.

Native jewelers of Ceylon polishing gems by primitive methods.



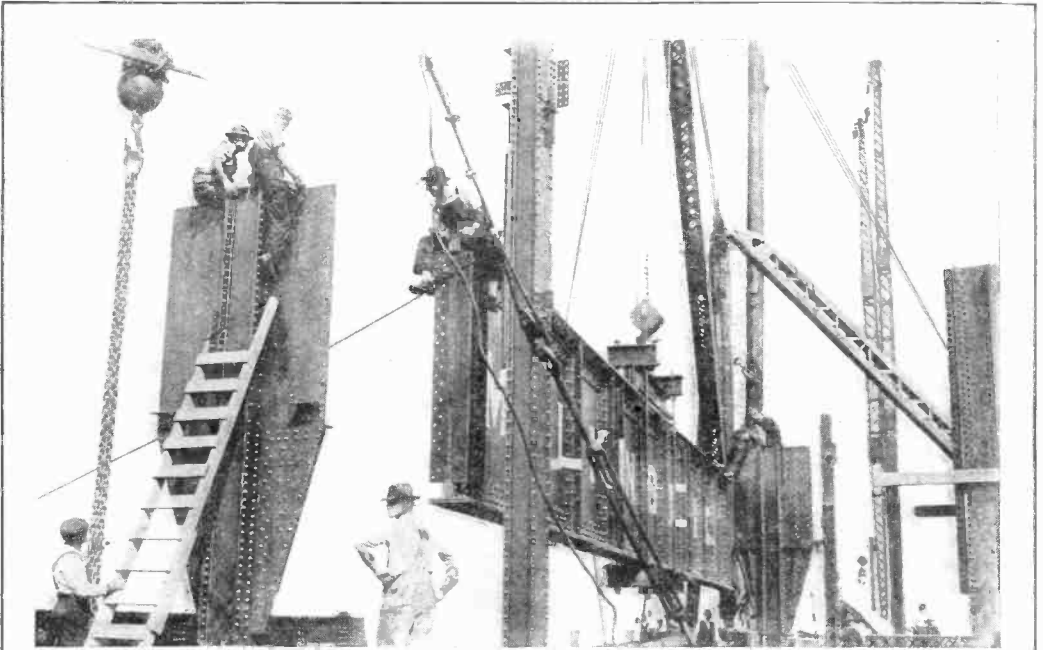


PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

Raising one of the 46-ton girders for the New Consolidated Gas Company Building in New York. Seven floors of the building will not rest directly on the foundation but will be hung from girders like this suspended from the adjoining buildings. Girders of such size have never before been lifted to so great a height — nineteen stories.

A Field of spineless cactuses. This plant was developed from the wild, prickly variety by Luther Burbank and is highly valuable as a forage plant for stock.



PHOTO BY THE AMERICAN PRESS ASSOCIATION

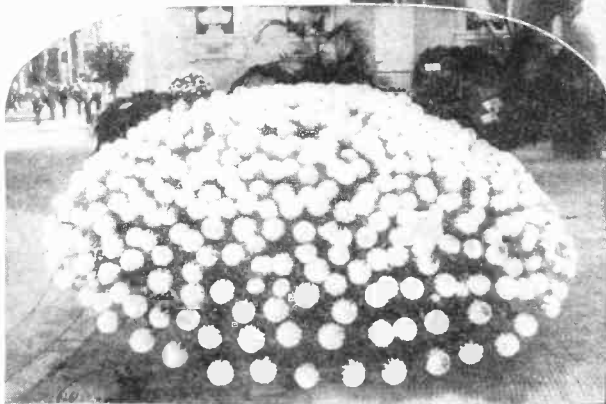


PHOTO BY C. L. EDMOND

This remarkable Chrysanthemum has no less than 1,200 perfect blossoms growing upon a single bush. It was grown by Mr. Adolph Lewisohn and exhibited at a recent flower show in New York. A wire frame was necessary to separate and support the flowers, making the display resemble a huge bouquet rather than a growing plant.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

General Euphonio Zapata (arrow) brother and co-leader of the rebels with Col. Zapata, in the camp of the "Zapatistas," at Cucnavaca ready for the insurrection against President Huerta to spread to Southern Mexico. The General is in supreme control of Morolos.



PHOTO BY THE AMERICAN PRESS ASSOCIATION

Sixty of the trouble makers leaving Sing Sing Prison. Shackled hand and foot, they are being removed to Auburn Prison.



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The art of rhythmic expression has been taken up by a number of socially prominent women at the Summer School of the Rhythmic Expression at Sharon, Mass., where they are being instructed by Miss Florence Flemming Noyes, who, according to Rodin, has the most perfect right arm in the world.



PHOTO BY GETTLER, CHICAGO

This ivory elephant, which is over 200 years old, was purchased in Delhi, India, by Mr. William Wrigley, Jr., for \$5,000.00. The entire piece, except the base, is carved out of one solid piece of ivory, requiring over 30 years of patient labor to complete the work. To-day it could not be duplicated because all elephants having tusks large enough have long since been slain. This piece has a base 10½ by 14 inches and is 21 inches high.



Curious ways of getting from place to place in China. Some go by wheelbarrow—the strap-hangers of the Orient—others by Sedan chair or two-wheeled pony cart.



PHOTO BY L. N. RIDER, WESTERN ELECTRIC CO.

In India the Elephant takes the place of men and derricks in handling telephone poles and, as the picture shows, they use "any old thing" for a pole.



PHOTO BY THE AMERICAN PRESS ASSOCIATION

Only pair of buffalo in the world trained to harness — Cheyenne, Wyo.

Sir Oliver Lodge, the noted British scientist, and president of the British Association, who asserted in his presidential address, Sept. 10, that a belief in a continuity of existence before and after death is essential to science.



PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

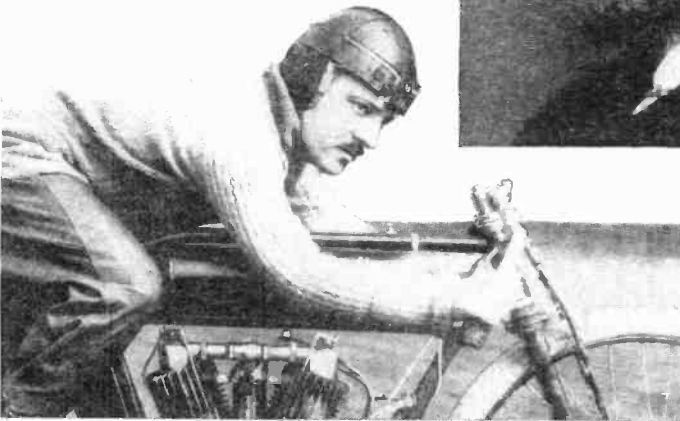


PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

Andre Grapperon, the French motorcycle champion, who came to this country to meet the American champion, Charley Davis, at the Brighton Beach motodrome.



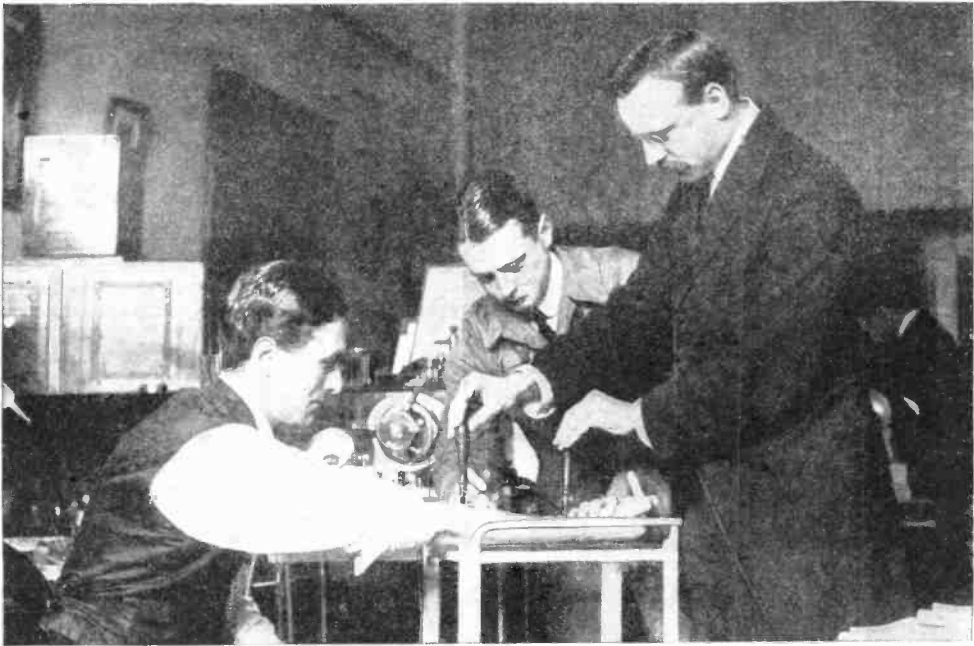


PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.

Dr. Le Duc of Paris, applying his latest apparatus for producing local anæsthesia by impulses of electric current

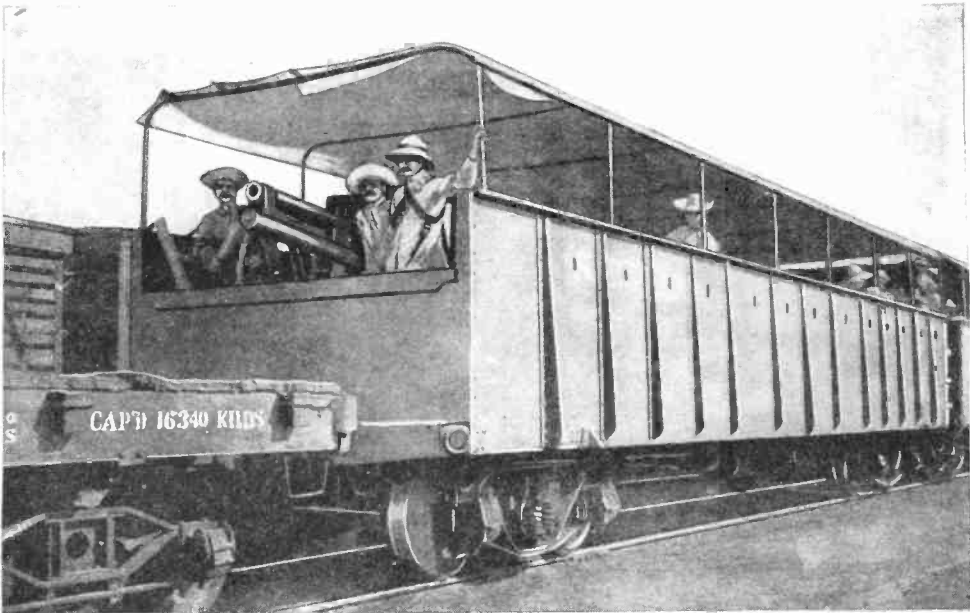


PHOTO BY GEORGE GRANTHAM BRIN, N. Y.

This picture, just received from the war zone in Mexico, shows an armored car used by the Federals in their fights with the Insurrectionists. Different parts of the railroad system in the northern part of Mexico are in the control of the different factions, and regular traffic is suspended.



PHOTO BY L. A. PERRY



Ten women policemen recently appointed in Chicago. They do not carry clubs or revolvers.

Funeral Pyre upon which were cremated the remains of Joaquin Miller, the Poet of the Sierras. It was built by the poet's own hands.



PHOTO BY FRANZ OTTO KOCH

Bathroom of the King of Siam. As bearing upon the "September Morn" discussion, it may be said that in that country statuary is almost invariably draped or clothed as in this picture.



Natives of Madagascar preparing rice food

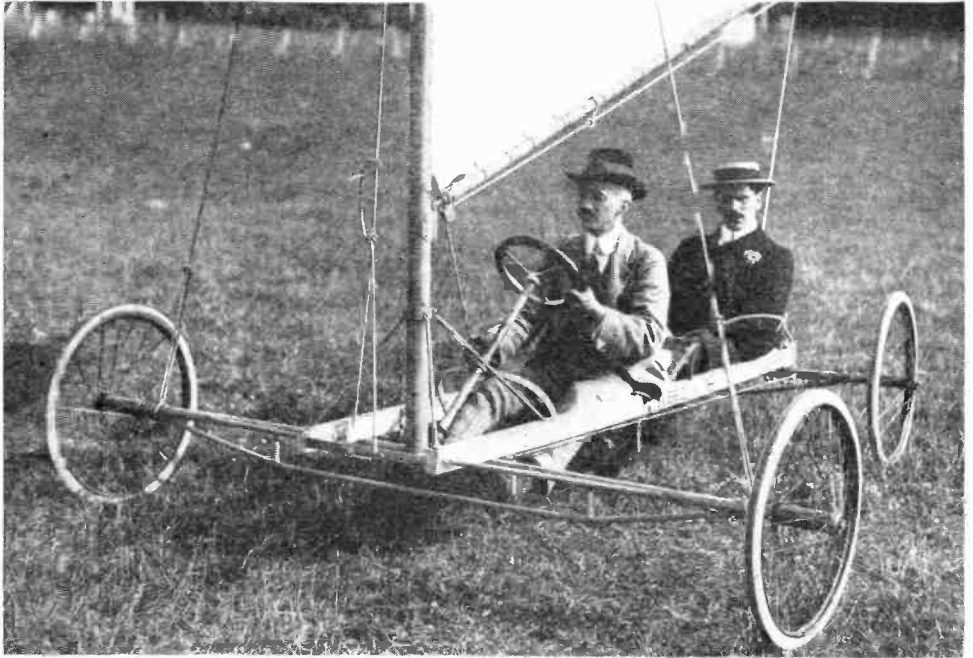


PHOTO BY BURKE & ATTWELL, CHICAGO  
Uniform proposed



PHOTO BY FRANZ OTTO KOCH

Grotesquely dressed figures are sent out two or three hours before a funeral in China to draw attention to the event



The "aeroblage" made its first appearance in England when the well known aviation firm of Messrs. Bleriot brought over from France several of their machines for trials at Hendon aerodrome. The manager of the Bleriot firm is seen at the steering wheel.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

General view of a great tea estate in Ceylon, including the factory and living quarters

# How Electricity Gets the Blame

BY CHARLES K. THEOBALD

## FIRE OF MYSTERIOUS ORIGIN

PARTLY DESTROYS MRS. ENYBODIE'S  
HOME. DEFECTIVE WIRING  
SAID TO BE THE CAUSE

Those were the headlines — and they are not uncommon ones — describing a recent fire on which our agency held the policy, and my duty that morning was to investigate the loss. Knowing next to nothing about electric wiring and with the inspector out of town, I decided to ask my friend Billy Williams, a competent electrician, to examine the lighting system in Mrs. Enybodie's house.

"Exactly so!" Billy exclaimed, when I showed him the newspaper item and stated my business. "When they can't find a cause for the fire they blame it on the wiring. There seems to be a general belief among you fellows — you insurance men and other members of a misinformed and skeptical public — that electricity is responsible for a large proportion of our fires. You think because electricity and fire are both mysterious characters that they must necessarily be side partners.

Coming from anyone else, I might have taken offense at being accused of such ignorance, but when we were in the car and I came to consider fully Billy's words, I concluded that I might learn a great deal from him that would be to my advantage. Before I could put a question, however, he resumed his dissension.

"Frank," he complained, "you fellows have heard and read about 'short circuits' and 'open circuits' and 'live wires' and 'grounds' and other technical expressions until you have come to imagine that they are all fire dealing agencies and constitute the main part of all electrical installations."

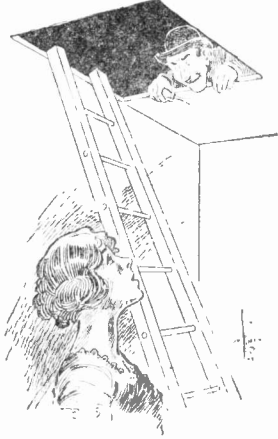
No matter what I thought about it, I said nothing, and Billy continued:

"I am sorry to admit it, but a few unscrupulous electricians and greedy contractors, with a view to swelling their pocketbooks, have contributed largely toward instilling this false idea in the layman's mind. For example, Johnny Graft, the 'curbstone contractor,' whose kit of tools comprises a screwdriver and a pair of pliers and whose stock in trade is usually culled from the junk heap, is installing an additional light or so in Mrs. So-and-so's house. Johnny is working in the attic, where Mrs. So-and-



so has never been and cannot go, unless she climbs a ladder and crawls through the little scuttle hole. She calls up to Johnny: 'Please do be careful and fix it right — I am so afraid of fire.' This immediately gives Johnny an idea and when he comes down into the room again he tells her that some of the wires in the attic are too small to carry the current without heating and should be

repaired at once. Johnny gets the job, of course, and the credit for being a bright young man—and leaves his patron under the false impression that electric light wires are supported on non-



"Please be Careful and Fix it Right!"

inflammable insulators because they are charged with red hot current. And Mrs. So-and-so tells her neighbors about it and they inform their friends.

"Another consumer's lights go out when he attempts to attach his electric fan to a chandelier," Billy went on. "Johnny Graft also gets this job and he sees the trouble at a glance. Constant screwing and unscrewing of the attachment plug at the chandelier socket has resulted in the wires in the plug becoming twisted together, causing a short circuit at that point and blowing out the fuses in the cabinet. Johnny could repair the trouble in five minutes for about 50 cents, but he sees more money in the job. He gets a step ladder, makes an examination of the chandelier and looks very serious. 'What's the trouble?' his customer asks. Johnny looks very wise. 'Electrolysis,' he says, 'has developed in the fixture wire and caused a heavy ground, which if not repaired may cause a fire in time.' 'I see,' says the customer, when, as a matter of fact, he doesn't see in the least. But Johnny gets the job of rewiring the fixture and electricity gets the blame for being very dangerous.

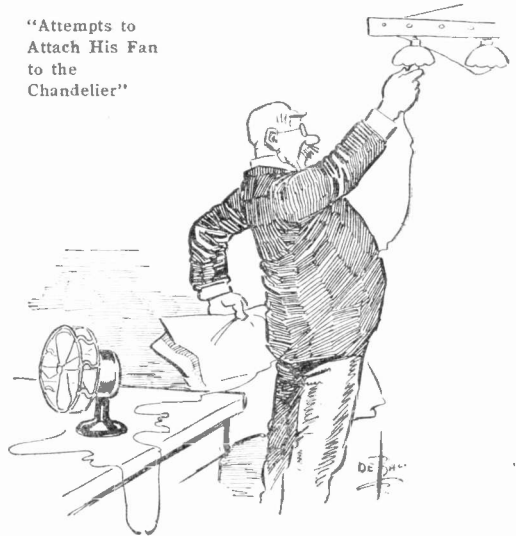
"How about hot wires?" I inquired. "The other day, when your men were installing the switches in the office, the man in the loft would shove a wire down the partition to the man below and say, 'That is the hot wire—make your taps on that.' And the other fellow would—"

"And so it goes," Billy interrupted with a grin. "A 'hot wire' to us fellows means simply a wire that is carrying current. In dry places, like your office, we seldom take the trouble to kill the juice when—"

"Hold a minute, Billy," I stopped him. "'Killing the juice' means what?"

"Opening the main line switch, of course," was the explanation. "We can handle one live wire with perfect safety so long as we are off the ground and not in contact with any conductor such as

"Attempts to Attach His Fan to the Chandelier"



gas or water pipes leading to the ground, for the human body offers a path for the flow of current to earth."

"How about rats gnawing the insulation off the wires in garrets and between walls and starting a fire?" I asked.

Billy looked his disgust. "Oh, rats!" he exclaimed. "That same question has been asked me a thousand times in the past fifteen years. It's absurd. In the first place, I have never seen the insulation on electric light wires removed by



rats and I don't believe any one else ever has. Rats might chew the paraffin and cotton covering on bell wires carrying only a weak battery current which of itself could not start a fire, but they balk at eating the bitter rubber compound on lighting wires. And in the second place, no fire would occur even granting that the wires carrying the customary voltage of 110 were stripped of their insulation and laid bare on the dry timbers.

"If the circuits are properly fused, it is hardly possible to set fire to the building with the ordinary low voltage current; if you'll drop in the shop sometime I'll prove it to you."

We left the car at this point, and as we walked the two blocks toward the scene of the fire, Billy resumed his talk.

"Many fires and accidents caused by electricity," he contended, "are due to carelessness. Take, for an instance, the blaze last week in the Park View Hotel. That fire started from an electric smoothing iron which had been left on the dresser with the current turned on, while the owner was contentedly eating her dinner. A similar case is that of Mrs. Vandergilt's. Susie Vandergilt's beau had called to take her to the 'movies,' and Susie, who had been primping her hair for the occasion, forgot to turn off the key on her electric curling iron when she left the room."

I recalled a fire which had destroyed an entire city block a few summers ago and for which electricity was said to be responsible. I asked Billy what he knew about it.

"I know *all* about it," he declared. "That fire had its origin in old Aleck Tightwad's shoe shop. About a year prior to the fire, Tightwad bought a 32 candlepower lamp from me to use above his work bench. The lamp had become dim from age and constant use and he called me into his shop, and complained about it. As is natural with an old incandescent lamp, it became hot when lighted and besides burned dimly, consuming more current than ordinarily. I explained this to Tightwad and sug-

gested that he buy a new lamp or put a shade with a good reflecting interior on the old one. But he couldn't see it that way. Times were too hard, he said. Passing his shop the next day, I noticed that he had equipped the old lamp with a homemade, cone shaped reflector fash-



"Suggested that He Buy a New Lamp"

ioned from a piece of white paper. Tightwad's ingenuity saved him about fifty cents — the price of a good lamp shade. That night he fell asleep at his bench and the heat confined in his make-shift shade started a hundred-thousand-dollar fire."

Reaching our destination, I observed that part of the roof only was burned from Mrs. Enybodie's house and that the light company's service wires were still intact on the building. The transformer pole was stepped, and the first thing that Billy did was to climb the pole. He came down grinning from ear to ear. He rolled a cigarette with exasperating slowness and looked up the street, where a wagon containing three or four linemen was approaching.

"I'll have a word or two with the line gang before I tell you the trouble," he said, as he lit his cigarette and went forward to meet the wagon.

At the wagon, Billy exchanged a few words with the foreman, and when he returned, his grin seemed wider than ever.

"Well?" I asked impatiently, partly anticipating his answer.

"It is just as I thought," he laughed, with an I-told-you-so air. "Mrs. Enybodie locked up the house and went to Cooper's Wells last week, and, as a matter of precaution, she had the light company disconnect the service wires on the pole. Poor old electricity, how thou art persecuted!"

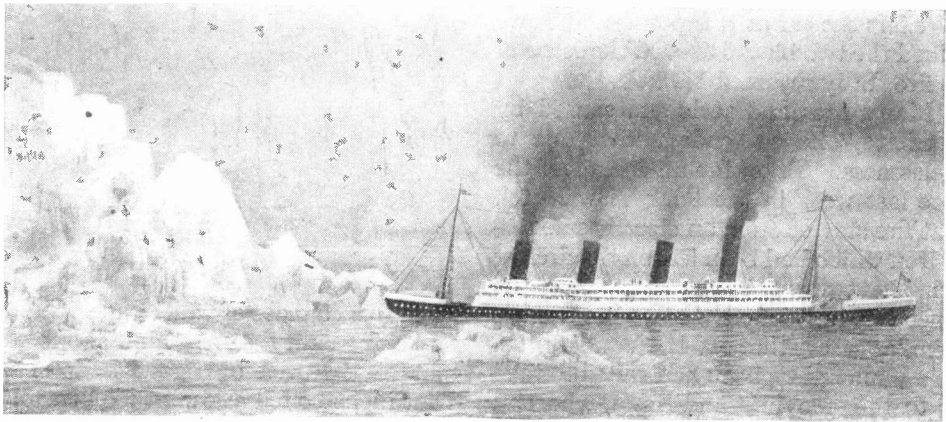
I felt rather foolish, I must confess, but with the firm's interest at heart, I felt constrained to ask:

"Surely, Billy, you are not going to

## DEPICTING THE TITANIC DISASTER

The sinking of the ship, Titanic, April 14, 1912, carrying to the bottom with it 1,635 persons out of 2,206 on board, is the world's greatest sea disaster and the facts and heroic incidents surrounding it will ever interest. This spectacle in the form of a mighty panorama is presented by the aid of electricity with wonderful realism at Riverview Park, Chicago.

From the auditorium the observer looks out upon the Atlantic and in the distance



Spectacle of the Titanic Disaster

present a bill for this, are you? You haven't done anything."

"You mean," he was quick to retort, "you haven't got anything here for me to do. That's not my lookout. And besides, I've thrown in a few dollars' worth of valuable information. Sure, I'm going to send in my bill—I need the money."

But I'll tell you what I'll do, Frank," he amended, "if you'll come down to the shop sometime, I'll prove to you, free of cost, that electricity is the safest of artificial illuminants."

With which Billy swung onto a passing car, and left me to ponder on the ease with which a prejudiced mind can form snap judgments.

the Titanic is shown ready to leave Southampton, England. It is early morning of April 10th. After the sun rises the giant ship moves out of the harbor upon its fatal voyage. At the masthead flashes a wireless message. Presently, in the distance the spectator sees an on-coming iceberg. The ship strikes it, settles slowly as its wireless flashes the S. O. S. while the distant strains of a band playing "Nearer My God to Thee" are heard. Then with an explosion the boat plunges from sight leaving the water strewn with numberless lifeboats. The arrival of the Carpathia and its entrance with the survivors into New York harbor conclude the spectacle.

The representation of the Titanic

weighs 1,700 pounds and is 22 feet long. The total length of the scenery used if placed end to end would extend almost three miles. Behind the scenes is a little two horsepower electric motor from which shafting extends to every point where power is required. The ocean is a series of semicircular tiers of scenery kept in motion by electric power to immitate the ocean waves. Between these tiers are tracks upon which are drawn by cables, the ships, the landscapes, the icebergs etc. The cables run to cable drums and by simply throwing in a clutch the scenery and boats are stopped or set in motion. Sunrise, sunset, the night, the lighting of the ships, the clouds—all are produced by the application of electricity.

### THE WORLD'S LARGEST NUT-CRACKER

Although there are many of the so-called rocking or balanced stones in various parts of the world, it is very doubtful if there is another so delicately poised as the one near Tandil, in the province of Azul, Argentina. So evenly is the weight of this ten ton mass of granite distributed around its point of contact with the larger boulder upon which it rests that the touch of a child



The Nut-Cracker Rock Weighs Ten Tons

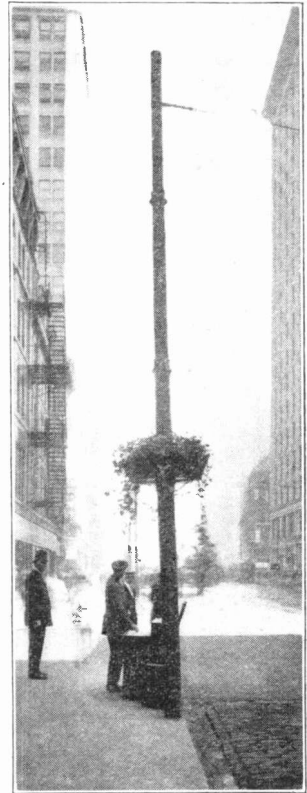
may rock it back and forth through an arc of several inches. The rock is a favorite point of meeting for *paseos* or picnic parties, and one of the favorite tests of the delicacy with which the stone balances is for one person to hold a walnut under it while another tilts the great mass gently down and cracks the shell.

### FLORAL BOX ON TROLLEY POLE

In the early part of last summer the Chicago Association of Commerce issued a booklet il-

lustrating the possibilities of securing a more attractive city through the use of ornamental shrubs, foliage plants and flowers in windowboxes. A look about the loop district during the summer afforded plenty of evidence that the suggestions had taken root and probably no better offering to this effect can be shown than the accompanying photograph which goes quite beyond the promoters' expectations.

A neat wooden box is placed about the trolley pole, is partially filled with earth and as the picture shows, is the home of a mass of beautiful foliage which takes away the plainness of the pole. This picture was taken at State and Jackson.

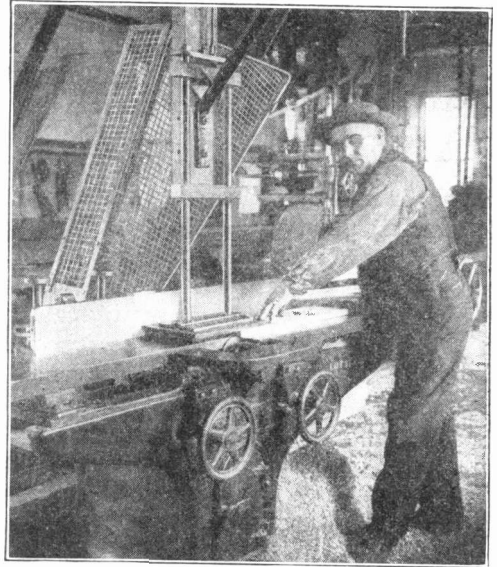


Quite Refreshing in the City's  
Turmoil

### PROTECTING THE LIVES OF 200,000 STEEL WORKERS

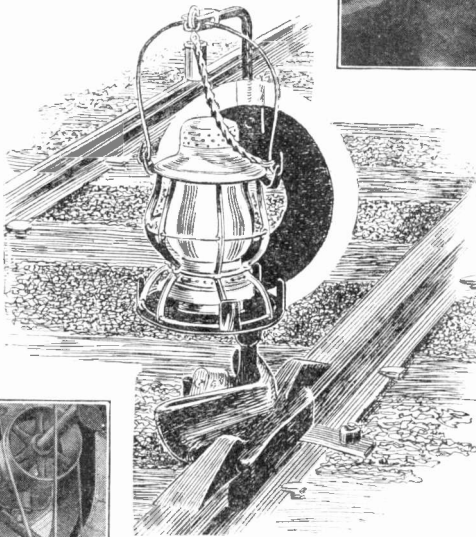
In the years that the manufacture and use of steel has been developing to become the real romance of American industrial life, worker after worker has paid with his life for the products that flow from the plants in a steady stream, for use in every portion of the globe. Accidents have been many, and thousands of workmen have found themselves disabled for life after only a day's work.

Six years ago the United States Steel Corporation realized that the time had come when something must be done to



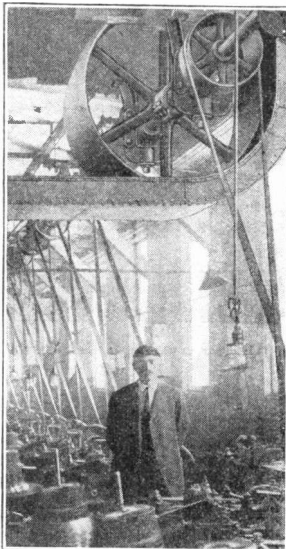
How the Planer is made Safe by a Steel Guard

Track Target and De-Railer Where Extreme Precautions are Necessary to Protect Workmen

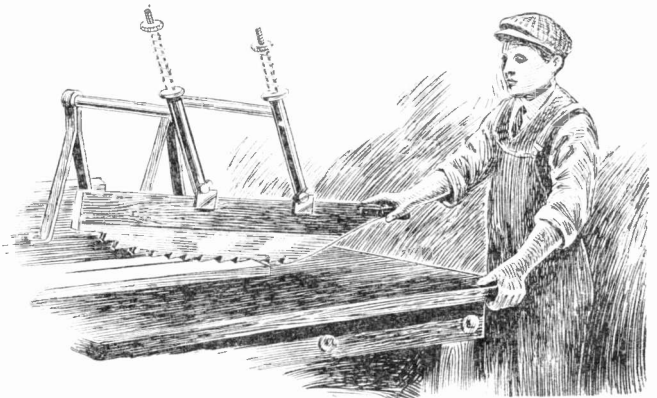


reduce the accident and death rate among the 200,000 workers.

"Safety First" became the motto under which the corporation proceeded to eliminate the numerous accidents, and, as far as possible, make safe the manufacture of steel. Since then work in the plants and mines has been almost revolutionized under the



Heavy Belts are made Safe, too, by Running Them Through a Steel Box



Ripping Boards in the Carpenter Shop by Aid of a Device which makes the Operation Perfectly Safe

guidance of "safety experts" whose only duty has been to devise means for protecting the workmen, with the result that there has been a reduction of 1.15 per cent in serious accidents. This on a basis of 200,000 employees, means that 2,300 workmen now escape serious or fatal injury every year who would have suffered under the system of working in vogue before the "safety experts" were employed.

The accompanying illustrations are typical examples of the safety devices which have been perfected and put in use for the protection of the steel workers.

### FIRST TRACKLESS TROLLEY IN WISCONSIN

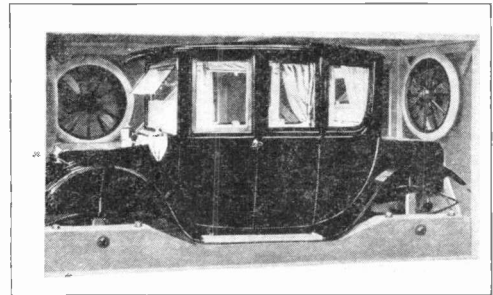
This is one of the trolley buses used by the Merrill Railway and Lighting Company at Merrill, Wis., to feed the street railway line from a portion of the city that did not furnish enough traffic to pay for the extension of the regular line. The bus is an eighteen passenger, one front entrance, single operator car, with heavy solid rubber tires single in front and double on the rear wheels. The motor is a special auto type, 500 volt, 12 horsepower, series motor and is controlled by a five jack shaft through a universal shaft and bevel gear.

It is the first installation of its kind in Wisconsin, although the type has been recognized in Europe as the only transportation system that is practicable for sparsely settled districts, as the cost of

maintenance and operating is much less than either storage battery or trolley car.

### BOXING AN ELECTRIC FOR FOREIGN SHIPMENT

Boxing a \$3,500 automobile for shipment to a distant part of the world is an important piece of work, since electric

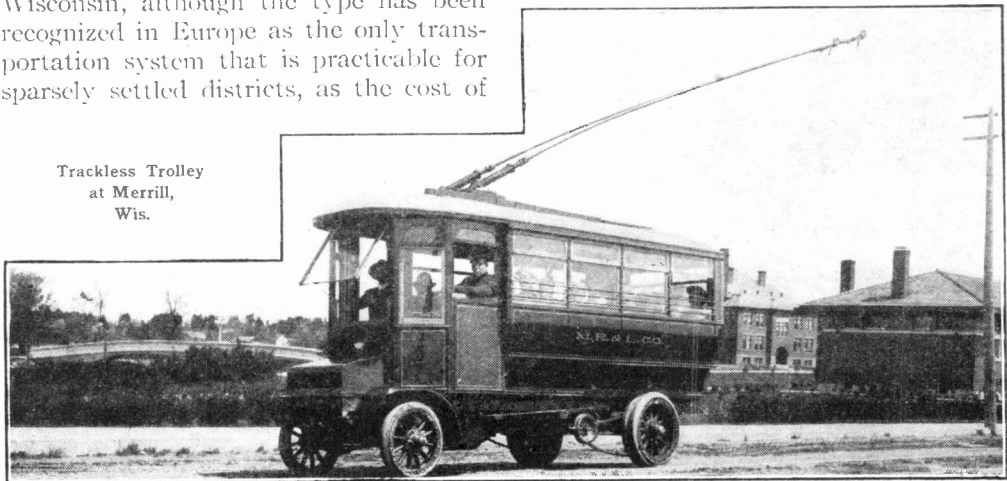


Boxed Ready for Japan

automobiles are not primarily designed to be lifted by derrick and dropped roughly down the hatchway of an ocean going ship.

The illustration shows a Waverly electric ready to be shipped to Japan, with wheels removed and axles resting in a heavy oak framework that is bolted to the outside box. The latter is built of matched pine with a lining of tar paper, firmly braced and all very substantially constructed.

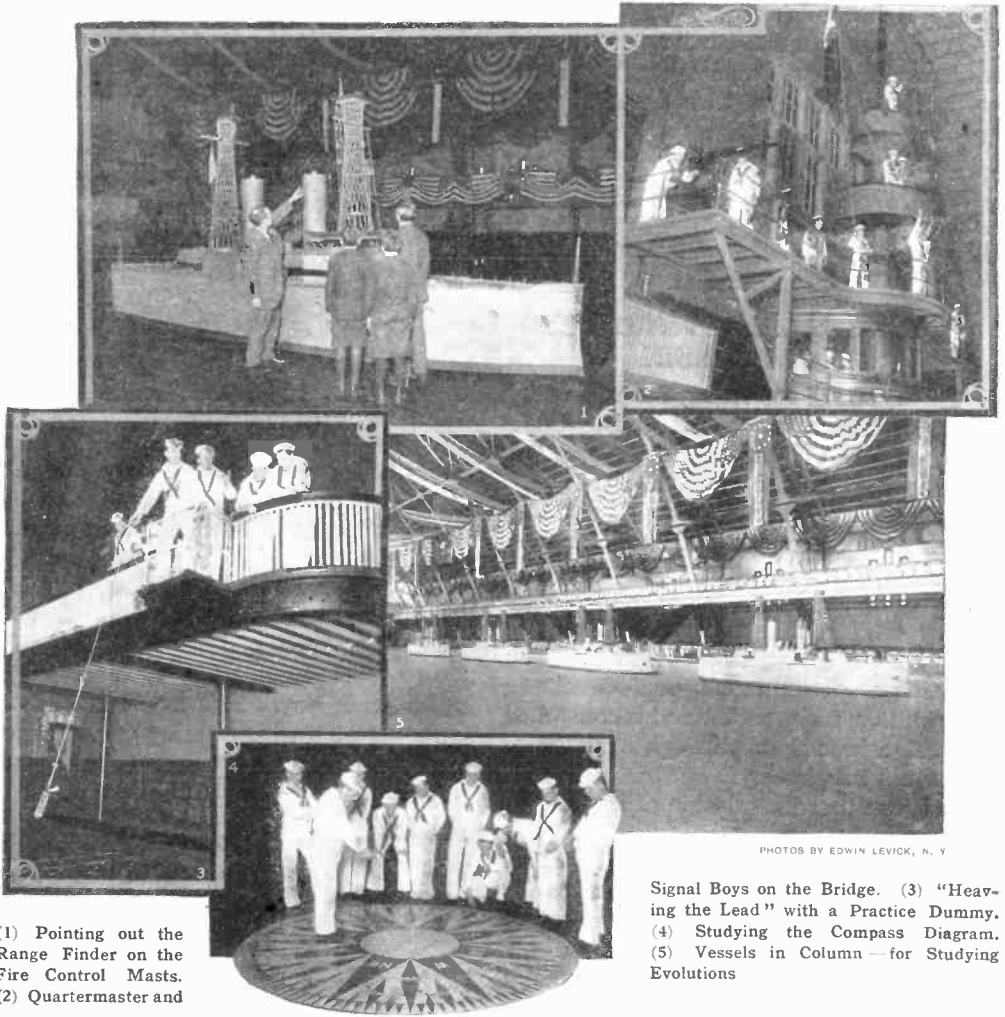
Trackless Trolley  
at Merrill,  
Wis.



## LEARNING THE RULES OF THE SEA

Learning the duties of naval militiamen on land appears on the face of it rather a paradox. How can a Jack Tar acquire

is much too brief to make really efficient sailors. To accomplish any training of this kind really worth while means at



PHOTOS BY EDWIN LEVICK, N. Y.

(1) Pointing out the Range Finder on the Fire Control Masts. (2) Quartermaster and

Signal Boys on the Bridge. (3) "Heaving the Lead" with a Practice Dummy. (4) Studying the Compass Diagram. (5) Vessels in Column—for Studying Evolutions

the knowledge of a ship except on ship-board?

Yet it can be done and is being accomplished quite successfully in New York City in a most novel manner. For a few weeks every summer our citizen sailors take to the sea if the national government is generous enough to loan them a ship for the purpose, which is not always. But this experience at sea, when offered,

least some work done all the year round.

Consequently Lieutenant Commander Martin of the second battalion of the New York naval militia hit upon the plan of teaching his men the rules of the sea in one of the Brooklyn armories.

To represent the actual conditions as nearly as possible which exist on a man-of-war, Commander Martin determined to use carefully constructed, self-propelled,



miniature battleships, which, maneuvering on the armory floor, simulated wonderfully well the movements of real ships. The little vessels, which the commander has caused to be built for the use of his men, are fully equipped in every particular with the proper complement of guns, basket fighting top masts, the regulation running lights, etc. Thus in handling these little ships the naval militiamen learn the duties of Jack Tar at first hand or under almost the actual conditions as they exist at sea. All that is lacking is the rolling sea, which, truth to tell, a few of the would-be sailors are just as pleased to escape, for some of them are by no means immune from sea sickness although of course like good sailors they would not acknowledge it.

As the ships with lights lit are maneuvered from one end of the armory to the other, the men learn the rules of the road at sea.

"Green to green or red to red,  
Perfect safety, go ahead!"

Thus when the time comes during the summer course, they are fully qualified to take the wheel on a real man-of-war and handle it with as much knowledge as that gained by most Jack Tars at sea alone.

The miniature battleships not being high enough from the floor for the purpose, the militiamen learn from a convenient balcony how to heave the lead and soon become so efficient at it that when the gunboat is put in commission for the summer cruise they are veterans at this line of work.

On the floor of the armory the citizen sailors acquire a thorough knowledge of the sea's traffic rules and also perfect themselves in signal work and small arm practice.

Before learning the sea's "rules of the road" the men of the naval militia must know how to name the points of the compass in correct succession — or, in sea lingo, to "box" it. For this purpose a huge compass has been marked out on the armory floor and a quartermaster teaches

the recruits to understand that north by east is quite another story from east by north.

Against one of the walls of the armory a fully equipped signal bridge, just like a man-o'-war's and almost actual size, has been built. Here the signal gang, a fraternity by itself, learn their p's and q's, whether spelled by bunting or lights.

The mechanism of a modern gun is intricate, and the efficient gun crew must be able to quickly take down and assemble its movable parts. For this purpose a real gun similar in type to those found on many of our gunboats and fully supplied with all its intricate mechanism has been secured and fastened to the floor of the armory just like it would be to the deck of a ship. During the drills a junior officer explains, on this gun, fully to the men, the technique of breech blocks, sights and other gear. Thus it will be seen that to the New York naval militiamen at least life is not all beer and skittles, but mostly hard work.

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### HAS NO CURRENT OF ELECTRICE

A sad tale of disappointment is contained in the following communication received by a La Crosse (Wis.) electrical firm from a farm customer. The son of the soil, it seems, had ordered a lamp fitting while under an impression somewhat similar to that of the Kansas farmer who bought a motor to do his farm work, although there wasn't a power wire within 25 miles. The Wisconsin agriculturist "came back" as follows: "Dear Sir, this letter is to acknowledge to you of the receipt of your two ball adjusters but in addition I will make you understand that I misunderstood you. I thought that it was a lamp by itself and not a apparatus which is of no use to me as I have no current of electrice so you see. I want to send them back to you again and you send my money back to and nothing more to say your trully."

# Machines for Utilizing Wave Power

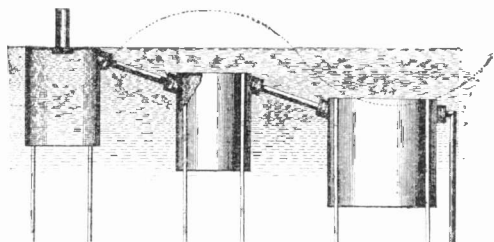
BY JACK BAUM

In the United States Patent Office at Washington there are over four hundred patents issued covering various ideas, machines and apparatus for the utilization of wave power. Since the earliest times, when the Phoenicians first began to navigate the blue waters of the Mediterranean in their crude caravels, men have realized the enormous energy and the incalculable power of the waves and tides going to waste at their very thresholds.

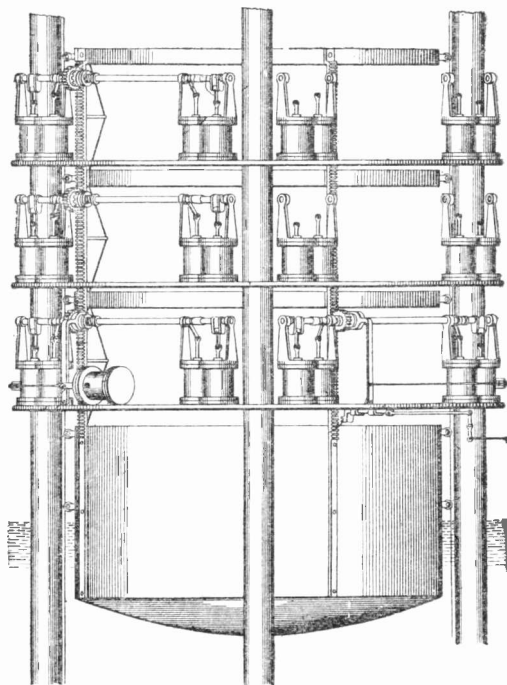
There have been many inventions and seeming mechanical impossibilities perfected and put into daily use that appear much more complicated and impossible than the perfecting of a motor to be run by the action of the waves and yet the problem has not been solved in a practical way. The competition is still open. The secret is still hidden, to be discovered and put into use by some unknown inventor with a spark of the Divine Fire and the courage to go ahead in the face of all precedent.

Some time ago an Italian army engineer read a paper before a very learned society in which he stated that wave power was too intermittent, unsteady, pliant and lacking in force to ever prove advantageous for use in a practical way. He brought some very plausible and clever arguments to bear, but he did not convince. For who that has ever seen the waves lift a barge loaded with coal weighing many tons upon their rise and fall as easily as a fisherman's cork could have anything but the most profound respect for the inherent power of those waves?

The main idea that many inventors have endeavored to apply in building a wave motor is that of a float working on the end of a lever, which, in its rise and fall upon the waves, compresses air in a

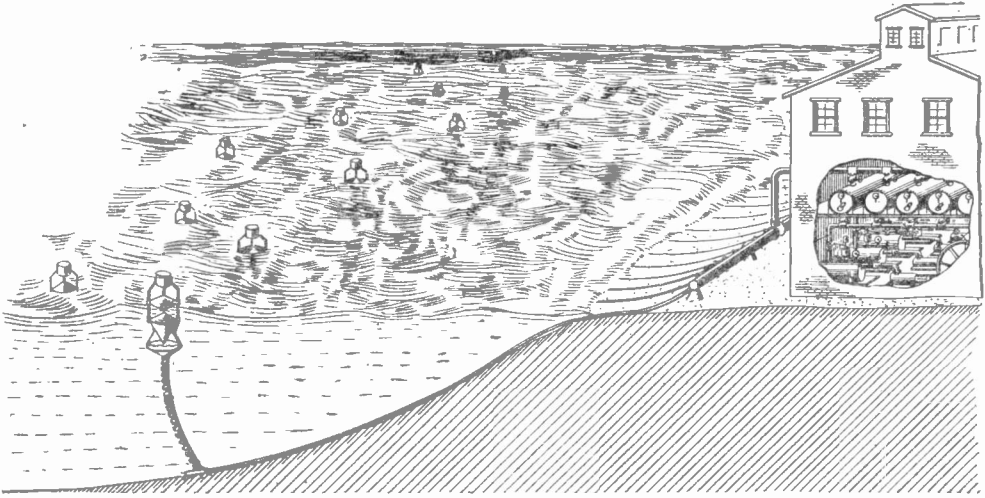


These tanks are held in the relative positions shown. As the waves rise and fall along the dotted line air is first admitted through a check valve in the vertical pipe at the left, and then compressed and caused to flow continuously through the system and out through the pipe at the right. —Patented by C. H. Kierter, May 4, 1886

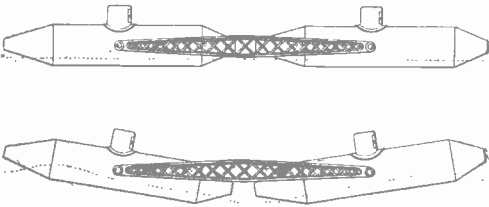


The vertical movement of a huge float operates, through a complicated gearing system a large number of air compressor pumps.—Patented by E. T. Odom, April 6, 1909

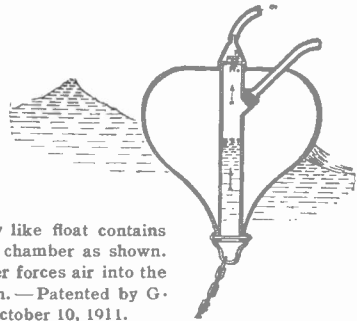
tank. It may be safely said that the majority of wave motors are built upon this principle, with, of course, many modifications, enlargements and variations. Others, relying more upon the tides, have as their underlying principle



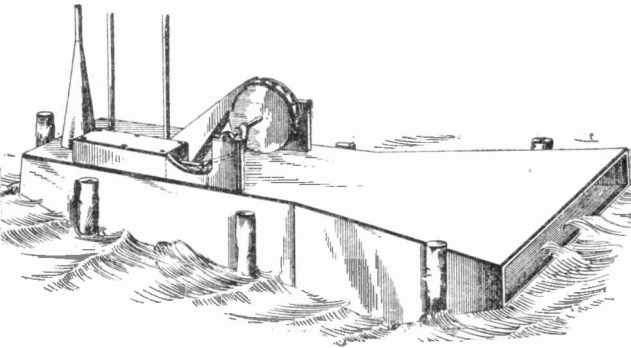
A large number of floats, each containing a specially constructed fluid compressing device, operated by the action of the waves, are all connected by flexible conduits to a power station on the shore. The power generated by the individual units is here collected.—Patented by Herbert E. Rider, October 18, 1898.



Two oscillating floats are tipped at an angle to each other by the action of the waves. In doing this they rotate the shafts in the ends of the steel truss and this rotary motion is translated into an air compressor system.—Patented by F. O. Rusling, June 25, 1895.

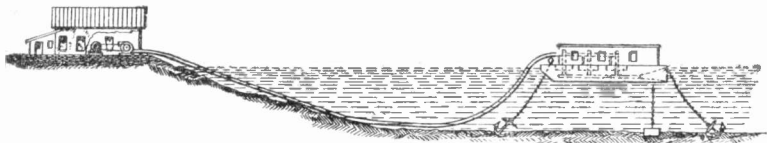


An odd, buoy like float contains an air pressure chamber as shown. The rising water forces air into the pressure system.—Patented by G. H. W. Doose, October 10, 1911.



In a float arrangement are compartments in which air is compressed by the waves flowing into them. This air pressure actuates a wheel which in turn operates a regulation air pump for delivering the power.—Patented by D. Beckers, September 13, 1898.

A boat like float contains pressure chambers in which the waves act to transmit compressed air through the long tube to an air motor on shore, which in turn operates a dynamo.—Patented by D. G. Weems, March 29, 1904.



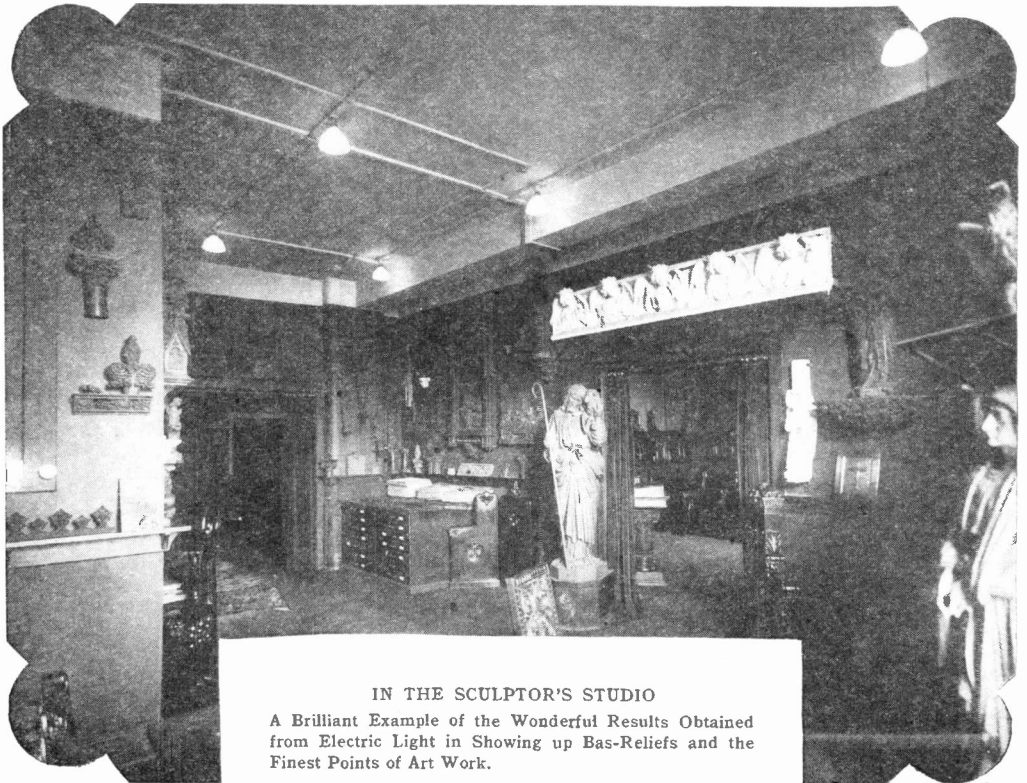
different mechanisms for utilizing the potential energy gained when the rising waters in a large tank or other vessel flow out after having been raised to a higher level by the action of the tide.

If a practical wave motor could be built it would mean the annual saving of millions of dollars that are now expended in the purchase of fuel for the generating of power. The saving it would mean to a city like New York, or any other seacoast town, would be almost incalculable; dynamos could be run by wave power electricity generated at practically no cost and the giant machines that are used in the manufacture of the commodities of commerce be turned and operated without the present enormous expenditure that goes for coal and other fuels.

All our large manufacturing industries and inland mills would naturally gravitate to the sea coast, where power could be secured for little or nothing. They could afford to sell their product cheaper. It might even lower the high cost of living.

It has been estimated by long and close observation that the number of calm days during the year when there are no waves, and the regular ocean swells are at rest, is so small as to be almost negligible.

The problem of wave motors is in no sense allied to that of the "mechanical banshee," perpetual motion, for, in the motion of the waves we have an absolute and tangible power, and we only lack a practical way in which to harness and apply that power and make it do work.



#### IN THE SCULPTOR'S STUDIO

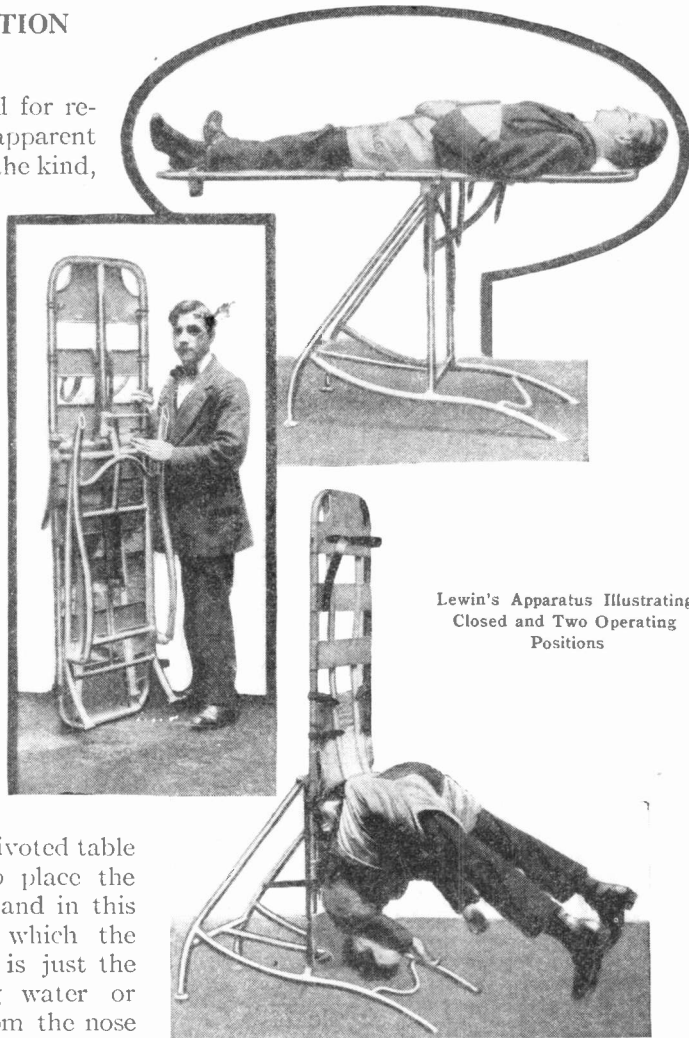
A Brilliant Example of the Wonderful Results Obtained from Electric Light in Showing up Bas-Reliefs and the Finest Points of Art Work.

## LEWIN'S RESUSCITATION APPARATUS

Prof. L. Lewin's method for resuscitating persons from apparent death is the latest idea of the kind, and is attracting attention in Germany as well as in other countries. It is intended to be used not only in cases of apparent drowning, but also for asphyxia. In Dr. Lewin's apparatus the person is put through scientifically combined movements in order to restore the breathing and also the circulation of the blood, and it has the advantage of being worked with a very small amount of power.

The man is laid upon the light and portable table device and held in position by suitable straps which are quickly put in place. Then the pivoted table is turned down so as to place the patient head downwards, and in this position the movement which the body is obliged to take is just the proper one for allowing water or other fluid to run out from the nose and mouth, not only by its own natural weight but from the fact that the lower part of the trunk is strongly compressed when in this position, so as to drive out the water.

After ten or 20 seconds in this reversed position, the table is pivoted around so as to bring the body in a slanting and nearly upright position, and here the lower internal organs now fall down so as to increase the lung space and draw air into the lungs. Then the table is reversed to the first position in order to empty the lungs as before by compressing the chest, as we have just seen, and these movements are kept up.

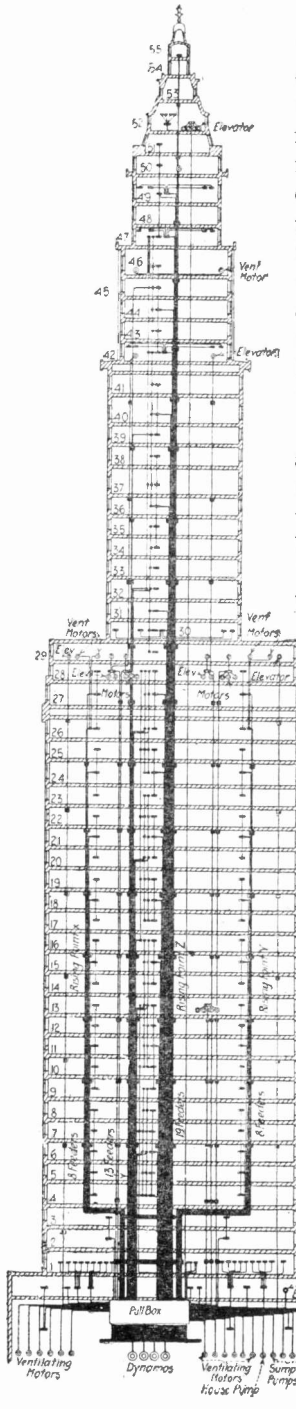


Lewin's Apparatus Illustrating Closed and Two Operating Positions

## BENZOL-ELECTRIC TRAIN FOR THE KHEDIVE

A very fine motor train of novel equipment has just been built for H. H., the Khedive of Egypt, by the Metropolitan Carriage, Wagon and Finance Co., Ltd., of Birmingham, England. The train consists of two carriages, one saloon car and one composite car, arranged to drive coupled together under a special benzol-electric system devised by the Allgemeine Elektrizitäts-Gesellschaft of Berlin. Each carriage is driven by means of one four-wheeled, two-motor bogie.

## FEEDERS OF THE WOOLWORTH BUILDING



This diagram will be of interest even to the non-technical reader, for it represents the general plan of running the electric feeders to the world's highest office building—the Woolworth Building in New York.

As will be seen, the dynamos supplying the current are located far down below street level. Then, rising above them like a mighty tree, is the main trunk line and the branching feeders—up and up to the 55th story.

It was no simple task to design and install this "vertical" trunk line which, with its feeders, supplies no less than 12,000 outlets. These are principally for lights, and the lighting load represents 450 k. w., about 590 horse-power.

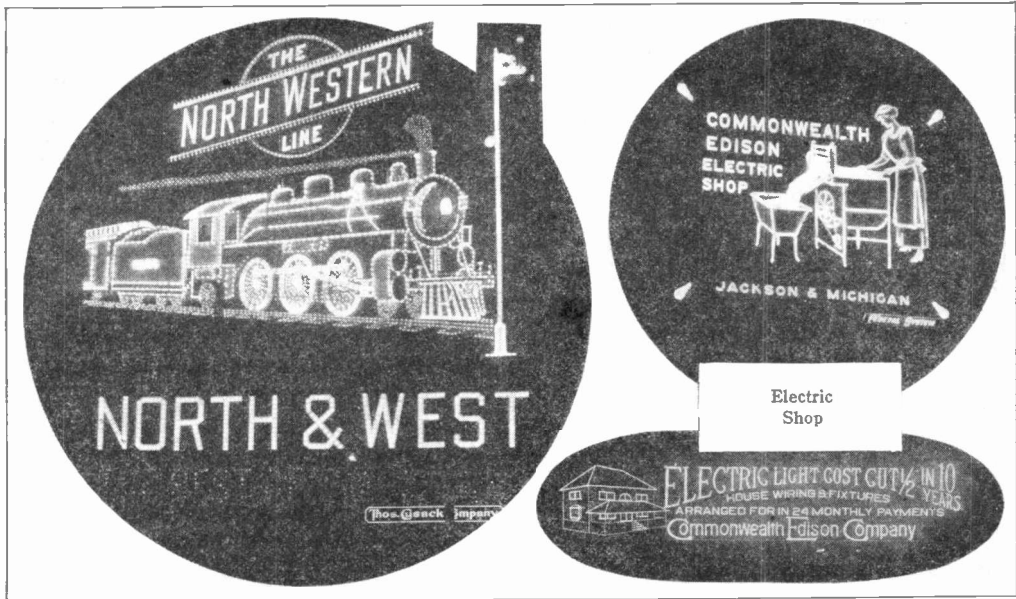
## SOME REMARKABLE ELECTRIC SIGNS

Three illustrations are given here of large and striking electric signs shown nightly in Chicago. The one with the girl at the washing machine is on top of the Commonwealth Edison Company's Market Street substation looking towards the river. The figure is 40 feet high on a structure 50 feet high and 60 feet wide. The illumination is nearly 12,000 candle-power, from 2,732 tungsten lamps with color caps and flashing effects which make the clothes to appear as passing through the wringing machine. There is also a motograph at the bottom by means of which a different inscription appears each night, the announcement moving along steadily and appearing as an endless chain of words as though on a continuous trolley.

The Harrison Street sign of the Commonwealth Edison Company as illustrated here is also another huge affair, 50 feet by 280 feet with over 3,300 lamps in it.

The locomotive sign of which an illustration is also given is, however, probably the most interesting and beautiful ever seen in Chicago. It stands on Chicago and Northwestern Railway Company property by the Rush Street bridge and is a plain advertisement of that company's speedy trains. A photograph cannot do justice to the motion effect, which may be briefly described as follows: With the semaphore or block signal set against the engine it stands with all parts motionless except the small cloud of steam and smoke issuing from the stack. Suddenly the block is raised, the red light in it changes to green, the back pressure of steam in the cylinder exhausts down by the track and every wheel shown in the picture begins to revolve. As this occurs the smoke from the stack takes a fleeting backward course over the top of the cab and tender. The lighting effect is such that the engineer practically disappears from the lower position and is seen more strongly in the cab window. It is indeed





Northwestern Engine Full Size

The Harrison Street Sign

a wonderful affair and is the admiration of all beholders, being built to full size.

The largest sign in Chicago in so far as length is concerned is that on top of the Montgomery Ward Building at Chicago Avenue bridge. The firm name appears in letters ten feet high and 700 feet long. Over 2,000 ten watt tungsten lamps are used for it. Another large and prominent sign is that on the Sears, Roebuck & Company building on the west side of the city. It is 246 feet long by four feet high and contains 500 lamps.

### AN ELECTRICAL SCARECROW

In the crowded Orient, where nine tenths of the people live a hand-to-mouth existence, the protection of the growing crops from both feathered and four footed robbers is a really serious problem, and out of necessity have grown some very ingenious contrivances. In China one may see a peasant farmer sitting quietly in the middle of his diminutive paddy patch and scaring off the rice birds by pulling a series of strings which, radiating from him like the spokes of a wheel, jangle tin cans full of stones at their

further ends. In Borneo, in places where there is running water, the Dyaks contrive to make a flexible bamboo vibrating in the current shake coconut rattles in their mango trees, the connection being made by a strand of thin liana or creeper. It remained, however, for a Yankee electrical engineer who was engaged at the hydro-electric plant in Mysore, India, to bring out something really up to date in the way of a scarecrow.

The vegetable patch upon which the several Americans at the plant in question depended for their table supply, was constantly being raided by birds and monkeys. None of these paid the least attention to ordinary types of scarecrows.

Posts about five feet in height were set at the proper strategic points and on top of these, arranged to revolve horizontally, two bladed electric fans were installed. Above these, skulls, wearing old pith sun helmets were rigged, while the posts themselves were dressed up in imitation of khaki clad, native policemen. The blades of the fan were passed through the arms of the jacket and formed the shoulders. Two small bulbs at the eyes

of each skull were arranged to wink alternately, while each revolution of the fan was made to trip a hammer which struck a gong.

The first few nights that these veritable whirling dervishes were operated they were not only successful in driving all the birds and monkeys to a distance, but in depopulating several small native villages upon which the plant depended for help as well. When the latter had been reassured, the pendulum swung the other way, and for weeks the clever Yankees were compelled to receive delegations from all the villages of the countryside begging that spinning fire devils be erected to protect their fields.

### TELEPHONE TRANSMITTER WORKS UNDER WATER

One of the illustrations shows a unique waterproof telephone transmitter, without guard or back shell, submerged in a fish globe filled with water. This transmitter was connected directly to the regular hotel telephone and the operator was requested to get a certain number in New York City. The transmitter was connected with a testing set, adjusted for use on a long distance telephone line and operated by two sets of fifteen dry cells, each set in series, and both sets connected in multiple.

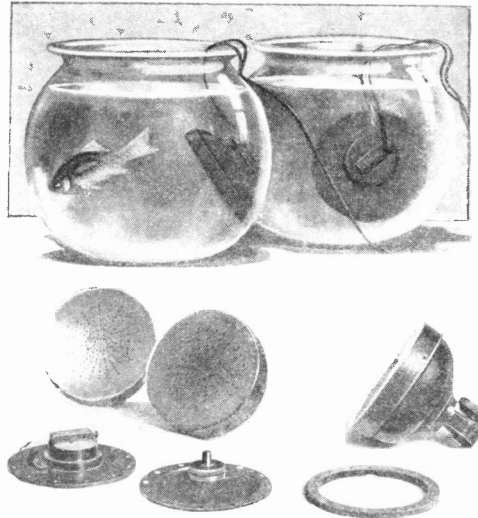
The room at the hotel was fitted with the usual telephone subscriber's set and the waterproof transmitter, through the testing set, was connected with the city telephone line.

It is stated that the Chicago operator was requested to connect with a certain office in New York and the following tests were made: Talking in an ordinary tone, six inches away from the fish globe, against the submerged transmitter, a conversation was carried on for over five minutes and New York reported that the transmission was perfectly distinct, clear and the voice heard in natural tones.

Locally, at the hotel in Chicago, a line to which a receiver was attached was

connected up and taken into an adjoining room. The ticking of a watch held against the side of the fish globe could be distinctly heard.

It is claimed that the transmitter was submerged from 3 p. m. until Thursday



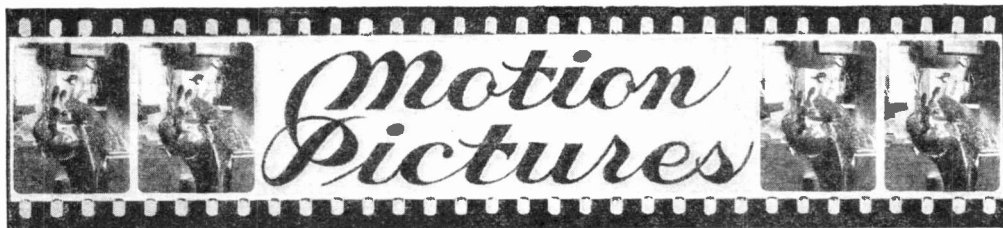
Telephone Transmitter which Works under Water

at 6 p. m., or 75 consecutive hours. The transmitter was taken back to New York and at 10 a. m. Wednesday, again submerged in a globe filled with water and has given perfect transmission at all times.

### IMITATION

Imitation is a habit. It is a habit that is quite expensive most of the time. It is a habit, too, which deteriorates the mentality; weakens, starves and cheats it. It is a habit we seldom outgrow or overcome, once it is formed.

It is imitation that keeps back the more rapid progress of electricity. Not one manufacturer imitating another manufacturer, but neighbor waiting to imitate neighbor. Waiting! Yes, waiting to imitate. Electricity and its application appeals to the reason. It seems better than anything else. But neighbor Jones uses it only for lights, or neighbor Smith is just waiting. So Brown waits to imitate. Who loses?—*The Silk Cord.*



## Filming "Hamlet" a Tremendous Undertaking

Shakespeare was not only what Ben Jonson denominates him, the

"Soul of the age,  
The applause, delight and wonder of our stage,"  
but to this hour the constant companion

served up to the multitudes, who in many cases have never before seen the great tragedy enacted.

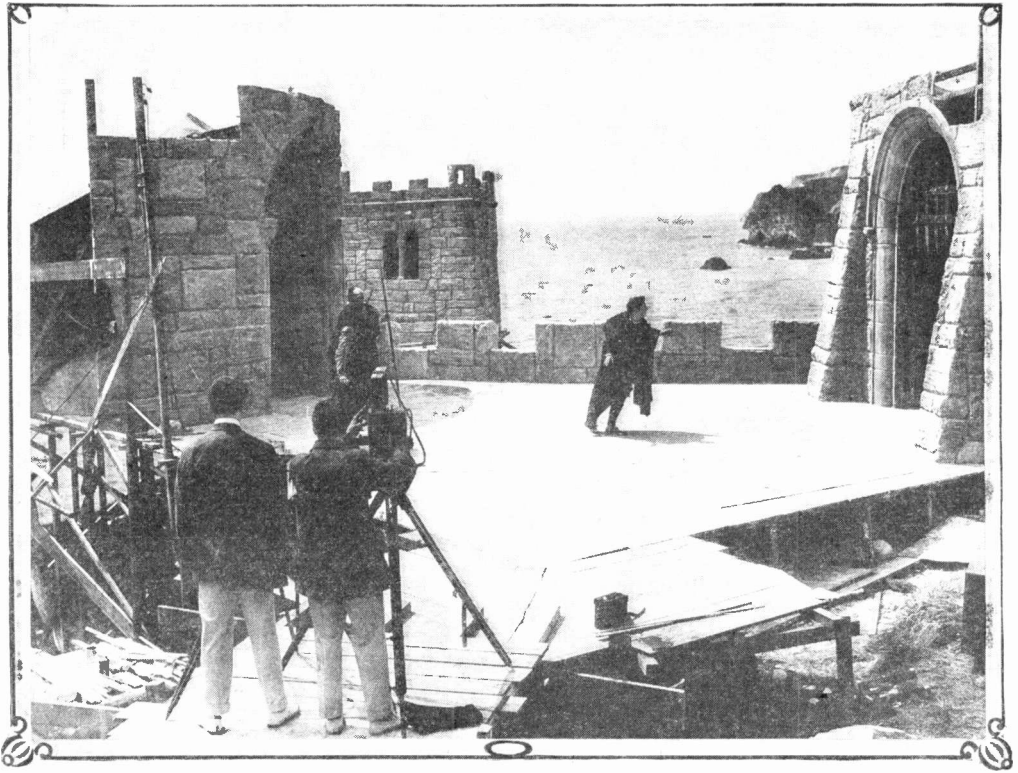
When the Gaumont Company of France undertook to film a subject of



In Making the Film for the Ghost Scene, Hamlet and the Ghost had to be Photographed Separately, Taking Their Successive Positions by Count, All Timed to the Second

of the contemplative, as well as the gay associate of the gay and the happy. And now, through the medium of motion pictures, "Hamlet," one of Shakespeare's greatest plays, is to be immortalized in film, and in the form of "canned drama"

such magnitude and power, it selected no less a personage than Sir Johnston Forbes-Robertson to enact the rôle of Hamlet, and his talented wife, Lady Forbes-Robertson, better known to theater-goers as Miss Gertrude Elliott,



A Complete Reconstruction of Elsinore Castle was Necessary

to play the part of Ophelia. Supporting the two great English stars will be the full Drury Lane Company from the Drury Lane Theater of London.

Though Messrs. Gaumont conceived the idea of filming "Hamlet" and engaged all the players who appeared in the big production, the work of photographing the scenes was turned over to Mr. Cecil Hepworth, the greatest British producer of cinematograph plays, whom they deemed fully capable of carrying through successfully this most difficult and important undertaking.

Immediately upon learning that he had been commissioned to superintend the production, Mr. Hepworth went to the British Museum to consult various authorities as to the conditions of life in Denmark at the time in which the play is laid.

He very soon found, however, that he would have to abandon the idea of

going to primary sources, as Shakespeare had so Elizabethanized the story that historical records were virtually useless in preparing an adaptation of the play. Therefore, the lines of Forbes-Robertson's own production of Hamlet were followed throughout, though of course it had to be changed tremendously in detail, for in filming the story words must all be translated into action.

In preparing the backgrounds for the various scenes, the beautiful scenery painted by Hawes Craven for Forbes-Robertson's production was used as a model for the studio sets, though in place of flat cloths Mr. Hepworth had to use solids, including many huge carved Norman columns two feet six inches in diameter.

In a dip of the cliffs of the old Dorset fishing village, at Lulworth Cove, England, with the little villages of Weymouth and Portland in the background,

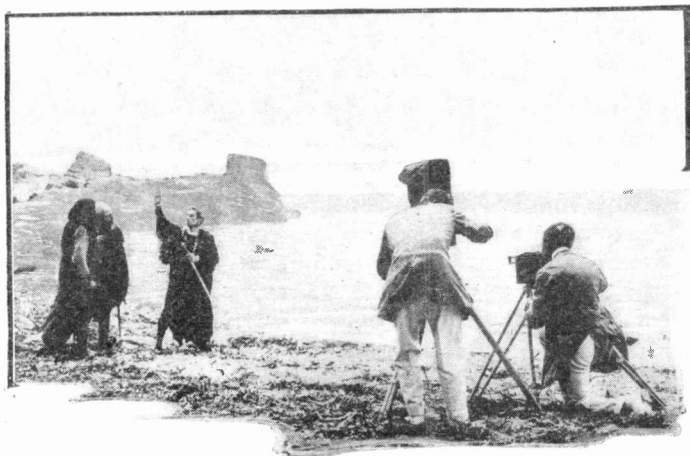
a complete reconstruction of Elsinore Castle was built up, though the site selected was so secluded that all the building materials had to be carried over a sort of rugged mountain pass. As the plaster alone weighed two tons, it is not hard to believe that this was no light matter.

Some of the other outdoor scenes were taken at Hartsbourne Manor, the residence of Miss Maxine Elliott, Lady Robertson's sister. The orchard scene was enacted in a private garden at Halliford-on-Thames where the conditions needed were found — a beautiful old apple tree, of such shape and size as would go well in the picture, overhanging a smooth lawn, such as one might expect to find in the grounds of a king's palace. Ophelia "died" in the stream at Hartsbourne Manor, where also she was "buried" — in a real grave beside a real church, specially erected. The scene in which Ophelia is seen by the Queen, gathering flowers, was taken by the side of a private lake at Walton-on-Thames, while all the interiors, of course, were produced in the extensive studios of the Hepworth Company.

Forbes-Robertson, it might have been expected, would be sadly hampered in picture work on account of the fact that he was suddenly deprived of the use of Shakespeare's words and his own magnificent voice, but having worked in two entirely different media, for it is well known that he is a painter of no mean achievement as well as one of the finest actors of the legitimate stage, he was able to quickly adapt himself to the exigencies of cinematography and to tell his story with dramatic emphasis and effect, despite the unfamiliarity of his surroundings.

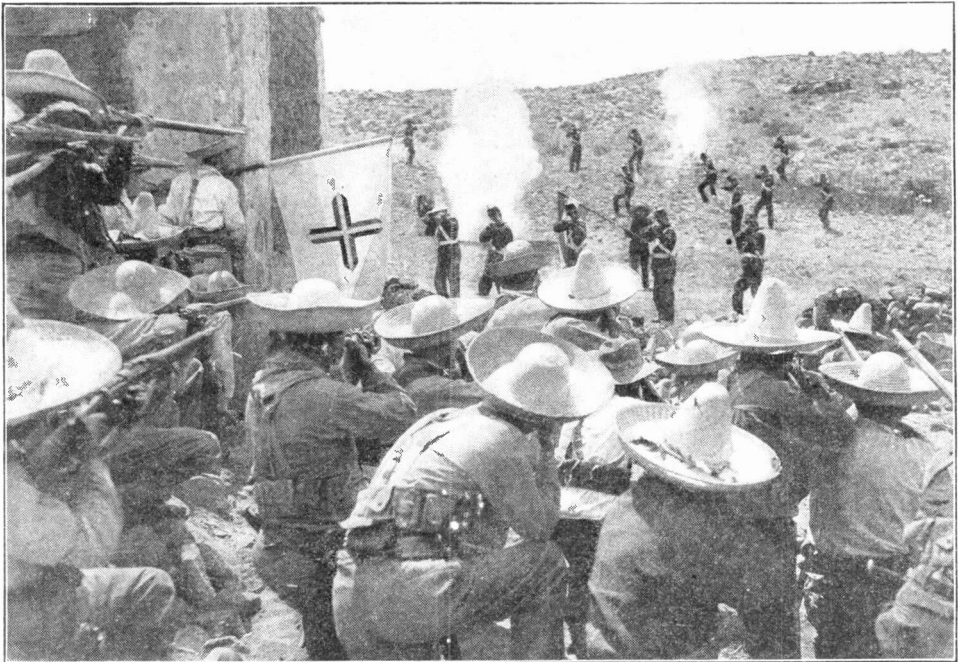
To those who are familiar with the production of motion pictures it will be sufficient to indicate some of the difficulties encountered, to say that the work included some of the most difficult trick work known to the realm of pictures, and that, not in a comfortable studio, fully equipped for it and with a set of actors trained to the work and incidentally, to the long waits which are inseparable from it, but out on the windy seashore, with people who are not used to being told what they have to do, and not used to being kept waiting for long hours.

For instance, where Forbes-Robertson sees the ghost of Hamlet's father on the ramparts of the castle at Elsinore, he had to do all the work without any visible ghost at all. He had to learn by heart that the ghost was in such-and-such



Photographing a Scene with Two Cameras

a position on such-and-such a count — for the only cues he got were the counting of the seconds as the film was turned through the camera. Then, later on, when all this scene was finished, the stage with the castle had to be transformed into a huge dark room — a cage lined entirely with black velvet — while the ghost walked over the ground to the same dismal counting. If either actor or ghost had been a second out of time, the result would have been spoiled, for Hamlet's eyes must follow the ghost in riveted



Scene for "The Clod" Taken During Actual Skirmishing Between the Federal and Revolutionary Forces in Mexico

attention wherever he goes. The result on the screen will show that the requirements of the case were carried out with absolute fidelity by everyone concerned. But it was not done the first time, nor the second.

There is one very notable advantage which the motion picture camera has over the stage, especially in portraying the drama of such a man as Forbes-Robertson, for whereas in the latter case he has of necessity to exaggerate his normal actions sufficiently to reach the most distant parts of a huge theater, when he is dealing with the camera it is only necessary that his gesture be sufficiently marked to be recorded by an instrument from ten to eleven feet away. Forbes-Robertson adapted himself to these new conditions with wonderful quickness — with intuition in fact.

In much the same way the Ophelia of Lady Robertson (Miss Gertrude Elliott) which is probably among her best rôles,

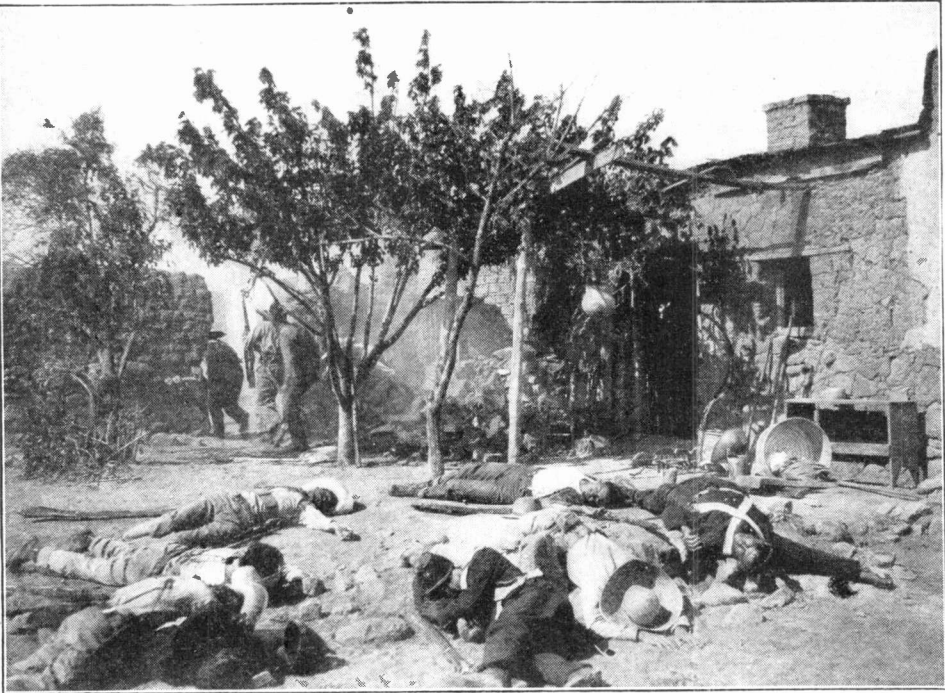
lost nothing by the interpretation of the camera. Indeed it probably gained.

#### MEXICAN REVOLUTION GIVES ATMOSPHERE TO PICTURE

In filming a two-reel drama entitled "The Clod," the Lubin Company, operating near the border line between Mexico and the United States, have taken advantage of the recent conflict between the Federal forces and the Revolutionary army in their vicinity, to incorporate several scenes of an actual battle in the picture.

The struggle between the opposing forces is therefore a real battle and not a mimic one, while the closeness of the camera to the combatants proves conclusively that, in this instance, the camera man literally took his life in his hands in his effort to secure some clear, close-up views of the battle. Bullets must have been whistling all about him,





After the Battle. This is no Posing but the Real Thing

and yet he calmly continued to turn the film through the camera, probably relying upon the poor marksmanship of the enemy to offset his daring.

the Essanay studio and they have played several games with the phosphorus ball.

### CAN NOW PLAY GOLF AT NIGHT

Being a golf fiend and being unable to play during the daytime, as his services are always in demand, "Smiling Billy" Mason of the Essanay company has decided to form a club to be known hereafter as "The Phosphorous Golf Club." Billy explains that he never gets an opportunity to play during the daytime and that on Sunday, the only day when his time is his own, the links are so crowded that it is well nigh impossible to play, so he decided that a ball painted or smeared with phosphorus could be used, and played with at night, it being seen almost as well in the dark as an ordinary golf ball is seen in the daytime. A small course was laid out by the golf fiends at

### FILMS AID PURE MILK CRUSADE

A moving picture film showing the dangers of an impure milk supply has been exhibited with such good effect in Germany that health officials at once became more rigorous in their enforcement of the pure food regulations. Their campaign against negligent dairymen was conducted with such energy, in fact, that the milkmen finally presented a petition to the proper authorities, asking for the withdrawal of this particular film subject. In reply to this action, Professor Schlossmann, of the Dusseldorf Municipal Hospital, who was responsible for the film, proved that it had led to the trial and conviction of dairymen for violation of the pure food regulations. The exhibition of the film was not discontinued.

# The Hermit of Lonely Gulch

BY EDNA FRANCES



**F**OR full fifteen years, Tom Wilson, the hermit of Lonely Gulch, had lived in his secluded little cabin, miles from any other human habitation, without seeing or conversing with any of his fellow men. Not one of the residents of Lonely Gulch had seen the old man in all that time. Years and years ago, the old hermit had arranged with Bill Scraggs, the driver of the stage coach which brought in the mail and such passengers as might be collected from Attelboro, the nearest railway station to the Gulch, to do his shopping for him.

Accordingly, Bill would scramble clumsily down from his high seat on the coach, when he came in sight of a certain old oak tree, and underneath a twisted root that curled its way into the soil, would find a note from the old hermit, ordering certain food and necessities. On the return trip, Bill would deposit the groceries, clothing, or other articles ordered, near the tree and old Tom would pick them up at his leisure.

The gossips of the Gulch varied widely as to the reasons for old Tom's seclusion, some imagining that he had committed a crime for which he was sought by the minions of the law, while others maintained that he had been disappointed in love and was endeavoring to stifle his grief and disappointment by a life of loneliness.

One day a stranger happened into the Gulch. He was an erect and sturdily built man of some 30 years of age; his hair was clipped rather tight to his head and his face wore a peculiar pallor, as well it might, for Frank Rogers had served the last ten years of his life in a prison cell and had made his way into Lonely Gulch while seeking to escape the sleuths, who had been instantly put on his trail following a sensational escape from the

penitentiary in which he had been confined.

While making his way through the rocky canyon, Rogers came upon the camp of the hermit and discovered old Tom Wilson to be badly in need of assistance. The old man had contracted pneumonia from a long exposure to the elements and at the last had been too ill to even attempt to go after the medicine which he had ordered recently by means of the system of notes he left beneath the roots of the old oak tree. Rogers quickly realized the serious condition of the old man and hastened to assure him that he would go for the medicine.

Making his way through the brush and tangled vines, Rogers found the tree at last, and there, beneath the concealment of the root, was the bottle of medicine, left there by faithful Bill Scraggs. Upon his return to the Wilson cabin, Rogers found the old man cold and still in death. Awed and surprised by this sudden death, Rogers reverently buried the old hermit in a grave he dug with difficulty in the side of the Gulch. Returning once more to the cabin which had sheltered the old hermit for so many years, Rogers decided that he could do no better than to assume the place of the aged hermit. Wilson had told him he had seen nobody for more than fifteen years, so Rogers felt perfectly safe in assuming to be the hermit and felt reasonably sure, also, that the officers of the law would never suspect the lonely man of the Gulch of being the man they were seeking, since residents of the Gulch would tell them the hermit had lived in the hills for more than fifteen years.

The months and even the years passed quickly by. Three years later the tall, bronzed, thickly bearded man who moved about the cabin would never have been recognized as the pallid, frightened ex-convict who had come into the Gulch in search of refuge from his pursuers.

Rogers had, all these years, continued the habits of the old hermit and Bill Scraggs had continued to bring in the necessary supplies, leaving them always beneath the roots of the old tree.

One morning when Rogers came down to the tree to pick up some things ordered the day previous, he was astonished to find a letter there addressed to "Tom Wilson, Lonely Gulch." Though Rogers knew the penalty which Uncle Sam imposes for opening mail belonging to someone else, he hesitated only a moment and then ran his finger along the flap of the envelope.



"Rogers Grew Angry Over Her Defiance"

Imagine his surprise upon discovering the letter to be addressed "Dear father," and signed "Your loving daughter, Jean," for Rogers had never suspected that Wilson had a daughter. The letter explained that just before her mother died the girl had been informed of the quarrel which had separated her parents, and



"Rogers Met Her with a Serious Face"

told where her father might be found. Being now alone in the world, she had decided to come and live with her father, and stated that she would arrive a day or two after the letter was delivered.

Staggered by the news which the letter contained, Rogers sat all day in front of the cabin in a kind of daze. He scarcely knew what to do. The girl would arrive before she could be stopped, and he would have to tell her the sad news of her father's death, three years before, but that would necessitate his also revealing his own identity. Rogers had been happy in the little cabin, in this wonder spot of nature, the grandeur of which none but the hermit and himself had realized, and he dreaded having to reveal his identity and thus to lose it all.

The following morning he met Jean Wilson, when she arrived on the stage and took her back to the little cabin in the Gulch. She believed, of course, that

he was her father and was so happy at seeing him that Rogers hadn't the heart to tell her the truth.

The coming of Jean changed his life and habits, and as the months went by he began once more to mingle with his fellow men. Villagers in Lonely Gulch soon came to know and to like Rogers whom, of course, they called Tom Wilson and life took on more rosy tints as he renewed acquaintanceship with the world.

Association with others, and the inner knowledge of the deception which he was daily practicing, led Rogers to realize his position more keenly. Constant association with Jean resulted in his beginning to love her, not as a father



"Her Anger Gave Way to a Far Different Emotion"

loves a daughter, but as a lover cares for his sweetheart. Rogers discovered, however, that Jean's heart was already given to Bert Craven, one of the village boys. He had happened upon Jean and Bert beneath an old oak tree that bordered a beautiful stream which flowed through

the Gulch and the lovelight in Jean's eyes had told its story to her pseudo father.

Rogers came to know, some weeks later, that Craven was a shiftless sort of fellow with an undue fondness for liquor and a temper that would some day lead him into trouble. Though he knew his objection to Craven as a son-in-law would break Jean's heart, he felt it necessary to break up the growing attachment between them, ere it was too late.

Accordingly, one morning when Jean came merrily up to the cabin with a mess of fish she had hooked in the stream, Rogers met her with a serious face and soon led the conversation round to a discussion of young Craven. Jean staunchly defended her sweetheart, and when Rogers grew angry over her defiance of his wishes and swore he would settle with Craven in no uncertain manner, Jean fell upon her knees and begged her supposed father not to harm her lover.

"But, Jean, girl, he's unfit for the likes of you!" thundered Rogers. "He's a drunken reprobate, totally unworthy the love of a pure, sweet girl like my Jean."

"Daddy, dear, you are — you must be mistaken," responded Jean. "Surely, I know him better than you possibly can, and I tell you these stories you have listened to are vile falsehoods. He's not the kind of a man you'd have me believe. I love him, daddy, I love him. Please, please, I beg of you, don't harm him. You'll only break my heart."

Rogers hesitated, in spite of what he knew of Craven, for he hated to cause even a moment's unhappiness to the girl who looked upon him as her father, and so matters drifted along for a week or two.

When, therefore, word came to the little cabin, less than a month later, that Craven had been killed during a saloon brawl, Jean came to realize that her father had known best, and her grief was not a lasting one, for she realized that she had been duped. Her disillusionment was now complete, and the knowledge that her father had been right, drew

father and daughter even nearer together than they had ever been before.

Not many weeks thereafter Rogers, while on an errand in the Gulch, discovered a newspaper, several days old, which contained a personal that caught his eye at once. It stated that Frank Rogers, convicted of murder and sentenced to life imprisonment, had been exonerated of the charge against him, as the real culprit had confessed on his death bed. Information was wanted as to the whereabouts of Frank Rogers.

The news brought unbounded joy to Rogers. His name was clear once more. There was no longer any reason for his masquerading as Tom Wilson, the old hermit. In his joy and excitement he showed the paper to Jean, upon his return to the cabin, and for a moment was puzzled because she did not understand. Gradually, it dawned upon him that Jean still believed him to be her father.

Then in a hesitating and shamefaced fashioned, he mumbled out his story. He told her everything. Told her that he had once been a convict. Explained how he had escaped from prison. Told of his finding her father and of his attempt to save his life. Related the tale of her coming, months ago, and how he had meant, then, to tell her the truth, but had been unable to do so when he perceived her joy at once more being with the man she thought her father.

As Rogers slowly unfolded his story, Jean was swept by a storm of emotions. First, she was bewildered, but when she came to know and comprehend the full deception of which she had been the victim, she was angry. He had permitted her to live with him in the cabin all these months as his daughter and then had attempted to dictate to her as only a father might — he, a total stranger. Her temper rose to the boiling point and she was swept by a perfect torrent of indignation. A moment later, though, she recalled how good and kind he had been to her — how he had attempted to secure for her such little comforts as were

obtainable in the little village, how vigorously he had protested against her affair with Bert Craven and how in the end his judgment had been proven to be right.

As Jean recalled all these things, her



"Beside the Stone Marked Grave"

anger gave way to another and far different emotion. Certainly, she admitted to herself, no real father could have been more loving and devoted than he had been. As full appreciation of his kindness came to her, the last vestige of her anger turned to admiration, and with tears shining in her eyes she thanked him for telling her the truth, told him something of her feelings and then asked to be taken to her father's grave.

Some hours later, as they knelt there on the hillside, beside the stone marked grave, Rogers and she came to an even better understanding than had existed before. Before they went down the hillside, arm in arm, he had told her of his love, and received from her a promise to become his wife.

# The Scott Expedition in Films

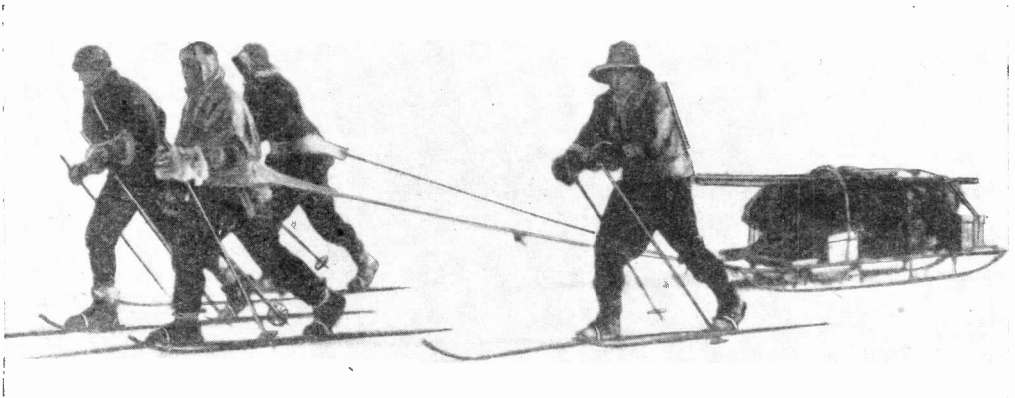


THE power and real value of motion pictures as a record of historic events and exploration in the far corners of the earth, has probably never been better exemplified than by the series of films now being exhibited in this country under the title "The Undying Story of Captain Scott and Animal Life in the Antarctic."

Mr Herbert G. Ponting, Fellow of the Royal Geographical Society of London, England, who was the official artist of the ill-fated Scott polar expedition, took all of the pictures, and, considering the tremendous difficulties and the bad light

tion, skua gulls stealing penguin eggs, penguin chicks hatching, the advance on the pole by Captain Scott and his comrades, and others too numerous to mention in a brief article, are animated documents far more entertaining and fascinating than the best so-called "feature film" released by any film manufacturer. The Scott films are real slices out of the lives of the hardy explorers and give the public for the first time a faint conception of the hardships they had to undergo and the perils they encountered.

Mr. Ponting was able to obtain many close-up pictures of the various birds and animals which inhabit the Antarctic



The Long, Dreary March to the South Pole

conditions under which he worked, secured some truly remarkable negatives. In all, more than 25,000 feet of film and over 2,000 photographic negatives were brought back, though only about 5,000 feet of film is being exhibited to the public.

The films present for the first time, and in actual motion, many unique traits of animal life in the Antarctic and reveal many facts hitherto unknown to naturalists and scientists. Such scenes as the Killer whales chasing seals, Weddell seals sawing the ice with their teeth, Mt. Erebus, the great polar volcano in erup-

tion, for the reason that the wild creatures there had never before seen a human being and having no fear of a man, permitted the photographer to approach them and even to take pictures within a few feet of the subject.

"Difficulties?" said Mr. Ponting, upon his return, "of course there were many of them. Compared with polar photography everything else is easy. It is not alone the difficulty of the light. That is soon mastered. The temperature is where the most of the trouble comes from. If you take off your glove and put your hand near the lens, instantly the lens is

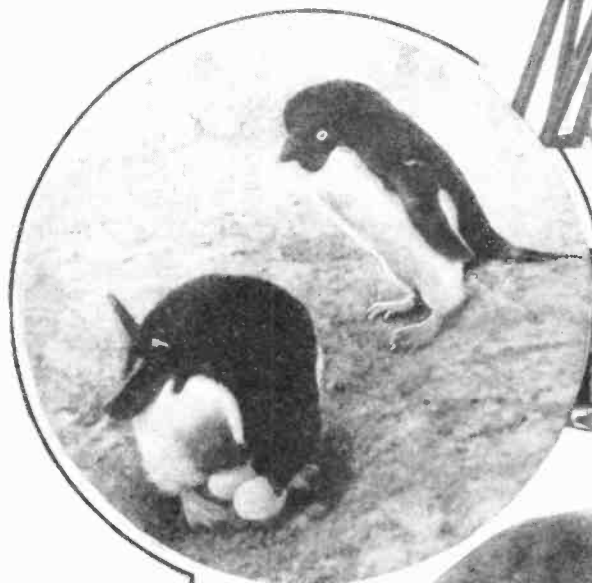


covered with a film of ice that no mere rubbing will remove.

"Sometimes moisture — condensing into the finest particles of ice — will get inside the lens — then you are through. A great danger anent the camera is the brasswork. If, by accident, you touch with your flesh any portion of the brass on the apparatus it will burn you like a red-hot iron. On one occasion the tip of my tongue accidentally came in contact with some of the brasswork and instantly froze there. The shock was so great that I went over backwards, and when I recovered I found that I had lost the tip of my tongue, which remained frozen to the camera.

"I recall one instance when I

The Strangely Human Penguins Are the Comedians of the Antarctic



Making Ready for the Dash to the Pole. Note the Cyclometer Wheel Behind the Sledge Which Measures the Distance



Mr. Ponting the Photographer of This Expedition and One of the Motion Picture Cameras

floe up for hundreds of yards. It was all I could do, with the assistance of my comrades, to regain the safety of firm ice. Once, while trying to film a pair of skua gulls at close range, I was attacked by the parent birds and one of them, swooping down, struck me such a blow in the eye with its wing that for an hour I suffered the most acute pain and at first feared I was most certainly going to lose the sight in that eye.

"Of all the scenes photographed in the Antarctic that of Mt. Erebus in eruption was the most difficult to secure. It would have been folly to attempt to drag the heavy picture apparatus up the volcano's side, but by a stroke of good luck and through the special telephoto-lens, taken along especially to film events at a distance, a remarkably clear picture was obtained of this southern volcano in action.

"On one occasion," said Mr. Ponting, "when endeavoring to induce a seal, weighing perhaps a half a ton, to pose for a picture, it suddenly plunged toward me and its teeth went through my clothing and drew blood. This, I believe, is the only instance on record of a Weddell seal ever having bitten a man. I certainly invited the trouble though and probably deserved what I got."

The films follow Captain Scott and his gallant companions through all their most interesting and perilous adventures, show their means of transportation, the motor sledges which were first tried out on this expedition, the various scientists of the expedition at their daily tasks, the great ice barriers they had to cross, their camp equipment and scenes taken in the same tent in which the little party of four were later discovered, cold in death, within but eleven miles of a well stocked supply depot.

Certainly, if the art of cinematography never accomplishes anything more wonderful, it will have achieved a triumph in this series of pictures, alone, sufficient to place it in the very front rank of the world's greatest inventions.

## UNIQUE AND INTERESTING PICTURE

The Gaumont Company recently released a film entitled "Palmistry," which is a distinct novelty and interesting throughout, for the pictures give the story of palmistry from its earliest known beginnings, showing how it originated in India, when certain priests tried to interpret Fate from the markings on the palm. Later these palmist priests were driven from their temples and took refuge in Egypt, where they formed wandering tribes, afterwards called Gypsies (from "Egyptians"), who read hands and predicted the future.

A very ingenious arrangement is shown, by which hands may be read, a model being exhibited in conjunction with a photographed hand, lines tracing themselves out on the former, which indicate the various stages in a man's life. Different types of hands are included — hands with square fingers which indicate method, discipline, common sense; certain types of pointed fingers which indicate imagination, poetry, frivolity; and several other types are given, together with full explanations in each case.

All the lines of the hand are examined in turn, and the film ends with a representation of a lucky hand. The clearness with which everything is shown and the originality of the idea will go a long way towards making this film a popular one.

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## STAGE SUCCESSES TO BE FILMED

Motion picture fans the country over will be delighted over the fact that within the last few weeks, affiliations have been made between the Lieblers and the Vitagraph Company, Klaw and Erlanger and the Biograph Company, and Augustus Thomas and the All Star Feature Corporation, as a result of which all the legitimate stage successes controlled by the Lieblers, Klaw and Erlanger and Augustus Thomas will be filmed.

## THE GILLESPIE ESTATE FILMED

Opportunity was recently afforded of taking all the scenes of a two-reel production in and about the beautiful Gillespie



Scene on the Beautiful Gillespie Estate Near Santa Barbara

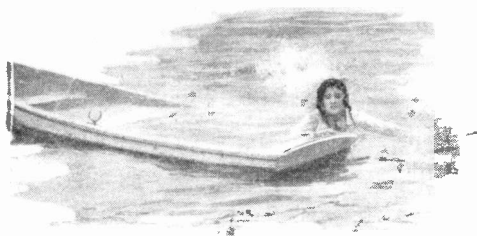
estate, located near Santa Barbara, Calif. Mr. Gillespie, who is a California millionaire of note, is the owner of one of the most lavishly beautiful homes in the Golden State, and the residence of palace-like splendor, the private swimming pools, the marble fountains and handsome bits of landscape gardening were all used to give "atmosphere" to the American film in which they are incorporated. Though other film manufacturers have occasionally been given carte blanche in taking pictures in the grounds of other American millionaires, it is rarely indeed that more beautiful results have been obtained. The illustration herewith gives some idea of the effects which were obtained. It is taken on the staircase leading down to one of the private swimming pools.

## ENGLISHMEN ANALYZE THE POLO GAME

Lovers of sport the world over were delighted with the recent topical film released by the Edison Company, in which almost the entire play of the recent International Polo Match was filmed. Thus, by means of motion photography, the thousands who are interested in the exciting sport of polo, but who were unable to be actually present at the recent match between teams representing England and America, can see on the screen all the exciting plays chronicled by the newspapers. In England, where the film was also released, it is attracting a great deal of attention, as the English public is being shown in exactly what features of the game their representatives were outplayed.

## PUZZLE — FIND ALAN HALE

While playing a scene in "The Silly Sex," one of the recent Reliance releases, Rosemary Theby, leading woman of the company, had to row out on Long Island Sound and allow her small boat to be swamped while she floundered about in the water calling for help. Of course, the director and camera men were close at hand in a launch, but the water was deep and very cold and the expression of



Her Left Hand on Mr. Hale's Head

alarm on Miss Theby's face is very far from being studied. In fact Alan Hale, the leading man, had to go to her aid at the eleventh hour and was swimming around just beneath the surface.

### PAINTING REPRODUCED IN FILMS

In connection with the forthcoming Edison picture, entitled "Keepers of the Flock," which was made near Wallingford, England, it is interesting to note that one of the scenes, a reproduction of which appears herewith, is almost an exact reproduction of Luke Filde's well-known painting "The Village Wedding."

### "PASSED BY THE NATIONAL 'BOARD OF CENSORSHIP'"

You have probably seen the above words thrown on a motion picture screen hundreds, if not thousands of times, but do you know what they really mean? Do you know what the National Board of Censorship is, who it is composed of, how it became the power in the film world that it is, and why the manufacturers of



"Keepers of the Flock." Remarkable Setting to Reproduce with Fidelity Luke Filde's Well Known Painting

As it happens, the artist painted the picture on almost this very spot, in Wallingford, in 1861, and Charles Brabin, Edison director, was assisted in arranging his group of players by some of the natives who actually posed for the original picture, more than 50 years ago. In fact, the old gentleman seen in the foreground, to the left of the scene shown on this page, appeared both in the original painting and in the modern photoplay. The two characters coming down the path are Marc MacDermott and Miriam Nesbitt, leading players of the Edison company sent to England some months ago.

the silent dramas that you see on the screen voluntarily submit their product to this board before it is shown to the public, and if, in the board's opinion, the film subject is injurious or detrimental to the public morals the subject is voluntarily withdrawn, even though thousands of dollars may have been expended in filming that particular subject?

Right at the outset the question may arise why there is a need for censorship of films any more than there is need for a censorship of plays or of newspapers, and the answer can be found in the mere statement of the fact that a person can select the drama he wishes to attend, or

the paper he wishes to read, but frequently attends a moving picture theater without any idea of the pictures which he will be shown. Consequently some agency must guard the spectator, and particularly so in the case of the child.

Back in 1909, at the time when Mayor George McClellan of New York City issued a blanket order revoking the licenses of New York picture theaters because, in those prejudiced days, fanatical people regarded the films as agents of the devil, the National Board of Censorship came into existence. The exhibitors of New York City were pretty well organized and went to the People's Institute for advice and aid. That organization, which had appreciated the possibilities of the films from the very first, offered to have some of its committees pass upon and censor the pictures if the exhibitors would agree to bind themselves to the decisions of the censors. Next the matter was taken up with the film manufacturers—both licensed and independent groups—and their hearty co-operation was obtained. Arrangements were made for the members of the censorship committee to view the films long before they were shown in the theaters, and whatever pictures were rejected were either pruned so as to remove the objectionable features, or else discarded altogether. Public opinion immediately endorsed the action of the censors, and it having been found that the plan worked so well in New York City an effort was made to have it national in its scope, and to-day the films passed by the National Board are passed almost without exception by the authorities of every state or city in the union.

A general committee of the National Board has control of matters relating to the passing of films, and this committee numbers seventeen, of whom eleven are delegates from New York civic agencies and the remainder representative citizens. Under this committee is a subcommittee numbering 125 and divided into branch committees, each with a chairman.

While the manufacturers of films now contribute from 60 to 90 per cent of the expenditures, the people who actually vote on the pictures receive no salary, and no one commercially interested in the pictures can be a member of the Board.

The board does not attempt to judge the art of a picture but passes solely upon the moral side of a production. Historical, geographical or scientific accuracy is not considered. All representation of crime is not forbidden. It is not with the depiction of crime that the board concerns itself but with the moral effect of discouraging or encouraging criminality. It aims against gruesomeness as well as a detailed way of showing how crime is committed. Close attention is given to arson and poisoning—which might be suggestive to the youthful mind—and the act of suicide is rarely permitted, although it is occasionally suggested.

Each day the films are passed upon by the branch committees, and if any member objects to certain details in the film the subject is taken up by the general committee. It sometimes requires more than one meeting to reach a decision. The manufacturer or owner of the film is notified of the result of the board's ballot and either makes satisfactory eliminations from the film or altogether withdraws it. The decision of the board is almost always final and rarely indeed does a manufacturer attempt to release a film subject that has been condemned by the National Board of Censorship.

Among the well-known names included in the membership of the advisory committee of the board are those of Lyman Abbott, Felix Adler, Andrew Carnegie, Samuel Gompers, Jacob A. Riis, and Oscar S. Strauss.

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James K. Hackett is being filmed in the person of Jean Valjean, the convict, in "The Bishop's Candlesticks." The picture is being made under the personal direction of Mr. Hackett and he will be supported by a specially selected company.



### KATHLYN WILLIAMS

Kathlyn Williams, "the unafraid," has made name and fame for herself in the portrayal of daring roles for the Selig Company. Possessing brains, beauty and bravery she quickly rose to be leading woman of the company, and no characterization has been too fraught with danger for her to attempt. In fact, she has largely, alone, been responsible for the success of the series of animal pictures put out by the company, in many of which she has taken her life in her hands. Ten years of legitimate stage work and some months with the Biograph Company preceded her work for Selig.



### JOHN BUNNY

Probably no face in all the motion picture world is better known than that of John Bunny, character comedian of the Vitagraph Company. Mr. Bunny has in the past supported, on the stage, such stars as Sol Smith Russell, Maud Adams and Roland Reed. He was manager of the Grand Opera House at Salt Lake City for several seasons, has played in "A Midsummer Night's Dream," "Tom Jones," "Fluffy Ruffles," "Old Dutch," and other musical comedies. In pictures he will probably be remembered longest in the role he created in "Pickwick Papers," which was produced in England.



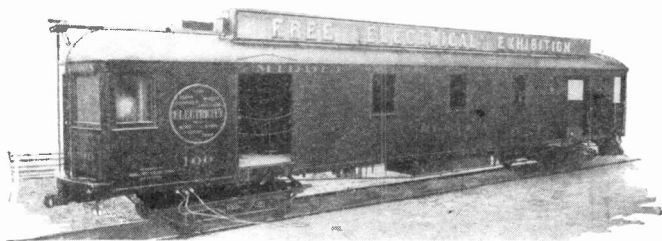


## "PRESS AGENT" CAR OF AN ELECTRIC COMPANY

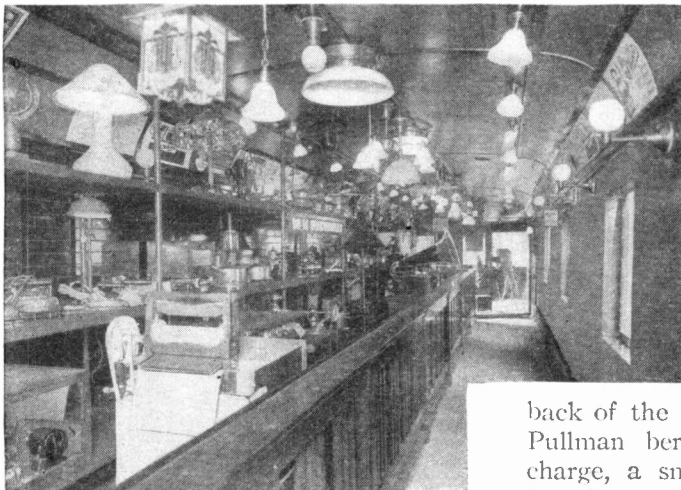
There is touring the United States at this time a very remarkable and quite unique railway car. It is known as the "Electra" and is in point of fact an electrical exposition on wheels. The car, 60 feet long, and which was specially manufactured and fitted up for the Middle West Utilities Company, is attached to passenger trains and makes stops of a week or several days at the points served by the subsidiary companies of the Middle West company. When it

There is within a complete switchboard arranged for connections with the local electrical supply station.

The interior, handsomely paneled in wood, has a long aisle at one side down which the public passes while inspecting the display of electrical appliances and devices arranged systematically on counters and shelves. Thus the first section is



"Press Agent" Car and Its Display of Labor Saving Devices



devoted to kitchen and household conveniences, the next to the dining room and parlor, the next to farm electrical appliances, the next to all manner of lamps and so on. There is even a moving picture outfit and a phonograph.

At the observation end back of the entrance there is a regular Pullman berth for those traveling in charge, a small office and ample cupboard room for clothes and the very complete supply of literature carried along. This is to be distributed in the various towns and villages at which the car stops.

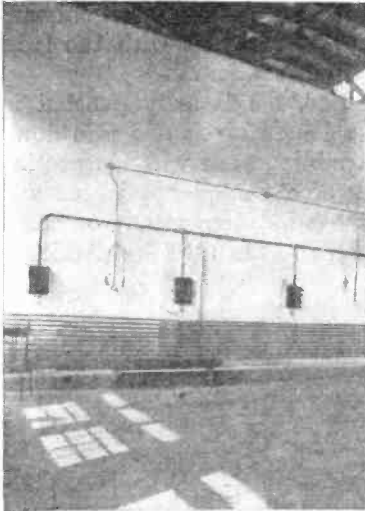
The car is in charge of Mr. F. H. Soden and was built from plans made by him and Mr. Hart of the Middle West Utilities Company.

left Chicago July 4, last, the first objective point was Marshall, Ia.; from there it was to go to Lexington, Ky., and so from place to place as might seem expedient. It will eventually go as far east as Augusta, Maine.

At the top and running along both sides, for the entire length is a huge sign "Do It Electrically" which forms a kind of flap, lifted up at night so as to display a blazing electric sign. At each stopping place a minor sign goes up in the middle underneath the large one giving the name of the subsidiary company supplying the particular locality.

On July 4 on Seventh Street, between E and F streets, N. W., Washington, D. C., there was unveiled a tablet marking the site of the first public telegraph office.

# THE PASSING

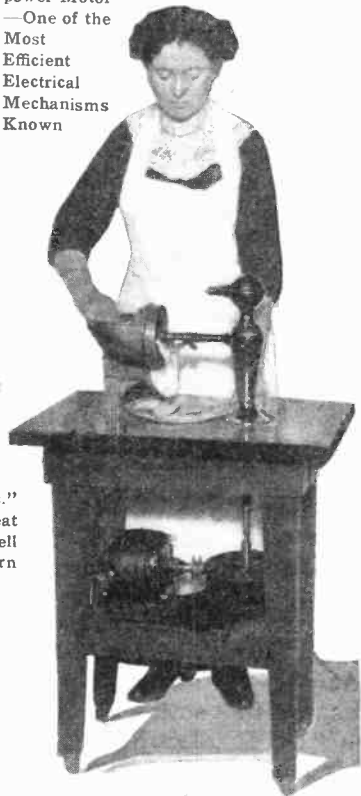


The Modern Garage is Provided with Rows of Charging Stations for Electrics

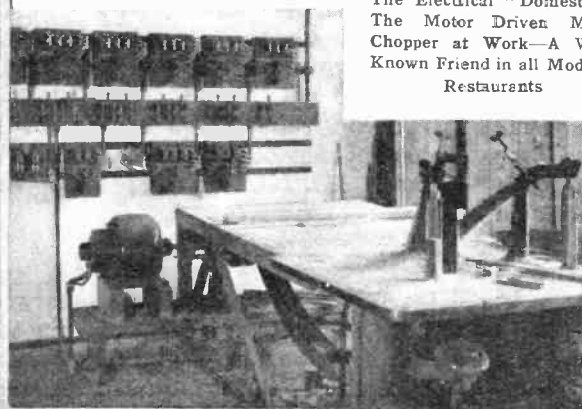


A Self Propelling Floor Surface Smoother —showing Saw-dust Bag and Five Horse-power Motor

—One of the Most Efficient Electrical Mechanisms Known

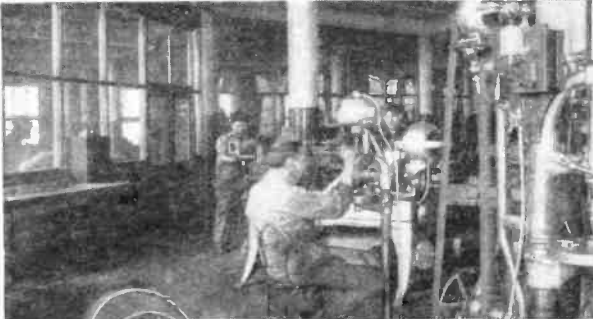


The Electrical "Domestic." The Motor Driven Meat Chopper at Work—A Well Known Friend in all Modern Restaurants

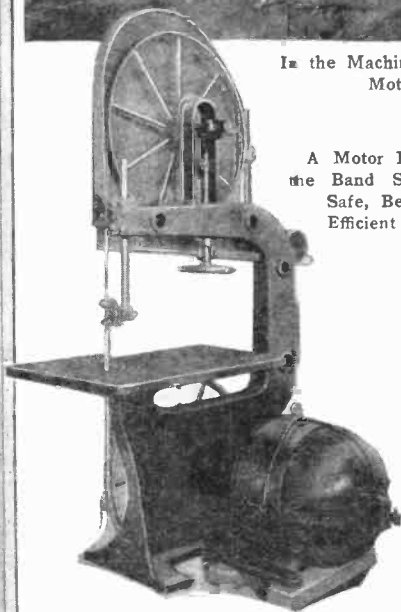


Corner in a Wood Working Establishment where Motors, the Ideal Power, are Used

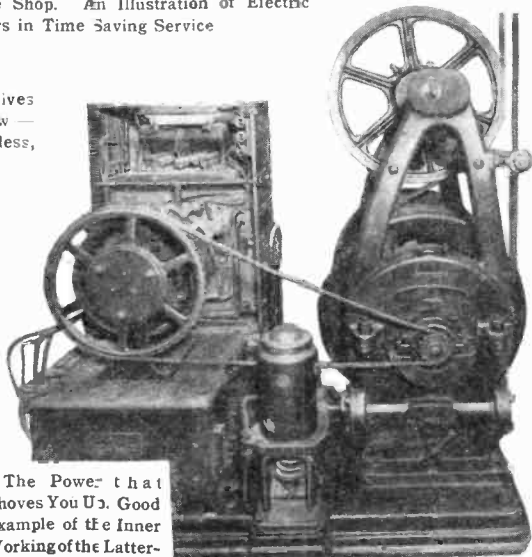
# ELECTRICAL SHOW.



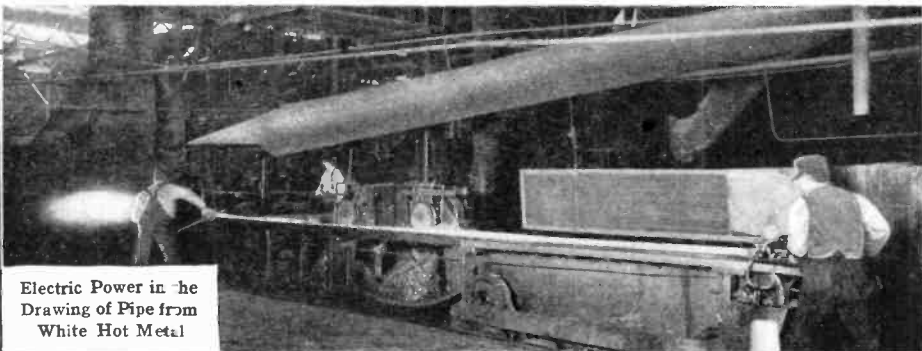
In the Machine Shop. An Illustration of Electric Motors in Time Saving Service



A Motor Drives the Band Saw — Safe, Beltless, Efficient



The Power that Shoves You Up. Good Example of the Inner Working of the Latter-Day Electric Elevator

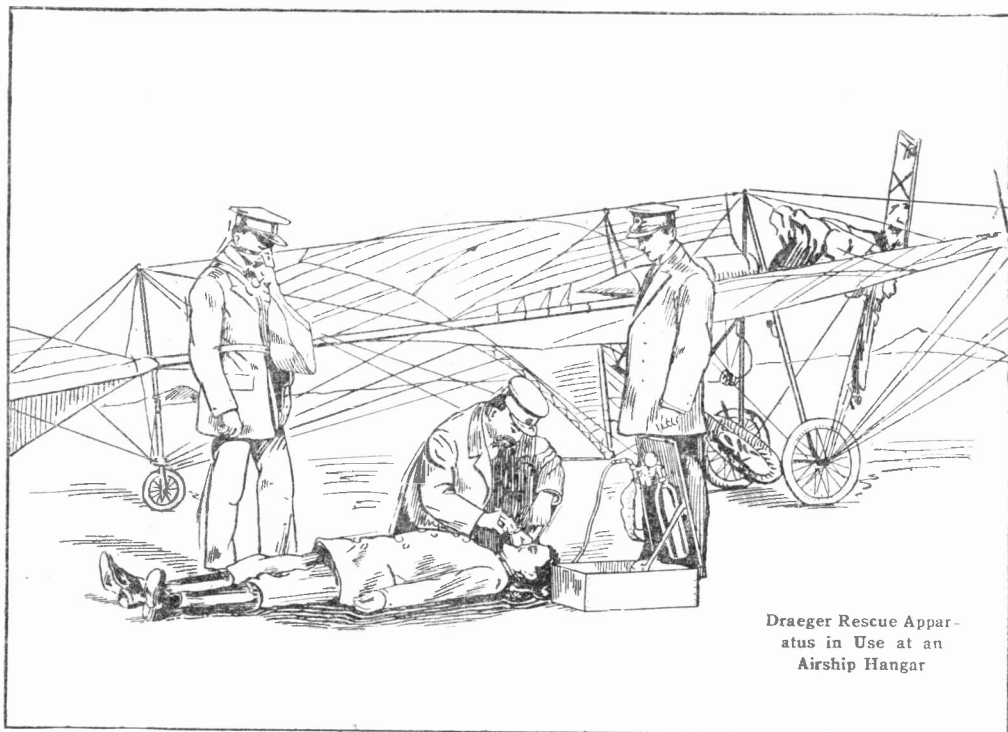


Electric Power in the Drawing of Pipe from White Hot Metal

## OXYGEN IN AVIATION

Artificial oxygen respiration was used by Tissandier, Sivel and Crocé-Spinelli, during the fatal trip of the "Zenith" on April 15, 1875, to obviate the heavy physical and mental disturbances produced by oxygen deficiency. The industry of oxygen generation was then

altitudes is based on an automatic regulation of the oxygen supply by a suction and pressure nozzle and on the absorption of the exhaled carbonic acid by a potash cartridge. The regenerating apparatus supplies 45 cubic inches of oxygen per minute, absorbing the exhaled carbonic



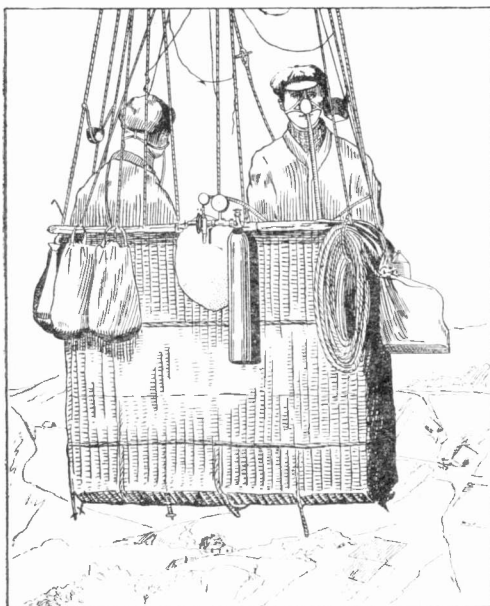
Draeger Rescue Apparatus in Use at an Airship Hangar

still at the very beginning of its development and the problem of compressed gas accumulation was as yet unsolved. The "Zenith" had been equipped with three oxygen balloons, which, however, at the altitude of 26,000 feet proved unable to protect Sivel and Crocé-Spinelli against absolute oxygen starvation, while Tissandier remained deaf for life. It was not before oxygen compressed in steel cylinders to a tension of 150 atmospheres was brought on the market that oxygen respiration became a reliable and helpful adjunct of aerial navigation.

Draeger's self contained breathing apparatus for aerial navigation at high

acid. It will work for fully six hours, while the aeronaut himself may be relatively passive. The apparatus warrants a perfect utilization of the available oxygen supply, the air tight nose mask preventing any loss of gas. In fact, any oxygen remaining unabsorbed by the lungs returns into the apparatus in order there to be freed from the secretions of respiration and thus to be again rendered available for the airman.

Another apparatus designed for aerial navigation, but without air regeneration, is constructed in two types, for accidental voyages at great heights (with an oxygen provision of six cubic feet) and for volun-



Oxygen Apparatus without Regenerator, for Balloonists

tary trips at great altitudes (with an oxygen provision of up to 70 cubic feet) respectively. A regulating screw in the reduction valve allows the oxygen supply to be adapted to any altitude. The oxygen current at first flows into an accumulation bag, in order thence to be drawn in, through a flexible aluminium tube which in no way interferes with the movements of the aeronaut. Any surplus air is derived from the atmosphere through a small hole in the mask, thus adding an average of 40 per cent oxygen to the air available for breathing. Any residual oxygen and any secretions of exhalation are allowed to escape into the atmosphere.

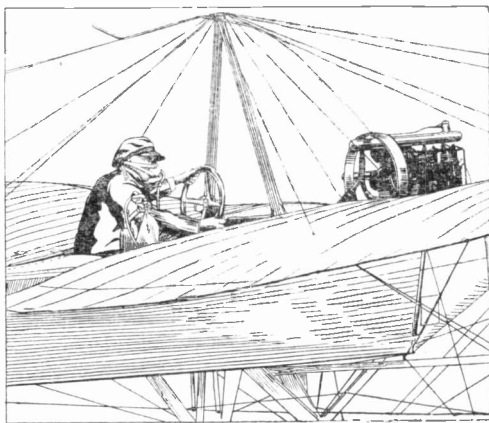
Recent experience has shown that oxygen is called upon to become an important hygienical agent in aviation. In aeroplanes the symptoms characteristic of oxygen deficiency (physical prostration, tremor of the muscles, disturbances in blood circulation and a feeling of cold) are already noted at extremely high altitudes.

Another task of oxygen lies in the utilization of its therapeutical effects

after any accident met with in landing. In fact, airship halls and aeroplane hangars should always be equipped with an oxygen reanimation apparatus. "Pulmotors" have, for instance, given excellent results in connection with this kind of service.

### HIGHER ELECTRIC LAMP EFFICIENCY

The General Electric Company announces further advances in the direction of higher efficiency of the incandescent lamp. The new lamps contain especially shaped tungsten filaments and are filled with inert gas, such as nitrogen, at a pressure of about an atmosphere. The types which it is expected to develop first are adapted to comparatively high current consumption, six amperes and above, and operate at an efficiency of half a watt per candlepower. This is fully twice as high an efficiency as the most

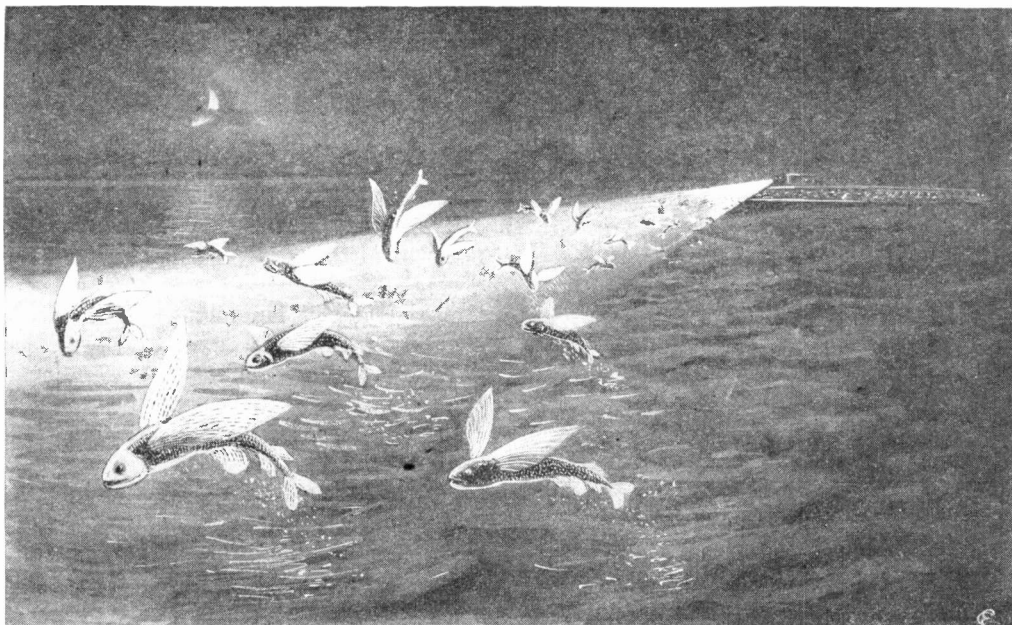


On an Aeroplane

efficient incandescent lamps heretofore available.

The new type of lamps promise to be of particular value in a field not heretofore covered by incandescent lamps, and should greatly broaden the applications in which they can be used advantageously, particularly in the direction of very large candlepower units.

## FLYING FISH ILLUMINATED BY SEARCHLIGHT



Shedding Drops of Silver and Flashing like Diamonds

Avalon, Catalina Island, which is situated off the coast of Southern California some 25 miles from Los Angeles, is visited annually by thousands of pleasure seekers. It is here that the wonderful submarine gardens abound, and where many flying fish are daily seen skipping along the surface of the blue waters of the Pacific.

To obtain a better and more novel way of showing the latter to the best advantage brought forth the device herein described.

A 50 foot motor boat was especially constructed for the purpose. In addition to the ordinary equipment of a pleasure boat, a small but powerful searchlight was mounted on top of the boat, just forward of the steering wheel so that it would be convenient for the helmsman to operate. This searchlight is supplied with current from a 70 volt, direct current dynamo belted directly to the fly-wheel of the main engine.

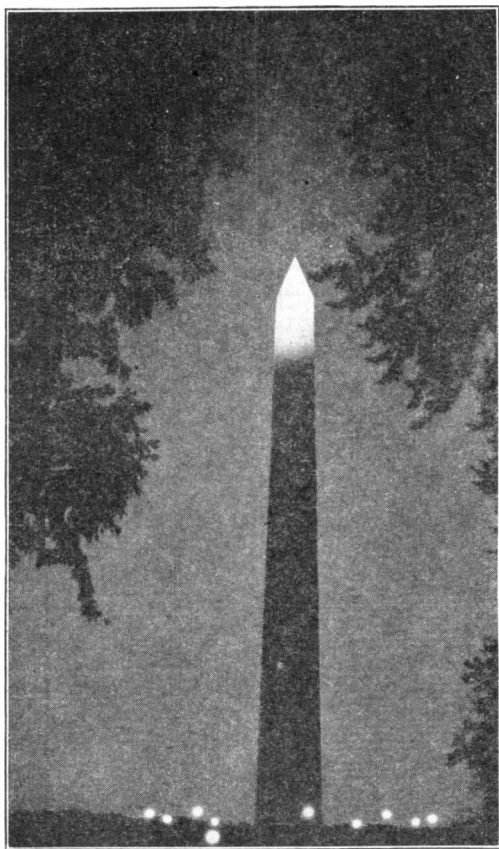
Pleasure parties are taken out each evening, and it is said words cannot describe the dazzling beauty of the hundreds of flying fish, attracted by the light, as they leap from the water and skim along in front of the watchers, shedding drops of silver and flashing like diamonds as they turn and settle into the sea.

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### WASHINGTON MONUMENT AT NIGHT

This striking view of the Washington Monument at night was taken at a distance of about 1,000 feet, through a vista of trees. The light at the top is due to a beam from a searchlight on the Raleigh Hotel, one-half mile distant. The white spots at the base are the enclosed arc lamps arranged in a circle around the great shaft. The exposure was made on a moonlight night and was of 30 minutes' duration.





Like a White Hot Point of Metal

### POWER SKATES

Since the publication of the article in our August issue, page 360, on the subject of "Roller Skating Under Power," we have heard from the inventor of the two devices, Mr. B. Eytinge, 53 Waverley Building, New York. It appears that he built both of the types described, although we were informed that there were two inventors. He is now at work upon still another to be driven by a twin cylinder gas engine, for racing purposes. For his battery driven skate he is looking for a 24 volt, 60 ampere-hour battery weighing less than 30 pounds. With such a battery, the electric skate would prove the lighter and besides would be much more simple. The little motors which he has built for the purpose, are designed for four volts, but by putting 24 volts upon

them, he has found by trial that they work satisfactorily, giving a speed of from ten to fifteen miles per hour, which is remarkable.

### THE FLORIST'S WINDOW

No one can pass a florist's window which is skilfully lighted by electric lamps, without stopping to admire its appearance. The effect is fairy like and electric light does not harm any kind of plant or flower, even the most delicate ferns being unaffected by it and therefore the plants remain fresh much longer. The mercury vapor lamp produces most beautiful effects when used to illuminate green foliage.

### A PHANTOM SHIP

Many tales are told of phantom ships which are supposed to be seen as a warning of some impending disaster. They are described by the observer as looking like the one in the photograph, a sort of ghost ship. But this particular one was seen only by the photographer, who liked to play tricks with his art. It was accomplished by merely printing a positive on glass, and so, of course, all the light and dark shades were reversed.



The Phantom Ship

# On Heaven-Born and Other Inventors

BY DR. ROBERT GRIMSHAW

The world is full of inventors — heaven-born and others; but the great trouble with the children of their brains is that so many attempt to evolve from the depths of their moral consciousness, as the German evolved the camel, something entirely foreign to their training and surroundings — and, may I add, mental capacity.

We laugh at the “bull” in which the traditional Irishman, on learning that a certain stove would save half the fuel, announced his intention of buying two, to save it all. But he is not more ridiculous than the inventor who, on learning of compound steam engines, proposed a series of turbines on the same plan, and announced that with his system he would produce 150 horse power from the exhaust tailrace of a 100 horse power turbine.

Then there is the inventor who proposed to prevent railway collisions by having in front of all east-bound trains an incline, up which any opposing train would run, after which it would expend its speed along a track lying the full length of the train roof.

I will start at home and mention a few familiar objects invented, designed and made without due consideration of the fact that they were to be used and which are used.

I have an extra large wash pitcher of blue enameled, sheet steel, which I bought, not because it was dearer than a china one, but because it was likely to prove cheaper in the end than three or four of the latter. Now the handle is of such shape and so placed, that it strains one's wrist to use the pitcher, when the latter is full. The accompanying basin of the same material is an unconscious discovery of the theoretically correct curve for turbine blades — for water poured in

at the center at maximum velocity emerges all around the rim at minimum rate. A gallon enameled sheet iron pot has its handle of circular cross-section and outline, fixed as near as possible to the upper rim, so that when the pot is full of boiling water one is sure of being scalded when lifting it with one hand without a “holder.”

My china teapot is a “thing of beauty,” even if it will not be “a joy forever;” but the tea, instead of pouring from the spout, climbs down the under side thereof, and dribbles around generally. An expensive, cut-glass, syrup jug, with a silver lid supposed to cut off the golden stream, fails in this mission, and is always sticky outside; but I have one that cost only a “quarter” that shuts off the current as cleanly as scissors sever a piece of tape.

The draftman's compasses with which I literally tried my 'prentice hand were so constructed that either of the triangular points made an admirable reaming awl, and both together could serve as a washer cutter. Those which I have now, which cost three times as much and are by celebrated makers, are so slippery and so slender that the average hand can not manage them.

Among other ingenious inventors, some have devoted much time and thought to getting up an apparatus that would extinguish petroleum lamps at a given time; that is, after a certain number of hours' burning; this being very desirable in small towns having petroleum street lighting, to save the expense of a man to traverse the streets and put them out at daylight or midnight, as the case might be. At last in one town, the problem was solved by an inventor who was not heaven-born, but simply lazy, as was the

pumping engine valve boy who invented the valve gear, constructing it out of cords, so that he could play marbles instead of opening and shutting cocks. The fame of this ingenious but not heaven-born inventor of self extinguishing petroleum lamps reached far and wide, even to the borders of the county. He just found out how much petroleum would run a lamp an hour, and made a few tin measures in accordance. When the oil was "out," the lamps just ceased to burn of their own accord. The smell that they made in doing it was by no means heaven-born, in fact, it was "rank and smelled to heaven," but the main thing was, all the lamps went out on time.

This was one case where the inventor had a practical knowledge of the line in which he invented and a practical personal interest in the success of his invention.

The architects plan houses with insufficient space for bedsteads and tables, doors that open the wrong way, and closets that necessitate twice as many steps to reach them as should be necessary. The tool makers turn out axes that stick in the tree, and hammers that are badly balanced, the machine builder makes machines that have to be taken apart in order to get out the piece that needs replacing or adjusting most frequently, or in which the "breaking piece" is the most expensive part.

I have just returned from a trip in which I stopped at a new and quite expensive hotel. My room had a stationary wash stand with hot and cold water and marble top the same height from the floor as that of the usual wash stand (perhaps a trifle lower) but the basin was sunken, so that although reasonably supple, washing my face properly would require some previous experience as contortionist in a circus.

And so it is all along the line — things are invented and things are made, by people who never use them, or who never either test them or have them tested before putting them on the market.

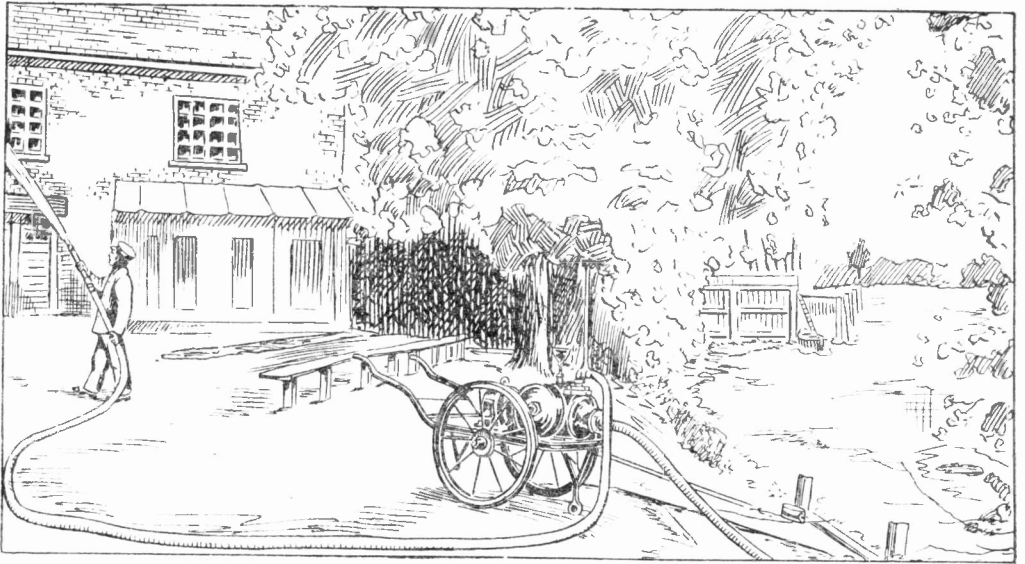
## A RARE MONKEY — THE SIAMANG

"Gollywog" was captured when young in the forests of Sumatra, which is his habitat, somewhere close to Lebong Donok. He is one of the few Siamang monkeys in captivity, and there are none in the European zoölogical gardens, for



Gollywog, the Siamang Monkey

they will not survive the change of temperature. He is a quaint little fellow, small bodied, long armed, and as mischievous as a puppy. Every morning and evening he will walk hand in hand with his owner to his office. In the interim he will either play about the master's bungalow or else walk down to the gold mine, where his owner works, to inquire into things for himself. "Gollywog," could he be brought to Europe, would net his master at least \$2,500.



### ELECTRIC PUMP ON A PUSH CART

In Germany a useful type of portable electric pump has been evolved, suitable for spraying lawns, washing down buildings, fighting fires and similar purposes. The electric motor and centrifugal pump which it operates are mounted on a small push cart.

### NEW TEST TELEPHONE

Telephone wires often run quite near electric light wires, so that in case the telephone lines are being repaired, any of the men wishing to use a portable telephone so as to talk over these wires are in danger of receiving a severe shock in case of an accidental contact with the electric light wires. In order to meet this special case and provide a safe telephone set, the London Adnil Works now makes a telephone set consisting of a solid oak case with rainproof hinged lid containing a loud speaking telephone set and all the needed appliances. The box as a whole is mounted on a steel rod which has a pointed end for boring into the earth, and this gives the ground connection.

The current carrying parts are well insulated and it is impossible for the man

to come in contact with them, and as an extra precaution, all the other inside mental parts are connected to the ground.



Telephone Test Set

## OLD TIME TELEPHONE SWITCHBOARD

The picture accompanying this article, drawn from a photograph, shows a telephone switchboard of 31 years ago, in Richmond, Va. It might readily be mistaken for a huge lamp shade were it not for the numerous cords and plugs in evidence. Upon the top of the board is a galvanometer which in those days served as a visible busy signal to the operator. Two of the operators who worked upon this board are still living in Richmond.

### A SIGN OF THE TIMES

Just as the motor car has superseded the buggy, phaeton or smart trap as the case may be, the carriage horse in point of fact, so it can only be a very short time before the electric vehicle will have forced itself to the front as the superior of the gasoline. The fact of the matter is that, allowing for long distance tests, the electrically operated van or carriage has more than proved its worth in city and suburban service.

The point to which attention should be drawn is this: that every motor garage owner recognizes the coming power. It is then well to say that the "meet" held at Cedar Lake, Ind., this summer expresses very pertinently the identity of interest.

As a matter of publicity let it be said that there was nothing in the gathering but a chicken dinner and athletic sports, not particularly electrical, but at the same time marking harmonious relations in this particular field.

There were all the usual stunts at the picnic—fat men racing, women dashing, young men swimming, and over a thousand dollars in prizes. But the great point for the public to note is the certainty expressed by all the garage men of Chicago, that they must have charging stations right away to meet the coming conditions, and with "juice" delivered from an independent source, to wit, the

central station, and also that the lesson of the storage battery and its powers is more than convincing. It is no longer a question of Gretna Green, Scotland, or Crown Point, Ind., but of certainty in



A Telephone Switchboard used 31 Years Ago—Drawn from a Photograph

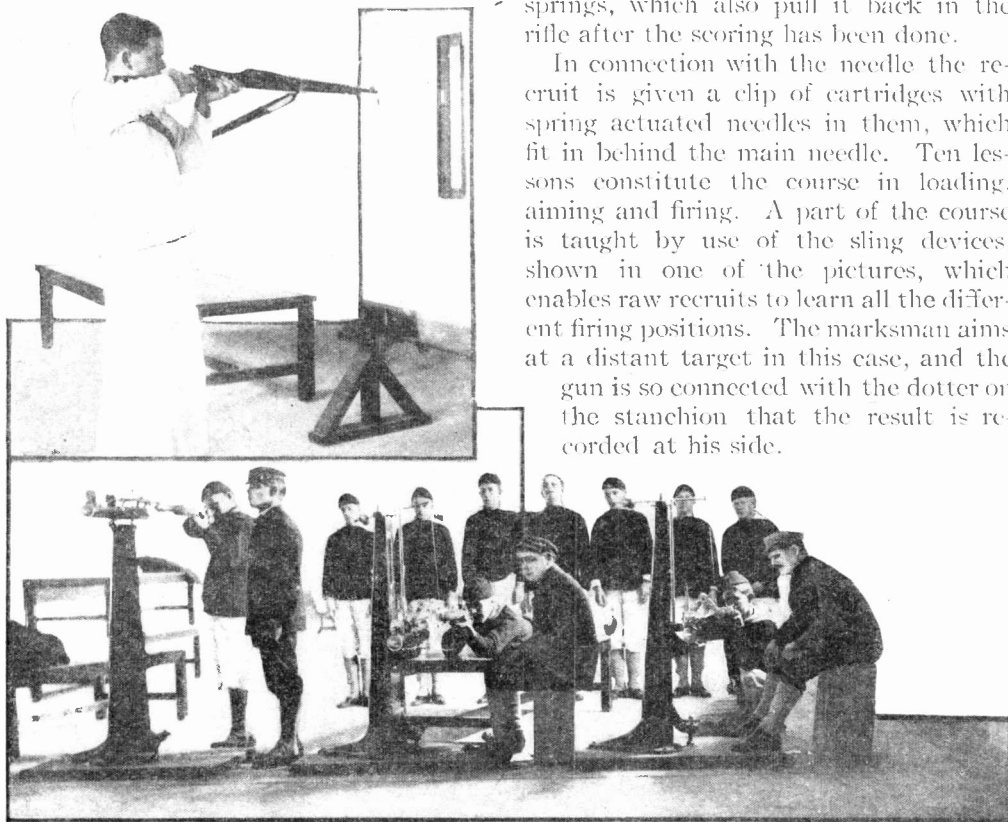
being able to control your electric vehicle of to-day and to-morrow and of seeing that it does not run away with you.

### CISTERN FILTERS DO NOT REMOVE GERMS

Cisterns that are properly constructed and receive rain water from roofs generally afford water of good sanitary quality, but if water of doubtful quality is stored in cisterns the supply is of course not safe for domestic use. Filters used in connection with cisterns are of value in making the water clear but are generally of no value in removing disease germs. Many cisterns are divided into two parts by a brick wall, the water being admitted into one compartment and drawn from the other. In such cisterns the water passes through the brick and in that way is improved in clearness and color, but not generally in sanitary quality.—(U. S. Geological Survey.)

### LEARNING TO SHOOT WITHOUT BULLETS

Recruits at the Lake Bluff Naval Training Station, Great Lakes, Ill., are now being taught the use of the rifle, carbine and pistol without having to fire a shot until their preliminary education



Teaching Raw Recruits to Shoot by Means of the Needle Gun or "Dotter" (Upper View) and with Cartridges Having Reduced Charges

is completed. So carefully has the course been worked out by Capt. George R. Clark, the commandant, that an apprentice seaman may become an expert marksman without having felt the recoil of a gun or smelt powder.

Training in marksmanship of this character is done by means of what is known as the Hollofield dotter. Usual service rifles and revolvers are used. A brass marking rod or needle is placed in the bore of the rifle so that it comes in

contact with the firing pin. The recruit then points the gun at a tiny target, only six inches from the end of the gun and pulls the trigger. The sighting target is just the distance above the tally target that the top of the gun sight is above the center of the bore. The needle is fired by means of the firing pin and a set of springs, which also pull it back in the rifle after the scoring has been done.

In connection with the needle the recruit is given a clip of cartridges with spring actuated needles in them, which fit in behind the main needle. Ten lessons constitute the course in loading, aiming and firing. A part of the course is taught by use of the sling devices, shown in one of the pictures, which enables raw recruits to learn all the different firing positions. The marksman aims at a distant target in this case, and the gun is so connected with the dotter on the stanchion that the result is recorded at his side.

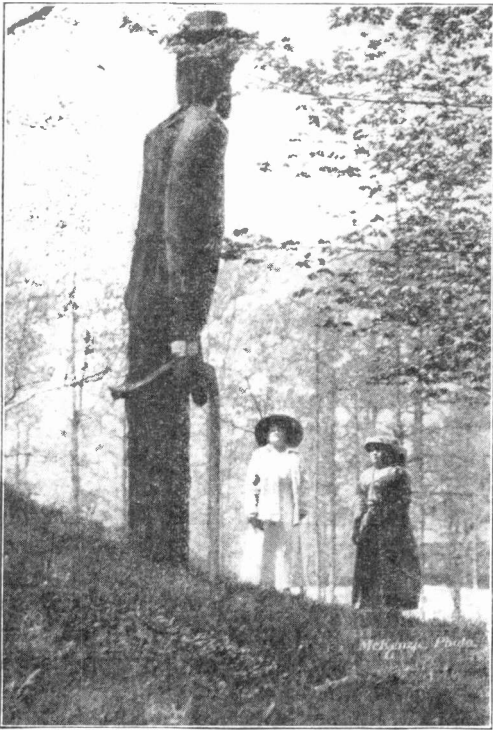
Following this preliminary dummy practice with the needle gun the recruits are given cartridges with reduced charges and small bullets, thus gradually accustoming themselves to the recoil of the weapon.

The needle guns were effectively used by the army riflemen who took part in the Olympic games at Stockholm. They practised on board ship. Officers at the naval station claim that they are excellent in securing good marksmanship.



## CURIOUS TREE MAN

With the exception of one or two minor touches, this "Wooden Man" is a perfectly natural tree growth occurring near Marquette, Mich. The gigantic proportions can well be gauged by comparison with the figures beneath. Practically the only "improvements" were the addition of a cane and the painting of a cuff on the wrist. The "Wooden Man" is still energetic and sprightly; youthful sap continues to flow in his veins, although it is safe to say that he



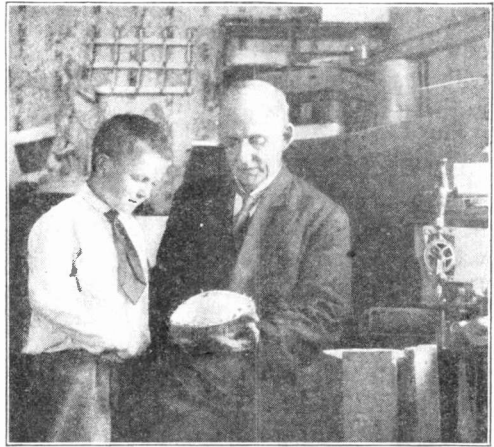
Tree Man Near Marquette, Mich.

has seen all of 150 winters. Fortunately, his pedal extremities are far enough under the ground so that he is never troubled with "cold feet."

Bear in mind that electrical energy is always under perfect control. Light, power and heat can be regulated at will by pressing a button or turning a knob.

## HIS FIRST INVENTION

A veteran inventor, A. C. Brush, who has many notable achievements to his credit, as for instance the projection of the San Francisco Bay bridge, and who has been the recipient of gold medals at



He Takes Pride in his First Boyish Invention—a Novel Battleship

international expositions and other honors, takes more pride in his first boyish invention than in any of his later successes. It is a decidedly novel design for a battleship, which he planned when he was ten years old, and which he whittled out with a great deal of skill, as a wooden model.

It was built in the form of a turtle, which as every boy knows is invulnerable. The head with its sharp beak was designed to ram and sink the enemy's craft, the guns were mounted in a circle on the back as the vessel floated half submerged and the tail served as a rudder. By means of heavy wheels, the land-and-water terror could ascend a shelving bank and travel across the lands of the foe.

All this is being explained to the small boy, who is of about the age that the inventor was when he designed this war craft, and who, therefore, grasps the essential points better than a "grown-up" might.

## NEWSPAPER PHOTOGRAPHY IN THE AIR

## STORIES OF CHINESE RAIL- ROADING

Nowadays the newspaper photographer has to be a man of steel nerves and be prepared to do anything in order to work a "beat" on an equally daring rival. He will stop at absolutely nothing in order to beat a fellow newspaper camera man. One of the most daring pieces of newspaper camera adventures was that of Ralph Baird, the staff photographer for the *Kansas City Post*, who made an ascent with Charles Willard at Kansas City in an aeroplane in order to get a birds'-eye view of that thriving western city and also to take a picture of another birdman flying in midair.

Baird had never been in an aeroplane before, but he was not daunted. Sitting on a part of the engine and holding his camera in one hand and one of the stays of the planes in another, he rose into the air with Willard and took many excellent pictures from his precarious position. Then as one of the other birdmen, giving an exhibition, swooped down from a height in a spiral glide to earth, Baird persuaded Willard to fly towards him so that he could get a close range picture of the reckless descent. Willard was as game as Baird and drove his machine close to the other man's. Then as the birdman swiftly swooped towards them, he made his picture, careless of whether there might be a collision in mid-air or not.

In the dressing rooms of theaters the combined curling iron heater and grease paint heater has proved very useful.



Ralph Baird, Newspaper Photographer Ready to Fly with Charles Willard at Kansas City, Mo.

The Chinaman was at first so distrustful of the railway that whole villages were depopulated for a time when the first locomotives made their appearance in some of the country districts, and when the tracks of the Shanghai-Nanking Railway pierced the walls of the latter city it was necessary to keep the workmen under guard to prevent their being mobbed by the indignant populace.

But this dread soon passed away, as shown by one of the pictures. A number of coolies, encouraged by the resemblance of a steel rail to one of their own hard Chinese pillows, are seen quietly "sleeping on the sleepers."

One of the most serious difficulties with which Chinese railway builders have to contend arises from the torrential rains which visit the country at certain seasons, the damage that results from floods being scarcely greater than that from the terrific erosive action of the rain drops on cuts and fills. A new fill on the Shanghai-Nanking Railway, after it passed through a rain storm in which

nine inches of water fell in eight hours, had its height reduced by over a foot. One of the illustrations shows a section of the Peking-Kalgan Railway, where a tenacious rooted, native grass is being tried to prevent erosion. In the same photo may also be seen a most elaborate piece of stone protective work



Native Grass Planted on an Embankment to Prevent Erosion

that is being erected against the encroachments of the river which the tracks skirt for a number of miles. Work of



They Soon Lost their Fear of the Iron Horse

this latter class is made possible by the extraordinary cheapness of Chinese labor, coolies being paid the equivalent of about fifteen cents a day in this part of China.

To a Chinaman the graves of his ancestors are dearer than his own life. With the graves of most of the countless billions that have died in the past preserved and marked, the whole country is honeycombed with them, and one of the greatest difficulties in the way of foreign industrial enterprises — especially railroads — has been to find room without interfering with the graves. It is usual to pay the owner of each grave so much for removing the ashes of his ancestor. There is shown here a part of a graveyard near Nanking. A cut is being made through a part of it with some of the



The Path of the Locomotive is Honeycombed with Graves

graves still standing on the little hummocks pending a settlement of prices.

A wireless outfit has been installed in the Fifth Street Methodist Temple, of Philadelphia, by the pastor. The antenna is mounted over the apex of the roof, and consists of four wires, each 65 feet long and 85 feet above the level of the street.

### ULTRA-VIOLET RAYS IN STERILIZING MILK

The successful use of ultra-violet rays, artificially produced, in Europe for sterilizing drinking water, led the United States Department of Agriculture to experiment with these rays as a possible means for sterilizing milk. These experiments show that the rays do not destroy all the organisms in milk produced under commercial conditions. While the experiments show that large numbers of bacteria are killed by the ultra-violet rays, there is always the possibility that some of the pathogenic or disease producing forms will survive. The rays, it is found, also impart a disagreeable flavor which would render the milk unsalable.

In attempts to sterilize cream, the results were still less satisfactory than with milk, nor could dirty milk bottles be completely sterilized when exposed to the action of the rays. Even if the methods of generating rays are improved, it is doubtful in the opinion of the experts if they can ever be used to any extent as a substitute for pasteurizing milk because of the disagreeable flavor they impart

### A RUNAWAY DYNAMO

On July 7 occurred a peculiar and somewhat serious "runaway" of a 10,000 horse power dynamo at the plant of the Northwestern Electric Light Company at Underwood, Wash.

Through some unknown defect, one of the gates of the dam opened to the limit, and the big machine increased from 360 revolutions a minute to 1,000.

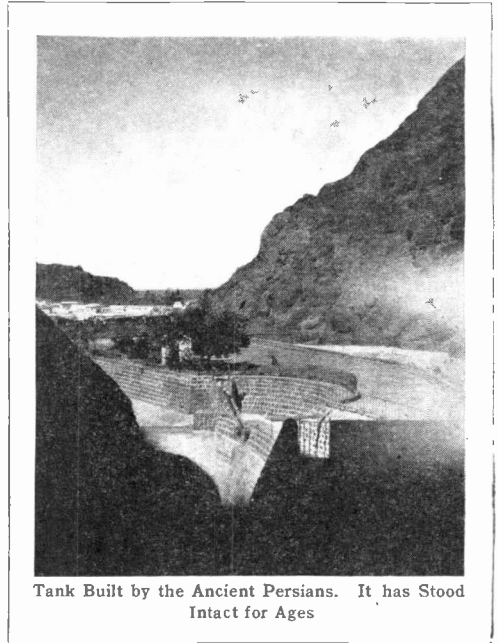
When this great supply of power came on, the machine and wires became literally one ball of fire. The White Salmon River Canyon, where the plant is located, was made as light as day. The coils were burned out and the copper and iron were fused together.

The foreman and his oiler acted in an admirably cool and heroic manner at

their post of duty and succeeded, after some effort, in getting the gate shut.

### ANCIENT TANKS OF ADEN

No one in his senses could call Aden, Great Britain's rocky fortress at the entrance to the Red Sea, a health resort or a place of beauty; but it is of tremendous strategic importance. It is just a bare rock and hotter than Hades, it



Tank Built by the Ancient Persians. It has Stood Intact for Ages

never rains there, and is so unhealthy that few white men can stay there for long and live.

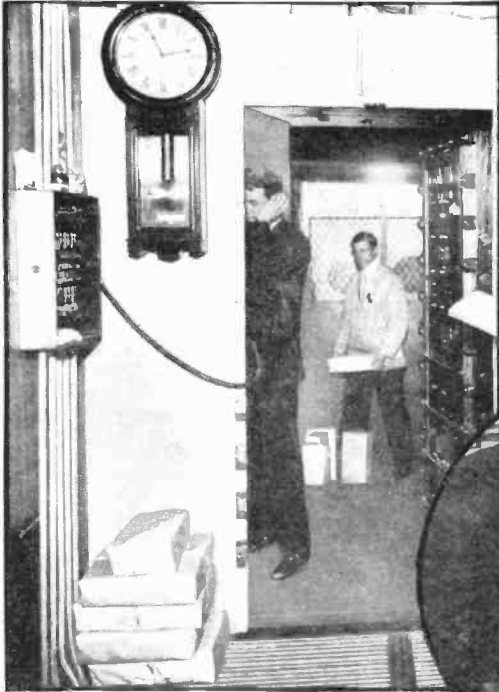
As there never is any rain it was necessary for the ancient Persians, who owned the place almost before the dawn of history, to build immense tanks to hold a water supply and these tanks are still in use, being the only source the residents can draw upon. No one has ever been able to find out the secret of the cement work used in the construction of the tanks, and the workmanship has puzzled the world's best architects and builders. These tanks have stood intact through all the ages, an everlasting monument to the foresight of the owners of Aden.

## ELECTRICITY'S AID TO THE POLICEMAN

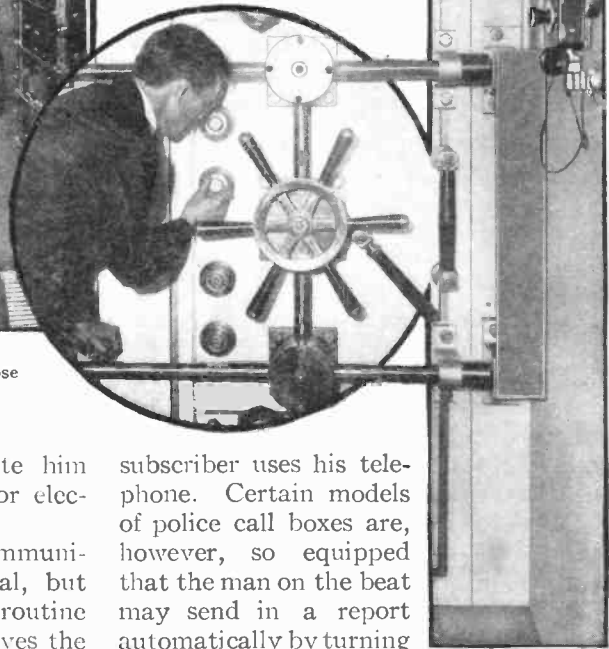
With the modern criminal gaining in elusiveness by the use of the automobile and the motor boat, it goes without saying that the representatives of law

for the rogues' gallery by the aid of electric lamps. Moreover, electricity, in a dozen different guises, helps the policeman on his job.

The usual police signaling system consists primarily of call boxes, mounted on posts at street corners and each box provided with telephone equipment for communication with the various stations and with police headquarters. In most instances the equipment of a call box includes a transmitter and receiver, which permits the patrolman to carry on conversations with his superiors just as the average telephone



A Telephone Inside the Money Vault or in Close Proximity Permits of a Quick Police Call

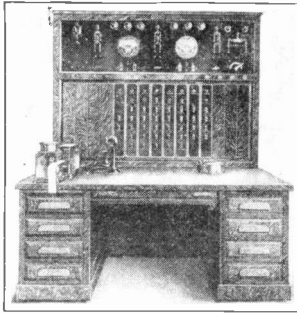


and order who would checkmate him must have improved resources for electrical communication.

Once upon a time electrical communication represented the sum total, but now that is but one phase of the routine in which the versatile current serves the police force. It is a telephone or telegraph call which summons the patrol wagon or ambulance, but like as not it is an electrically propelled vehicle which responds. And with a criminal in the clutches of the law it is an ingenious arrangement of electric lights which facilitates his identification; an electrical detecting instrument secures his confession; he is, very likely, photographed

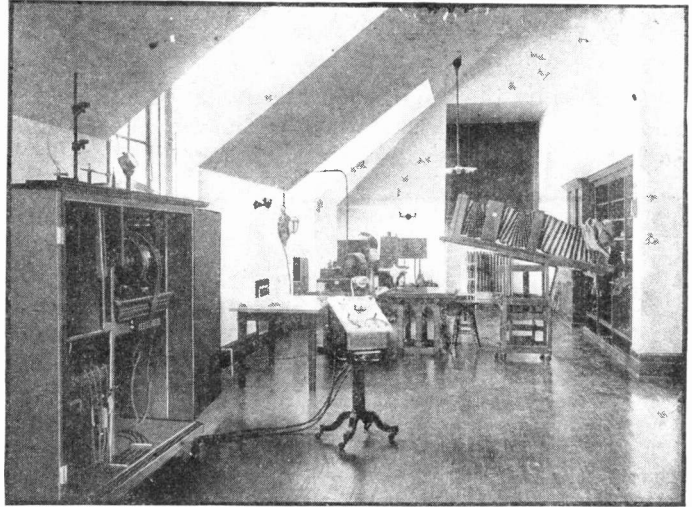
subscriber uses his telephone. Certain models of police call boxes are, however, so equipped that the man on the beat may send in a report automatically by turning a key, which operation has the effect of recording on a tape at headquarters the date, hour, minute and second of the call.

An important integral part of all police signaling systems is, of course, the "central" at headquarters. This is in effect a big private branch exchange but it is more perfectly equipped than any other private branch exchange, and it is



Police Station "Central"

Electrical Apparatus of an Up-to-date Police Station—for Photographic and X-ray Work



likely to similarly overshadow in magnitude all others in the locality.

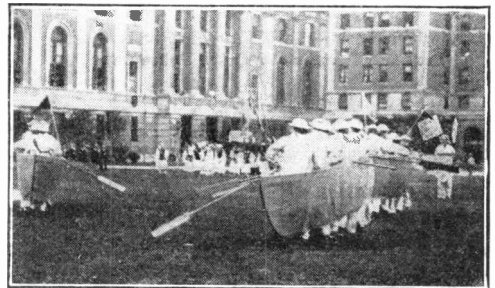
The central station switchboard of the up-to-date police signaling system may be arranged for the operation of as many circuits as required. Telephone communication may be held between any two patrol boxes or from any patrol box to any telephone on the local telephone system. Moreover, the operation of all patrol boxes is automatically recorded whether an attendant is at the switchboard or not. A modern improvement of the electric communication system is the introduction of lamp and bell signals whereby each patrol box has a red lamp and loud ringing bell which may be used to signal patrolmen day or night.

Electricity is rendering valuable aid in police laboratories where chemical analysis is made, and in police photographic departments where rogues' gallery portraits are secured, and where there is necessity all the while for more or less X-ray work. Mention has already been made in these columns of the revolutionary influence exerted by such telephonic devices as the dictograph and teledetective, which are often better than the "third degree" for securing confessions. Telephones are now installed not only adjacent to but also inside many of the large bank vaults — a ruse to help thwart

the robber but incidentally a precaution against the consequences of closing a vault door by mistake upon any of the bank's own employees.

### BOAT RACE ON LAND

This odd boat race took place at Columbia University during Alumni Stunt Day. The boats were suspended from the shoulders of the crew whose legs



Boat Race on Land

projected through the bottom of each boat. The crews ran backwards, the coxswain being the only man who could observe the course the "vessel" was taking.

The underground electric railroads of Paris are now carrying more than 400,000,000 passengers a year.

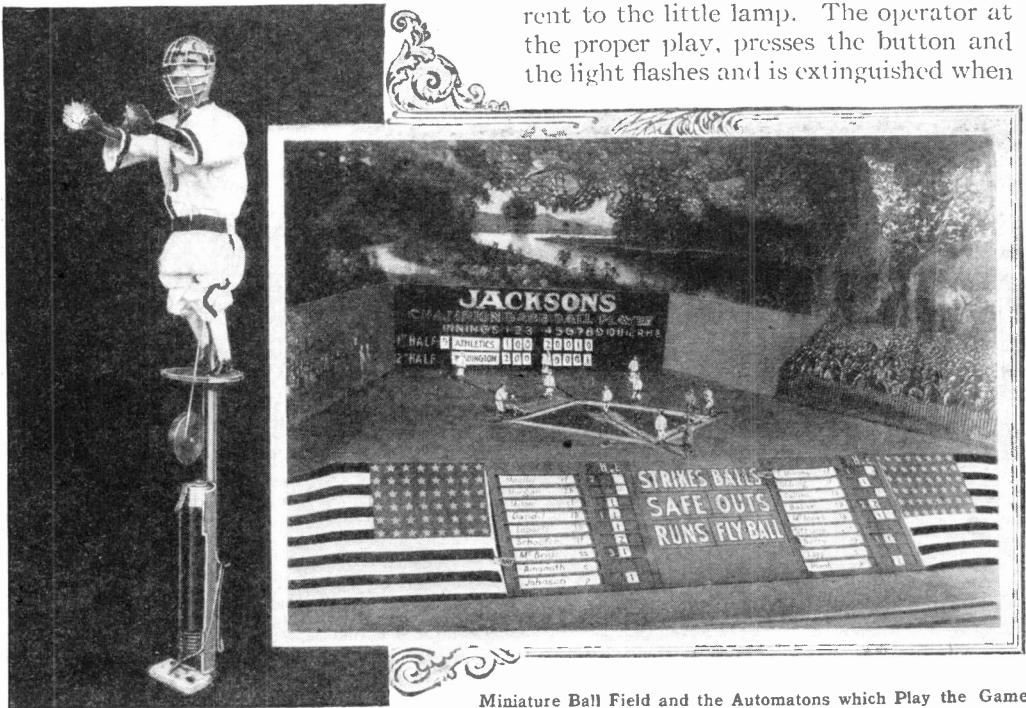
# AUTOMATONS IN A GAME OF BASEBALL

What is considered the perfection of mechanical reproduction of baseball games is that known as the Jackson Champion Baseball Player, the invention of Thomas H. Jackson, of Scranton, Pa. This player, patented February 18, 1913, is a miniature baseball diamond with manikin players that run bases and throw and bat the pigskin sphere just as the players do in real life, and so far as is possible, gives each play with fidelity. It is so large that it occupies the complete depth and width of a theater stage, while surrounding the field are fences, covered with advertisements. The center field fence is used for the posting of the score inning by inning.

In the reproduction of a game, the fielding players take their proper positions by coming up on the diamond through holes in the in- and outfields. The umpire calls, "play ball," and the batter comes up through a hole near home plate and with bat in hand, trots up to his

position. Through the medium of a small half candlepower lamp to denote the ball, there is a flash in the pitcher's hand. He winds up once or twice and then throws his arm toward the catcher, the light in his hand goes out, the batter swings and misses, and the light appears in the catcher's hand. The umpire raises his right hand and the announcer under the diamond calls "strike one." If, however, the batter hits safely (to right field, for instance) one can see the light travel along the ground, past the second and first basemen and into right field, where the fielder picks up the ball, raises his arm and relays it to the second baseman who in turn throws it to the pitcher.

The manikins, which go through all these motions, are about eighteen inches high, made of iron and tin and through a system of levers at the base, can be made to raise either right or left arms or both and to stoop. In the base is a small, dry battery and from this to the hand of the manikin is a small wire carrying the current to the little lamp. The operator at the proper play, presses the button and the light flashes and is extinguished when



Miniature Ball Field and the Automaton which Play the Game



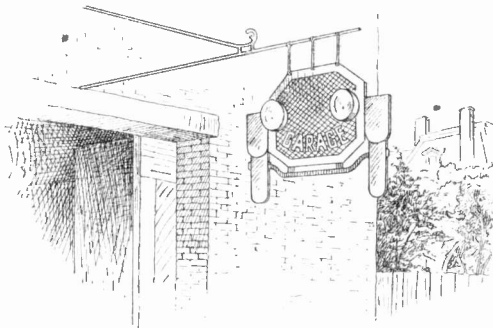
the ball is thrown to another player or to the batsman.

Ten men are required to operate the board, one for each player and the operator of the switchboard from which connections are made to show base-hits and fly balls. The latter feature is most ingenious. There is a row of lights over the heads of the infielders and a similar row in the outfield. When the batter hits a fly to centerfield, that fact is indicated on the front board and at the same time the light over the pitcher's head flashes, then the one over the centerfielder's head and then in his hand.

On the field there are two grooves completely encircling the diamond. In one of these the fielders move while the other is intended for the base runners. The groove is really a track to which a small wheel attached to each base runner fits and as he moves from base to base, the wheel revolves and imparts a running motion to his legs.

### APPROPRIATE GARAGE SIGN

An effective garage sign found on Wabash Ave., Chicago, is herewith illustrated. The perspective of the sign coupled with the two brilliant electric headlights imparts to it such a realistic appearance that the passer-by coming from either side is startled as the same view is shown on both sides. The lights also aid in illuminating the walk in front of the building.



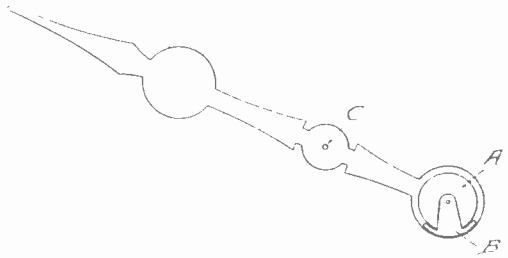
Garage Sign

### THE MYSTIC CLOCK EXPLAINED

*To the Editor of Popular Electricity and the World's Advance:*

The "Mystic Clock" referred to in the August issue, page 403, is not actuated by electricity in any form, nor by magnetism. The principle involved is gravity.

Each hand is provided with a counterpoise consisting of what appears to be a solid metal disk, but is really a hollow receptacle for the works of a watch which are firmly secured to its interior, as shown in the accompanying sketch. (A) is a watch movement. (B) is a weight carried in a circular orbit around this movement. The hand, including the weight, is accurately poised on the center (C). The weight, therefore, has a tendency to assume the downward position, as shown. As the watch carries the weight



The Secret of the Mystic Clock

around, it — the weight — assumes a downward position, and inasmuch as the hand is free to move on its axis it follows that it — the hand — rotates around the dial.

Each hand contains a separate movement. The movement in the minute hand counterpoise carries the weight one revolution every hour, while that in the hour hand carries it one revolution every twelve hours, corresponding with the motions the hands of a clock ordinarily perform.

In setting the hands the weights are placed so that they occupy a downward position when the hands point to correct time. It follows, then, that as the weights revolve around the watch, always

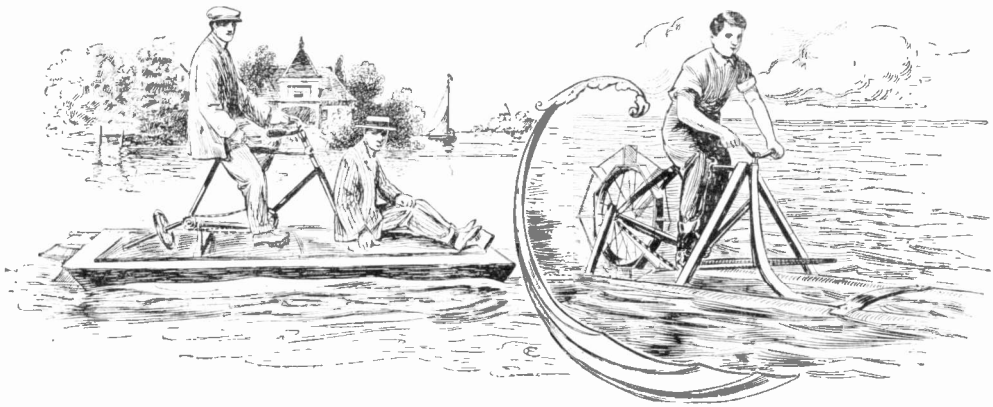
assuming a downward position, the hands, being free to move on their axis, will travel around the dial, indicating correct time. No matter in what position the hands may be placed, they will at once assume position to indicate correct time. When they are both whirled around the dial they will, of course, settle to the same position. This is the simple explanation of what appears to be a complicated problem.

CHARLES T. HIGGENBOTHAM,  
CONSULTING SUPERINTENDENT,  
SOUTH BEND WATCH CO.

South Bend, Ind., Aug. 1, 1913.

### WATER-CYCLING—A NEW SPORT

"Water-cycle" is the name of a new type of aquatic machine which is attracting English inventors. Chris. Harvey, a young shoemaker of the Cornish village of Mousehole, has built a sea-going cycle out of two old fishing spars and a disused bicycle. Paddle wheels are arranged on the rim of the wheel as shown. On his



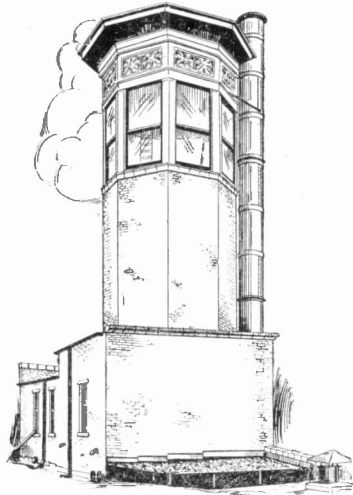
Two Types of Water-Cycles Devised by Englishmen

first trial he steered cleverly out to sea, but collided with a fishing smack and was swamped.

Fred Fenny, an Aldershot bookbinder, has designed another type which is able to carry a passenger in addition to the cyclist. In this case the bicycle sprocket is connected, by a driving chain, with an ordinary boat propellor.

### GIANT SEARCHLIGHT IN POLICE WORK

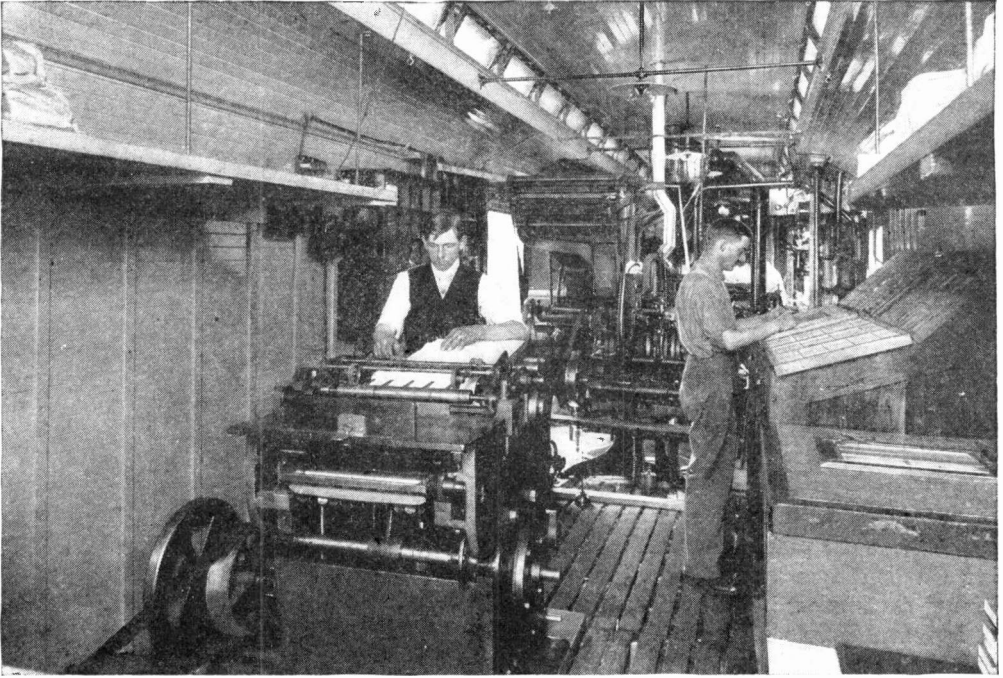
A giant searchlight is perched in the lofty fire tower on the tallest skyscraper in Indianapolis. The searchlight is 18,000 candlepower in strength, the lens



Lofty Fire Tower on an Indianapolis Skyscraper

is nearly half a foot in thickness and is 38 inches in diameter.

When a burglar alarm is turned in the huge searchlight is played on the place which has been robbed and by a series of rapid signals all the patrolmen in the vicinity are put upon the trail at once. The district is entirely surrounded and it is only with the greatest difficulty that



The Printing Plant on a Railroad Car

the thief effects an escape. Before the light was installed, the desk sergeant at headquarters could not give the officers news of a robbery until they made their hourly call, which in some cases might be as long as 59 minutes.

### NEWSPAPER PRINTED ON A RAILROAD TRAIN

The novelty of this newspaper plant lies in the fact that it was installed in a 65 foot, baggage car. It was complete in all details even to an engraving plant for making the cuts. The paper printed was the "Glacier Park Blazer," the first daily automobile paper ever printed on a railroad train. Nine issues were printed each day during the A. A. A. automobile tour from Minncapolis to Glacier National Park last July.

The train carrying this unique plant was the hotel train which accompanied the automobile tourists over the Great Northern. It furnished eating and sleep-

ing accommodations for the motorists during their 1,233 mile trip through three states.

### MODERN HOSPITAL DEPENDS UPON ELECTRICITY

The operating room in the Red Cross Hospital, Salida, Colo., is one of the best in the state, from the standpoint of electrical equipment, and is about 20 by 12 feet in plan, containing twelve service outlets, an electrically warmed operating table and an instrument cabinet 5 by 5.5 by 1.5 feet in dimensions, with six glass shelves, two four candlepower lamps being kept lighted constantly to maintain the proper conditions of dryness. Four 100 watt lamps are installed directly above the operating table and ventilation is facilitated by an eighteen-inch fan driven by a  $\frac{1}{8}$  horsepower, 110 volt motor.

In the diagnosis rooms and laboratories electric reflector lamps attached to head bands are in service, and electrically heated instrument sterilizers are in use.

A large examination table is provided with four 60 watt lamps, two of which may be cut off at a time. A full line of rheostatic equipment is available for use in connection with cautery apparatus, endoscopes and cystoscopes. An electric stove is employed in heating broth in the kitchen and an electric toaster is constantly used on the premises. An electric

## THE METRIC SYSTEM

A reader of this magazine desires a comparison of the metric system with the English standards. Although almost every handbook contains conversion tables, handbooks are not always available when wanted. So for his benefit and that of others we print below the readiest



A Complete Engraving Plant on a Railroad Car — Making the Plates for Illustrations

clock system and a complete set of interior telephones, floor bells, corridor, pilot and night lamps are in service and the nurses' croquet ground is illuminated for evening games by incandescent lamps of sixteen candlepower scattered at convenient intervals.—*Electrical World*.

During the past summer the telephone company of Temple, Texas, placed a transmitter in the band stand at the city park and so arranged that its subscribers might listen to the evening concerts given there by calling central and getting telephone connection.

means, in condensed form, of converting from the metric system to the English. Conversely, of course, to reduce English standards to metric simply invert the fraction.

Centimeters	×26/66	=inches
Meters	×82/75	=yards
Kilometers	×87/140	=miles
Hectares	×42/17	=acres
Grams	×6/170	=ounces
Kilograms	×75/34	=pounds
Liters	×14/53	=gallons
Liters	×6/170	=cubic feet

Electric light is valuable in candy stores because its color is good for the display of the candy, also because it does not heat and make the candy sticky.

### "PULQUE," THE CURSE OF MEXICO

The Maguey — the American aloe — is known to us as the "Century Plant." In its native land it grows very large and matures in seven or eight years, when it would blossom — if permitted to do so. When the sap begins to gather, to shoot up the tall blossom stalk, the center, or heart, is cut out, leaving a cavity as large as a wooden bucket.

In this receptacle, gathers each day three or four quarts of the sap. This sap is sweet and palatable, and would, no doubt, be nourishing, if used at once. It is syphoned out into pigskin bottles, carried to the nearest stations on burros and shipped to the cities. Mexico City alone receives 50 carloads of this drink, called pulque, each day. This is official.

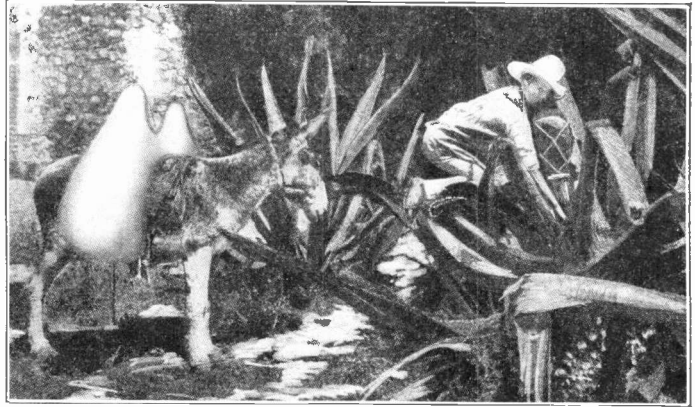
Fermentation begins in 24 hours. The liquid turns milky looking and is slightly intoxicating; at the end of three days it becomes violently so, and all that is not consumed must be turned into the streets — which is in compliance with the Mexican law.

The native, appreciating this fact, endeavors to see that none of the precious fluid is wasted, and to that end drinks every hour in the day. Men, women, and children all drink. It is the curse of the country.

The Maguey is planted in long rows — miles long — and grows in the sand without irrigation. For hundreds of miles around the City of Mexico, it seems to be almost the only crop, covering valley, plain and mountain side. When the center leaf is taken out it is planted, and takes root at once. This center represents three years growth, and so the crop is constantly renewed.

### RACE OF THE VETERANS

A novel race, in which all the cars were built in or prior to 1905, was held in Los Angeles last summer. Seven cars were entered of which the oldest was a 1903

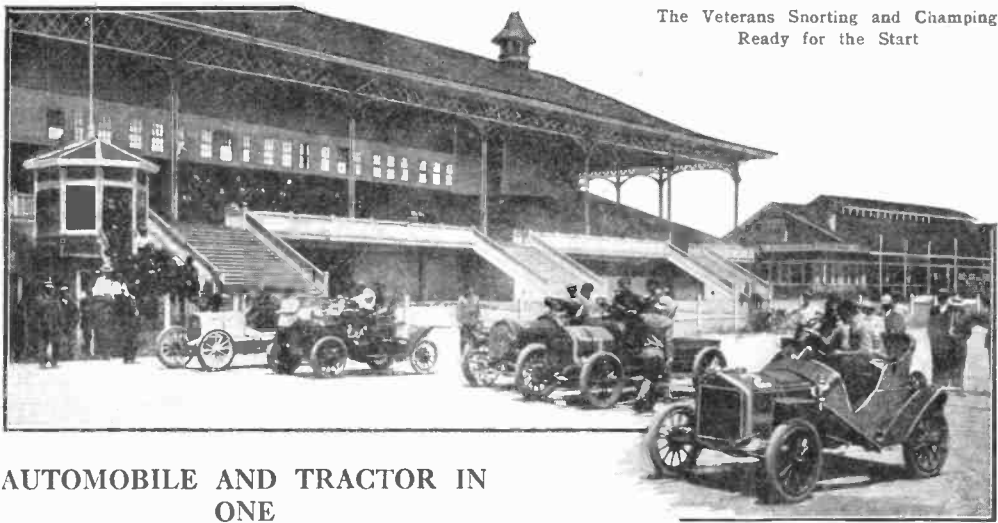


Gathering the Juice of the Century Plant

Locomobile, a two cylinder chug-chug which made  $9\frac{1}{2}$  out of the ten laps on one cylinder only. The winner was a 1905 Tourist, a Los Angeles product, which made the ten miles in 13 minutes, 38 seconds, showing remarkable spryness for its years. This was driven by George Stevenson, who brought his machine deftly around the grass grown track of Ascot Park, and brought up at the finish with almost a full load of alfalfa that had been mown by his radiator. His mechanic helped hold down the car on the turns, by standing on the running board and swinging far out to the inside.

The Buick, driven by Kenneth Nikrent and with Louis Nikrent as mechanic, won second place, while the Marion came in third with Larry Symonds, the challenger, at the wheel. Both of these cars were 1904 models. The other entrants were the 1903 Locomobile, a 1905 Garford, a 1904 Oldsmobile and a 1905 Corbin.

While the general hilarity of the spectators and contestants gave the affair the general atmosphere of a circus, yet the results were impressive as indicating the staying qualities of some of the early day gas wagons.



The Veterans Snorting and Champing,  
Ready for the Start

### AUTOMOBILE AND TRACTOR IN ONE

The Auto Tractor is a simple machine, which enables the farmer to use an automobile to perform farm work where mechanical power may be utilized. It attaches to any automobile and employs the engine and driving system of the auto, making the combination do the work of a traction engine.

Two large tractor wheels have between them a projecting steel platform upon which the automobile is backed up. On the hub of each rear auto wheel is a small

pinion which meshes with the gears of the big tractor wheels. The rear wheels of the automobile are clear of the ground in operation and since the rate at which the tractor wheels must move, as in plowing, need be only sufficient to cover from two to four miles an hour, the power of the automobile engine through reduction gears is readily utilized. Five minutes is ample to allow the operator to disconnect his car and start for home.



Two Machines in One. In Five Minutes the Automobile may be Attached to or Detached from the Tractor

### LOST STATUETTE UNEARTHED

The Greek statuette "Afrodidi" said to be 3,000 years old, which was stolen from the National Museum at Athens in 1900, was unearthed by detectives July 25, in the cellar of Charles Memphos, who



PHOTO BY BUCK

Dr. Vouros and the 3,000-Year-Old Statuette

keeps a candy kitchen on Chestnut Avenue in Baltimore, and brought to Washington by Dr. Alexander C. Vouros, the Greek chargé d'affaires. Dr. Vouros cabled the government for instructions concerning the statuette and its theft. Until word was received from Athens the work of art was kept at the Greek legation. The picture shows Dr. Vouros with the statuette in his hands.

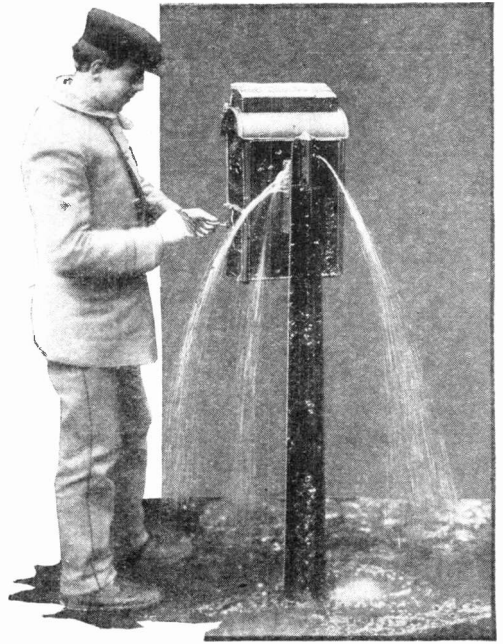
### RED FIRE AND BEET SUGAR

The chemical element, strontium, which is used in the manufacture of red fire is coming into demand (in the form of strontium hydrate) in a more peaceful branch of manufacture—the recovery of

sugar from beet molasses. Strontium nitrate is the compound used to produce red fire, although the chlorate and carbonate are also employed to a less extent. Strontium is derived from the mineral celestite, of which there are large deposits in California.

### WATER FROM A MAIL BOX

When a high pressure main burst during a hotel fire in Duluth recently, the water found a strange means of escape. Had the season been summer instead of winter, the water could have easily found egress upward through the soil and between the bricks of the street.



The Mail Carrier Did Not Seem to be Bothered

But the ground was frozen solid several feet deep. The only possible means of escape, therefore, was by the hollow mail box post, the bottom end of which protruded a short distance below the frost line. That is the course it took—escaping through weak parts of the seams as shown. The contents of the box were not damaged at all; and the mail was collected regularly.



**STARTLING TEST OF A HIGH EXPLOSIVE**

Just to prove that the high explosive which he manufactures is absolutely safe, unless discharged by a cap, the



He Threw the Blazing Stick of Dynamite Forcibly Against a Tree

manager of the company making it performed this test in the presence of a badly scared photographer. A stick of the explosive, which resembles dynamite, was ignited in the manager's hand, and after whirling it about his head, he threw it forcibly against a tree. It merely burned like pitch, there was no explosion. Then the explosive was hammered with a sledge hammer, shot full of holes with a shot gun and otherwise maltreated, but with no effect. Finally a stick was placed under a little mound of earth and connected with fulminating cap and electric battery wires. Then everybody present retired to a safe distance; the battery switch was thrown on and immediately a hole in the ground was made by the explosive almost big enough for a cellar.

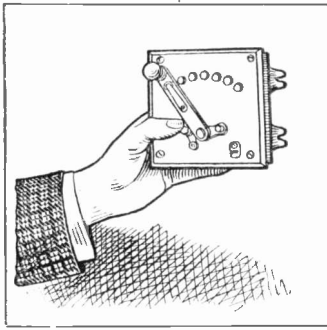
### **ELECTRICAL PRESENT TO A FAMOUS PREMIER**

The Hon. Robert Borden, the Prime Minister of the Dominion of Canada, has by reason of his own great interest in matters electrical been lately paid a high compliment. The Conservative members

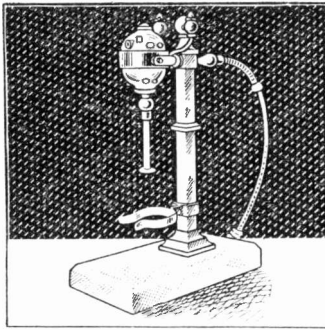
of the Canadian Parliament have presented to Mrs. Borden a very beautiful electric brougham in recognition of her enthusiasm for outdoor recreation. The "electric" is an Ohio car.

### **FOREST RANGERS TURN "SWORDS INTO PLOWSHARES"**

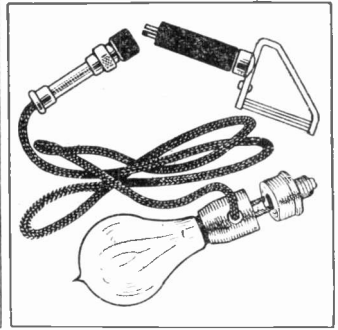
A regular army bayonet, converted from an instrument of war and destruction into an implement of peace and conservation, now forms part of the telephone kit of every forest ranger in the United States Forest Service. These bayonets have binding posts fixed to their ferrules and are used as ground rods to establish a return connection with the single conductor telephone lines which are being built through the wilds of the principal national preserves. The most important use for these lines is the reporting of forest fires. When a ranger wishes to communicate with headquarters he takes a coil of bare wire from his kit, throws it over the nearest telephone wire, and "saws" on the two ends until a good connection is established. Meanwhile his bayonet has been thrust deep into a moist place in the ground, thus completing the circuit.



Speed Regulator



Drink Mixer



Hair Singer

## NEW WAYS OF USING ELECTRICITY

### MIDGET SPEED REGULATOR

The Midget speed regulator is a substantial, small rheostat,  $4\frac{1}{2}$  inches square by  $2\frac{1}{2}$  inches in thickness.

The device is intended for the speed regulation of small motors, such as are used to drive jewelers' lathes, dentists' lathes and drills, washing machines, sewing machines, etc., but is also employed as a heating coil regulator, and in numerous other places where a small rheostat is necessary.

The front of the Midget regulator consists of a slate panel on which are mounted the contacts, operating lever and terminal posts.

The operating lever is of steel, fitted with a brush which is held tightly against the contacts by means of a strong spring and equipped with a handle for movement of the lever. A cast iron casing insures protection against dirt and dust and contains the resistance unit.

The resistance unit, which is a high grade special wire wound upon a slate core, is covered with a special cement and baked, making the unit moisture proof. The unit is mounted on the back of the slate front of the regulator by means of spacers so that to replace the unit necessitates only the removal of the front, all other parts remaining undisturbed.

Ordinarily the regulator is fitted with six running contacts and one off or open

contact but is furnished without the off contact if so desired.

### DRINK MIXER

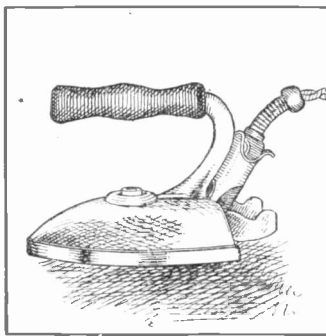
The small motor specialists have perfected a little motor that is rapidly replacing the "armstrong" method of mixing refreshing drinks at the soda fountain.

The motor is mounted on a suitable stand and direct connected to it is a vertical shaft on the lower end of which is a large, thick button. The glass containing the drink is placed in the holder and the button and shaft lowered into it and running at high speed. The button soon mixes the drink in a more satisfactory manner than it can be done by shaking or hand stirring. The amount of current consumed by the motor is very little.

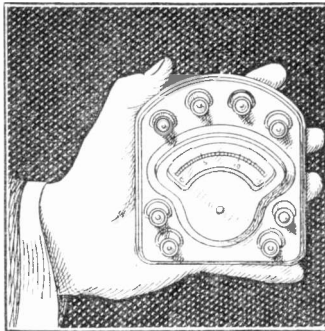
### ELECTRIC HAIR SINGER

One of the latest additions to the tools of the barber and the hair doctor is an electric singeing outfit. The claim is made that singeing is an effective remedy for falling hair since it seals up the ends after cutting, thus retaining the oil and nourishment. The replacing of the wax taper by wires in a suitable handle and heated by electricity will make this method of hair doctoring more popular.

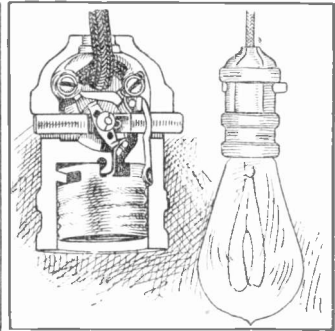
The illustration conveys an idea of the



Progressive Iron



Miniature Measuring Instrument



All Porcelain Socket

apparatus. The lamp placed in series with the tool reduces the voltage to a point not dangerous. The device can be used on any voltage up to 250 and on either direct or alternating current.

### PROGRESSIVE PRESSING IRON

A new electric iron that will find appreciative users when ironing into sleeves, pockets, armholes, etc., is here shown. The distinctive feature of the Pelouze Progressive Iron is the support of the handle at the rear end only, leaving the nose of the iron free. This part of the iron is smoothly rounded so that delicate fabrics can be pressed out without getting caught on the iron.

The iron takes 500 watts and is fitted with a quick break, switch plug which can be removed by a pull on the knob of the tension spring. No stand is provided as the iron is fitted with a heel so that it may be tipped back upon this when not in use. The weight of the iron for general family use is  $6\frac{1}{2}$  pounds.

### MINIATURE ELECTRICAL MEASURING INSTRUMENTS

The accompanying illustration offers the reader a means of comparison in noting the size of the miniature electrical measuring instruments of a set recently placed on the market.

The instruments are for use on direct current and are made for both switch-

board and portable purposes. The reduction in size is accompanied by a reduction in cost, while it is claimed that accuracy has not been sacrificed.

The cases of the instruments are dust proof and are made of special sheet steel which effectively shields the magnetic system of the instrument from the disturbing action of external magnetic fields.

The instruments are made up as voltmeters, ammeters, volt-ammeters, millivoltmeters, mil-ammeters and battery testers.

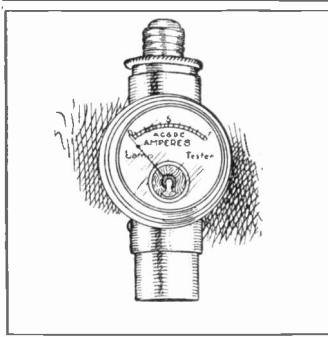
### ALL PORCELAIN PUSH BUTTON SOCKET

The accompanying cut shows a newly designed, all porcelain, C-H socket constructed for service with heating, cooking and motor driven devices. In fact, the socket is rated to carry 660 watts, somewhat more than the energy required by a six pound pressing iron.

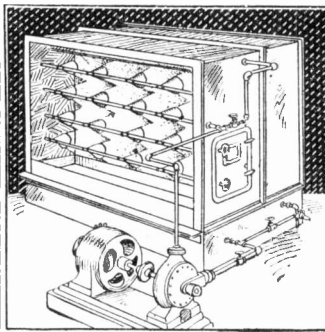
The horizontal switch bar enables the current to be turned on with one hand and without twisting or jerking the socket as with a key. Pressing the white end of the bar turns on the current, while pressing the black end turns it off.

The socket is especially adapted to damp locations such as basements, laundries, etc., and can be wiped off with a moist cloth and made to look like new.

The socket is readily installed, as a single screw allows the halves of the casing to be separated, exposing the terminal screws for the drop cord.



Portable Lamp Tester



Air Washer



Sandpapering by Motor

### SMALL, PORTABLE LAMP TESTER

The Advance lamp tester is a convenient instrument for measuring the current of incandescent lamps.

The tester is an accurate ammeter designed for either alternating or direct current, with a range from zero to one ampere divided into 20ths on the standard instrument. However, by special order the instrument may be made to cover a range of two or three amperes.

The ammeter is mounted between an Edison plug at the upper end and a lamp socket at the lower end, the length of the device being six inches, with a width of two and one-half inches.

The device is encased in a neat, covered box for carrying and protection. All metal parts are of polished nickel.

### WASHES THE AIR

To imitate Nature's way of cleaning and cooling the atmosphere, electrically driven air washers are made which produce artificial rain or spray through which air is passed. In winter the same apparatus is used to put the needed moisture into dry air.

Within a chamber numerous nozzles are installed that divide the water forced out of them by a motor driven centrifugal pump into very fine spray which in the air washer here illustrated moves in the same direction as the air, thus reducing the power necessary to handle the water.

From the top of the chamber, also, additional nozzles spray water downward through the air. After the water has been used, it passes to the bottom of the tank and is used again but not until it has passed through a screen fine enough to remove the accumulated dust. When it becomes necessary to clean the screen, this is done by reversing the direction of flow of the water for two or three minutes each week when any dirt will be thrown off the screen and readily drained away.

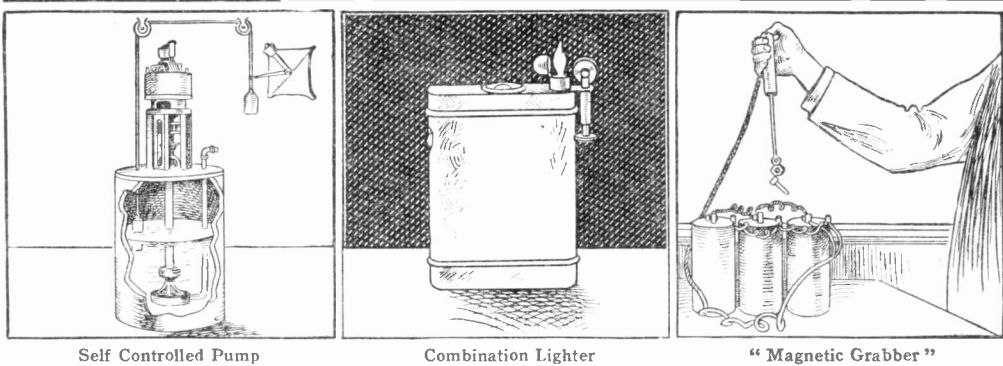
Make-up water is provided automatically. A ball float opens the inlet valve from the water supply system whenever the water falls below a certain point and closes it as soon as the tank or basin is full. In this way there is always furnished an ample water supply.

Excess moisture is removed from the washed air by passing it around sharp turns thus catching the water carried in suspension.

An electric lamp, properly protected and located in one upper corner of the spray chamber, permits observation of the conditions of spraying. An overflow pipe is provided for removing water should the inlet valve overdo its work.

### SANDPAPERING WITH MOTOR DRIVE

A labor saving application of a flexible shaft attached to an electric motor is here illustrated. Those who have sandpapered the exterior of the hull of even a medium



Self Controlled Pump

Combination Lighter

"Magnetic Grabber"

size boat preparatory to painting it will appreciate the situation.

The sandpaper is made up in the form of cones. These cones fit over a piece of felt snugly and are held in place by a spring garter. The felt acts as an elastic backing.

### PUMP THAT CONTROLS ITSELF

The word "bilge" commonly implies the bottom of a boat on the interior and the pump used to remove water that may leak in is termed a bilge pump. This name, however, has been widely applied to all kinds of pumps for removing seeping or leakage water.

Such a pump operated by electricity is shown in the illustration. It operates upon the centrifugal principle. One of the advantages of such an equipment is the fact that it may be equipped with a float which automatically starts and stops the motor according as the water level rises or falls.

### THREE IN ONE LIGHTER

A clever combination of an electric flashlight and a flame lighter for lighting the gas or a cigar has been placed on the market. The combined arrangement of the three devices is shown in the illustration. The case is of metal, highly finished and nickel plated. As indicated, a part of the case body is covered with a substantial cloth.

### "MAGNETIC GRABBER"

Owners of automobiles who have dropped nuts or tools into oil filled gear cases and then tried to get them, will appreciate the worth of the little electro-magnetic lifting tool here shown.

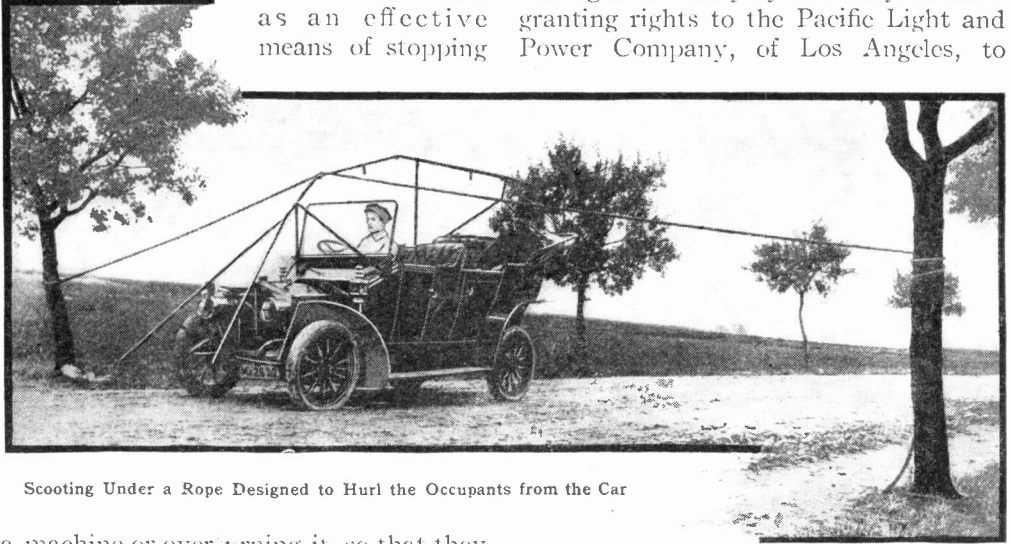
This tool is designed to operate on six to ten volts, from either dry cells or storage battery. When the thumb is pressed on the little button, as shown on cut, the tool becomes magnetized and will lift from three to five pounds, according to the strength of current. It is also useful for removing valves from the cylinder, finding nails in tires, removing chips from the oil in a crank case without removing the oil. This device is also designed to meet the demand from the machine trade for removing borings from holes to be tapped. For this purpose there is a 10-32 tapped thread for the end of the magnet, so that the user can make a curved or straight extension for the purpose of reaching a longer distance.

### CORRECTION

In the August, 1913, issue, page 393, in the article "Electricity Shows New Gas in Hydrogen," the statement is made that hydrogen peroxide differs only from water by having an extra atom of hydrogen in the molecule. This is incorrect, since the chemical formula is  $H_2O_2$ , there being two atoms of hydrogen and two of oxygen to the molecule.

## FOILING GERMAN AUTO THUGS

Automobile tourists in Germany at times are intercepted by desperate thugs, who stretch a stout rope from tree to tree across the road as an effective means of stopping



Scooting Under a Rope Designed to Hurl the Occupants from the Car

a machine or overturning it, so that they may rob the passengers at their leisure. A mechanic of Erfurt has invented the device here illustrated, which permits the motorist to set aside his fears of the rope trap; the device extends well down in front of the machine and will either break the rope or cause it to pass above the machine and over the heads of the occupants.

## LIMIT OF UNAIDED VISION

The ability to discern the star Alcol, at the tail of the Great Bear, has been held to be the test of the limit of human vision unaided by any glass. Very rarely is the eye of such power as to see the satellites of Jupiter, though there are of record two or three instances, the third satellite being the most distinct of those seen.

It is said that the Peruvians are the "longest-sighted" race of all. There is recorded by Humboldt the case of Indians in that country who perceived a human figure eighteen miles away, being able to recognize it as human and clad in white.

## BIG WATER POWER PERMIT GRANTED

The largest water power permit ever issued by the Department of Agriculture was signed recently by Secretary Houston granting rights to the Pacific Light and Power Company, of Los Angeles, to

operate power plants in the Sierra national forest. Electric power will be carried 240 miles to Los Angeles and vicinity at 150,000 volts, said to be the highest commercial transmission thus far attempted.

On account of the magnitude of the work and the amount of power to be disposed of, the permit allows twelve years for construction. Four power houses, two reservoirs and 25 miles of cement lined tunnels will be built.

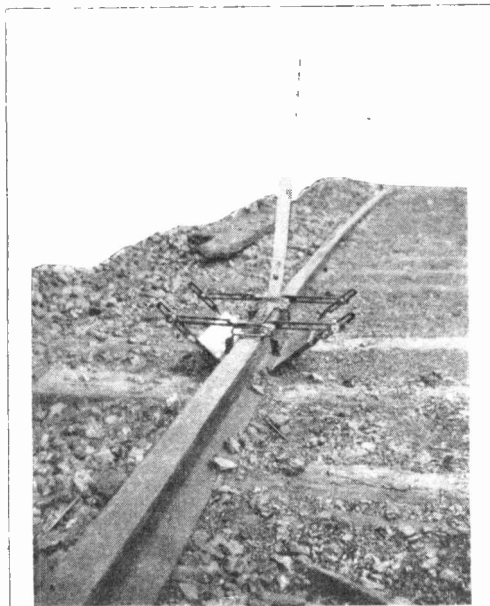
## AN ESSENTIAL TO DAIRYING

Electricity is perhaps more essential to a dairy than to any other place and the purity of the milk will be more likely to be preserved in an establishment where the air is not overheated by the illuminant used.

Moreover, a dairy should always have the appearance of scrupulous cleanliness and the entire absence of dust and dirt, which can only be accomplished with incandescent lighting.

## MIRRORS FOR INSPECTING RAIL JOINTS

A device for inspecting rail joints embodies mirrors which fit down on each



Rail Joint Tester

side at the proper angle to enable the section foreman or track-walker to make a thorough examination from a standing position, observing both sides at once.

## A REAL OLD-FASHIONED FIREPLACE

A real old-fashioned fireplace is something which every one of us has heard about but very few have ever seen. This picture shows the real thing. In "bungalowing" an old Haverhill, Mass., house the ancient fireplace has been retained in all its details, just as it was in the year 1700. Here you see also the bellows, tin



An Old Fireplace and the Odd Utensils Used Long Ago

lantern, frying pan, Windsor chair, kettle, candle-stick, candle snuffers, etc.

## CLOTHING AS AN INSULATOR

In dealing with persons suffering from electrical shock, if the victim remains in contact with the circuit, his body must not be touched by the rescuer, but the latter may pull him out of contact by hauling on the clothing, or he may take off his own coat, insert his hands in the sleeves and then handle the victim with little or no risk.

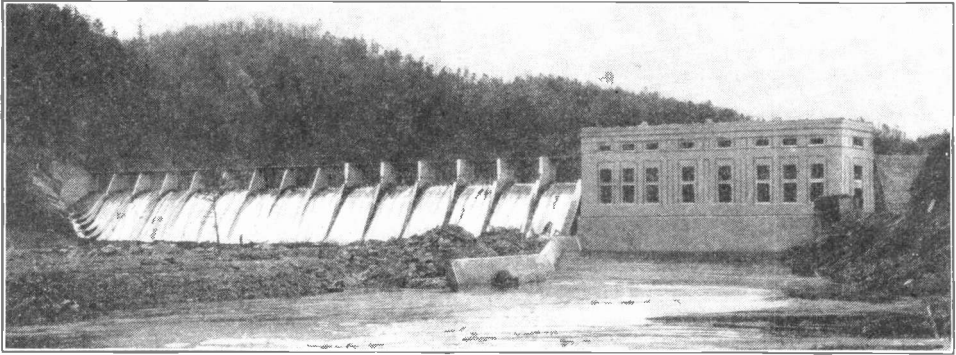
Almost any article of clothing or material may be used, provided it is dry and of moderate thickness. It has been pointed out that death from electrical shock is only an apparent death at that, and there is practically always a time during which it is possible to resuscitate the victim by artificial respiration.

Three of the largest cities in Europe — Berlin, Paris and London — have all together only a few more telephones than the city of New York. The statistics recently published disclose that there are 210,000 telephones in the German capital, only 92,000 in Paris, and 235,000 in London. In New York there are more than 500,000, or almost as many as in three great European cities combined.



# A Miracle of the Age

BEING A SHORT STORY OF A MODERN IDEA GENERATED AMONG POSSIBLY THE MOST CONSERVATIVE PEOPLE IN THE COUNTRY

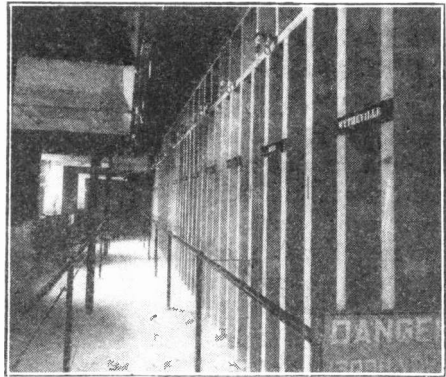


Second Hydro-electric Power Plant at Byllesby, Va.

If one had ventured a very few years back to suggest that anything could be done in the way of change or development among the mountains of West Virginia one would have been laughed at. It had for so long been a country regarded by the general public as of a class by itself, primitive and pre-revolutionary. To-day it stands self confessed the pride of America, for out of its own natural resources it is giving that backbone to the nation, that not only makes its people but its wealth. One has but to refer for a moment to the enormous coal resources—the Pocahontas coal fields famous the world over—and then to the pertinent fact that it has produced one of the greatest hydroelectric developments of the day. Just think of it!—the mountains of West Virginia and Electricity. Yet so it is. And from the Blue Ridge Mountains and the New River with head works in Bluefield there is being generated a source of power that ranks very high among all the power developments of the United States. In all the South there is none to equal it, except say that of the Chattanooga and Tennessee River Company at Hales Bar, fifteen miles from

Chattanooga, but this later product of the Appalachian Power Company has probably greater possibilities for it serves many states, the “Old Dominion” of course included.

The Appalachian Power Company was organized in May, 1911, being incorporated in Virginia. In June of that year preliminary work was started upon the construction of the dams and power stations. Before April 1, 1913, two water

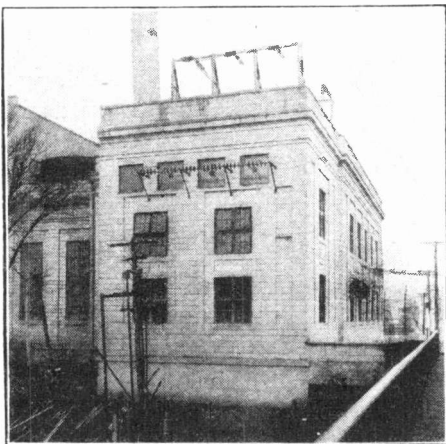


Interior of a Transformer Station Showing Separate Concrete Compartments for the High Voltage Switching Apparatus

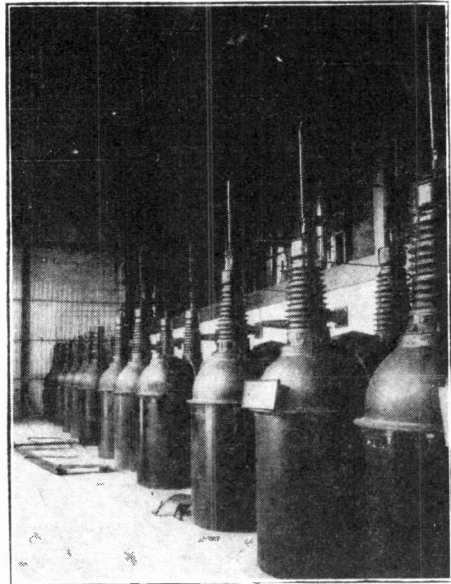
power developments with a combined installed capacity of 29,000 horsepower had been completed and in operation several months and there had been constructed 402 miles of transmission lines, to which was connected a combined load of 26,173 horsepower in fourteen municipalities, 39 mining operations and a number of isolated industries.

The two existing developments of the power company generate but a fraction of the power which it is possible to derive from the total of six power sites owned. These power sites, only two of which are so far utilized, are all upon the New River in Carroll and Pulaski counties and combined are capable of producing not less than 90,000 horsepower. As power demands of the district served increase, additional water power developments can be made at minimum cost, the present transmission lines running close by. In the chain of developments the same water is used repeatedly, and the succession of dams enables storage combinations of the greatest value. The company also controls two sites for the creation of immense storage reservoirs on the high reaches of the river above the first power site.

The flow of the New River has been measured and records made by the government's experts for a long period of



Exterior of the Substation at Roanoke



Immense Oil Switches for Controlling the 88,000 Volt Current

years. The river drains a territory which has the highest altitude of any considerable area east of the Rocky Mountains. The rainfall in this drainage basin is high, being about 60 inches annually and the country drained is covered with springs, many of them large. The entire drainage basin is heavily timbered. These conditions are favorable to a large runoff of water per square mile and also a well sustained flow throughout the year.

The power sites owned are entirely within one state on a non-navigable stream. The property is held in fee simple.

Bluefield, the operating headquarters of the Appalachian Power Company, is the metropolis and gateway of the Pocahontas coal fields. It is situated among the hills in the Allegheny Mountains and contains the great railway yards of the Norfolk and Western Railway Company in which the east-bound trains are assembled.

Private telephone lines, installed on the transmission line poles, connect the entire system. Telephones are placed at

each substation as well as at many of the coal mines. All load dispatching is done by telephone direct to and from the transformer station at Bylesby.

There are seven 88,000 volt substations constructed of brick, steel and concrete and equipped with the most modern apparatus. These are the transformer houses at Bylesby, at Roanoke, Pulaski, Saltville, Bluefield, Switchback and Coalwood. The distribution throughout the coal fields and to a number of the communities and industries is over the 13,200 volt lines which radiate to twelve substations and 72 transformer banks. Steam reserve plants are located at Pulaski, Switchback, Welch, Marion, Wytheville, Radford and Roanoke.

The system has been organized and is being operated by the firm of H. M. Bylesby and Company, New York and Chicago.

### BEST POLICE DOG IN NEW YORK

This dog "Dian von Buron," is rated as the best trained dog in the police department of New York City. It is a German shepherd dog and was purchased from the German government. There is to be a demonstration of the work of the

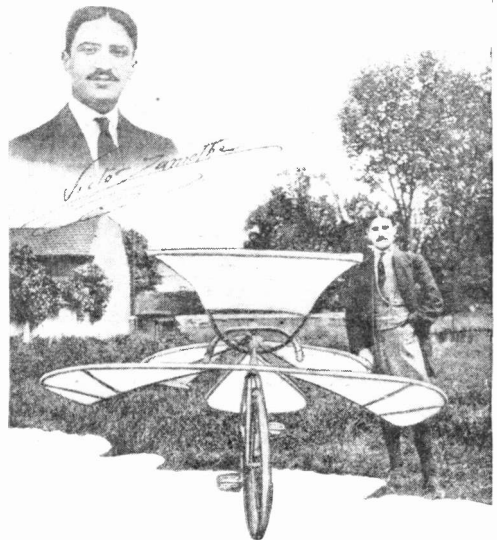


Dian von Buron, Champion Police Dog

police dogs at Van Cortlandt Park with the object of showing the public the value of these dogs in running down criminals. The German shepherd dog has proved to be the best for police work. The police department of Berlin has 1,956 dogs attached to the department. A well trained dog is worth about \$200.

### FLYING BY HUMAN MOTOR

The question of flying by the power of the "human motor" is one of the newest ideas, and some enthusiastic amateurs



The Flying Bicycle and Its Inventor

are at work in the hope of succeeding with the flying bicycle or "aviette" as it is called in France. One of the new flyers is made by Victor Lamothe and as will be noticed, it is very well supplied with wings, somewhat on the aeroplane principle. There are used two pairs of wings, one in front and the second at the back of the bicycle, both pairs being about alike in general shape. Over the back wheel is a tail which serves for steadying, and strapped to the front handle is a frame of peculiar shape. Given a good start on the ground, the inventor hopes to be able to fly for quite a good stretch

before alighting. Besides being a good subject for sport and amusement, the aviette may be able to fly over stretches of bad ground or small creeks, and perhaps even over rivers.

### TELESCOPE SPECTACLES



Telescope Spectacles for People Troubled with Nearsightedness

Telescope spectacles of German design have been introduced for the benefit of persons suffering from extreme myopia or nearsightedness, and by amplifying the retinal image are a powerful aid to vision. They consist of two components, a large converging front lens and a smaller diverging lens near the eye. The radii of curvature of the two components are such that when the wearer looks at an object in a direct line his vision will not in any way be marred by distortion astigmatism due to oblique pencils and perceptible color effects.

It is maintained that the practical tests

of Prof. Hertel, now Director of the University Eye Hospital at Strassburg, show that spectacle telescopes of small magnifying power are much to be preferred in the majority of cases. In these glasses the size of the retinal image is increased about 30 per cent as compared with the natural image and hence is comparable in its ophthalmic effect to the correction obtainable by operation.

### MINE RESCUE CAR

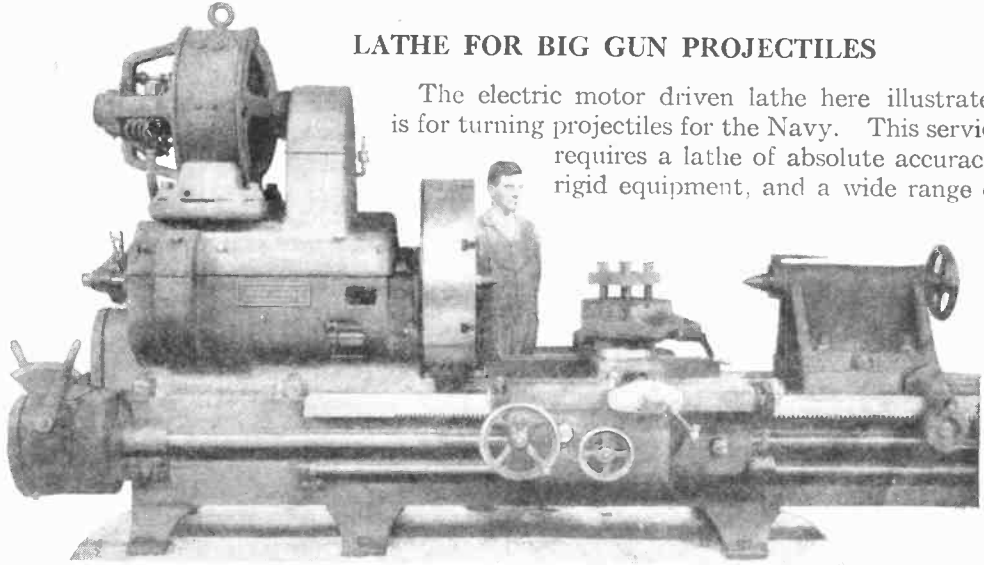
Mine rescue work has progressed one step farther by the adoption in some European mines of the car and apparatus here shown. The members of the rescue party wear oxygen helmets and generators of the Draeger type which enable them to go about safely in gas laden



Prepared for Mine Rescue Work

atmospheres. They ride on a small car upon the rails of the mine road, propelling it by a bicycle type of gearing. The car carries also a "pulumotor" for resuscitating asphyxiated miners. In front is an electric headlight with good sized storage battery to provide current.

To the hairdresser electric heat is serviceable when shampooing to dry the hair and for heating curling tongs.

**LATHE FOR BIG GUN PROJECTILES**

Electrically Operated Lathe for Turning Big Gun Projectiles

The electric motor driven lathe here illustrated is for turning projectiles for the Navy. This service requires a lathe of absolute accuracy, rigid equipment, and a wide range of

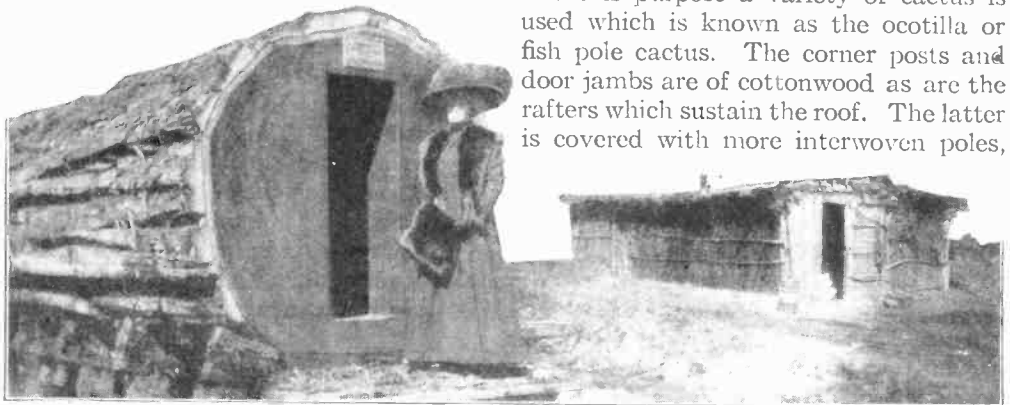
speed; a very high speed is necessary for finishing the point of the projectile. The lathe was especially designed for the service named and also for individual motor drive. The motor is placed on the lathe head; this location reduces the vibration to a minimum so that accuracy can be obtained, at the same time there is no danger of injury to the operator from coming in contact with the motor or the gears.

**TWO ODD HOUSES**

The trees of the Pacific Slope are of such huge size that a small one has been hollowed out to make a house or cabin. This is really a small specimen compared to the giant redwoods, which are so large that a

dancing pavilion has been erected on the stump of one sawed off near the ground. However, the "small" specimen is fairly sizable as trees go.

This dwelling of an Arizona Indian is built on the principle of a basket, the walls being woven of slender withes. For this purpose a variety of cactus is used which is known as the ocotilla or fish pole cactus. The corner posts and door jambs are of cottonwood as are the rafters which sustain the roof. The latter is covered with more interwoven poles,



House Dug Out of a Giant Redwood

Dwelling of an Arizona Indian Built on the Principle of a Basket

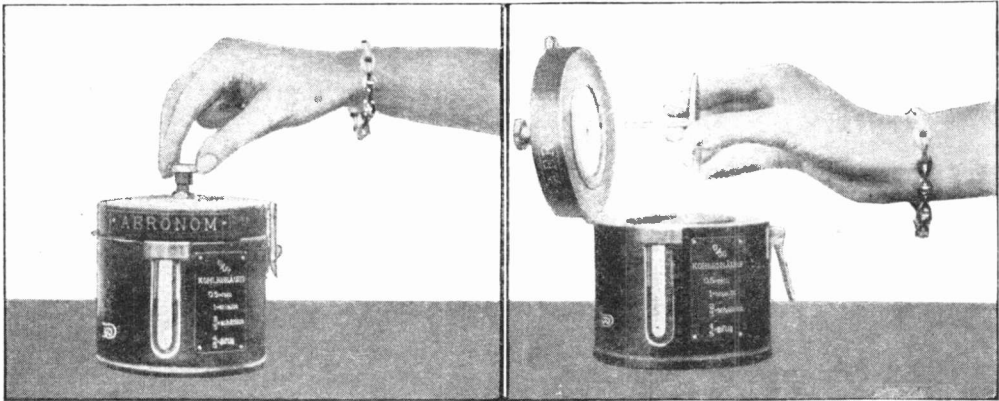
which in turn are plastered over with mud to shed the water, and the walls are also liberally chinked with the same substance.

### TESTING THE AIR WE BREATHE

The barometer and the household thermometer are soon to share their popular favor with a little instrument called the Aeronom, an apparatus of German origin. Originally inspired to

in doing this upsets the balance previously existing between this pent-up air and the atmosphere outside. A U-shaped tube, with its ends open, is the connecting medium between the free air and the air under test, but the open circuit is blocked by a double column of colored liquid — this is the registering device on the outside of the case.

When the weight of the air inside is reduced by the withdrawal of the carbonic acid gas, the outside air presses



Apparatus Sealed and Ready to Test the Air Within

Metal Disk Withdrawn Exposing the Pads Saturated with Caustic Soda

detect the presence of fire-damp in coal mines, it is rapidly growing in favor because of its facility and accuracy in measuring the carbonic acid gas in the air we breathe. It is the harmful prevalence of this element hurtful to animal life that is noticeable in a crowded or badly ventilated room.

The operation of the apparatus is dependent upon the action of caustic soda, which, as you probably know, has a strong affinity for carbon dioxide. Pads of test paper, charged with a five per cent solution, are kept sealed in the under side of the airtight cover. The air to be tested is confined within the instrument and exposed to the absorptive action of the chemical.

This extraction of the  $\text{CO}_2$  actually reduces the weight of the remaining purified air within the instrument, and

down to restore the equilibrium — incidentally lowering the fluid in one column and raising it in the other. The difference so produced gives a volumetric index of the amount of carbon dioxide originally in the tainted atmosphere.

### YOU PAY FOR WHAT YOU GET

Electricity cannot be adulterated, and the meter measures energy and not electricity. The light, heat or power depends on the energy and the energy is equal to the quantity of electricity times the voltage. Now if the voltage is not kept up, the light will be dimmer and the motors will run a little slower, but the meter will also run slower, so that if good service is not given, neither is it paid for; thus the meter automatically protects the customer.

# Electrical Men of the Times

J. ROBERT CROUSE



Marshall Barnes has said that "the millennium will come through co-operation" and this thought is the keynote in the life of J. Robert Crouse, manager of sales of the National Quality Lamp Division of the General Electric Company.

John Robert Crouse was born on New Year's Day, 1874, at Hartland, Mich. He grew up in the wholesome outdoor environment of this typical American small town and later moved with his parents to Cleveland, Ohio, where he

attended the Cleveland High School from which he graduated in 1893.

He continued his studies at the University of Michigan, obtaining his degree of bachelor of arts four years later. While attending the university he became a member of the Delta Upsilon fraternity, editor of the Palladium and was acknowledged as one of the most popular men in the university.

Immediately after his graduation he entered the employ of the Fostoria Lamp Company, Fostoria, Ohio, as a lamp



salesman. His selling ability, good business sense and pleasing personality soon proved him to be a most valued employee. The year following his start with this company he married Fanny E. Clark, and is now the father of six lively children. In due time he became a director of the Fostoria Lamp Company, which position he held until 1901, when he became manager of sales for the National Electric Lamp Association, of which the Fostoria Lamp Company was a part. He was also made a member of the advisory board of this corporation at the same time.

When the National Lamp Association was merged with the General Electric Company and became the National Quality Lamp Division, Mr. Crouse retained his position as manager of sales and member of the advisory board.

In appearance Mr. Crouse is well set up, of medium height, square jawed and smooth faced, with keen, twinkling eyes and a generous growth of black hair. He is the picture of good health. Elbert Hubbard says of him: "In America we have evolved a new kind of man. We call him the American type and the best specimen brick I can now think of is J. Robert Crouse. He believes in co-operation and can do team work with a vast number of men. J. Robert Crouse recognizes the good in everybody and everything. He would make a splendid president of the United States." Mr. Crouse always works at top speed without appearing to do so. He never seems to be hurried or irritated by interruptions and yet he accomplishes a vast amount of work by making every second count. There is no lost motion about him. He inspires everyone with his cordial cheerfulness and ever-present enthusiasm."

Uncle Joe Cannon has a rival in Mr. Crouse as a human perpetual cigar holder. However, there is a difference: Uncle Joe likes Pittsburgh stogies and smokes them, while J. Robert Crouse prefers a better brand and instead of smoking them, he simply holds them in his mouth.

Looking back a decade ago, we find him struggling, in the face of discouragement from every side, to bring electrical men into a more friendly, mutually helpful relation. He was, perhaps, the first man to see that the great defect in the rapid growth of the electrical industry was the lack of co-operation between electrical men and that much of the future development of the business required the transformation of the bitter hate that has existed until recently into a more amiable attitude. Mr. Crouse was mainly instrumental in organizing the Co-operative Electrical Development Association, which was the forerunner of our present day spirit of "all-together-all-the-time-for-everything-electrical." The recently formed Society for Electrical Development, of which Mr. Crouse is a vice president, owes much to him for his vigorous efforts past and present.

The name of J. Robert Crouse, seventh Jupiter of the Sons of Jove, is writ large in the annals of the society and its co-operative principles have won the best efforts of Mr. Crouse at all times.

Mr. Crouse is an enthusiastic champion and an earnest worker in every electrical organization which tends to promote friendship and an interchange of business. The People's Electrical Page which now appears once a week or oftener in the daily newspapers in many of our larger cities is one of the J. Robert Crouse projects. These pages contain a certain amount of popular reading matter on electrical subjects, interspersed with advertisements from local electrical firms. This method of co-operative advertising is many times as effective as the old method of small scattered advertisements. It is especially valuable to firms who do not feel that they can afford to purchase a large amount of advertising space.

The sales value of familiarizing the public with new electrical machinery and appliances and their uses through the reading matter in these pages cannot be overestimated.



# Electrical Interests of Women



EDITED BY GRACE T. HADLEY

## Illustration of New Domesticity

"Now that I'm settled, come and see me," urged Mrs. F. cordially. She had recently moved to one of the suburban towns of a large city and was chatting with a friend whom she had not seen for some time. "Come out this afternoon with me."

Luncheon in a fashionable tea room having been concluded, Mrs. F. piloted her friend via steam train to a pretty suburban town about 25 miles from the metropolis. A walk through shady, well paved streets brought them to a seven room house on a pleasant corner, a home delightfully open to the sun and fresh air.

"While I was getting settled," ran on Mrs. F., "a maid servant presented herself at my door one day and asked if I did not need help. I was so tired I said "Yes" at once and had her come right in. Well, I think she must have had the dropsy or some similar affliction for she dropped everything she touched. She dropped the kitchen clock, she dropped my percolator and then she dropped my new electric iron on a granitoid floor which broke the porcelain socket and damaged the stand. Well that nearly broke my heart, for the iron was brand new, so when the week was up I eliminated the maid, exchanged my electric iron for another and got a vacuum cleaner. Those are now my two faithful servants and with their help I do my own work.

"On Monday a laundress comes who washes for me from nine until four at 35 cents an hour; then on Tuesday I do

my own ironing with my new electric iron and I have found that many things such as sheets and other pieces can be folded and put away without ironing. They are so fresh with air and sun I do not mind doing this. There was a time when I thought every piece had to be smoothed with a hot iron but after keeping house for eight years I have learned to save my strength in every possible way. Then I sit down to the ironing

"She Dropped Everything  
She Touched"





"Then I Sit Down to the Ironing Board"

board and with my electric iron I do all the starched pieces. I have discovered that with an electric iron I do not have to stand up and press down and now the work is so much easier for me I almost look forward with pleasure to ironing day. I do not dread it as I used to.

"Then on Wednesday I take my electric vacuum cleaner and go over the house and it is so much easier than sweeping. In fact I cannot sweep any more. You remember those little lines you sent me once, 'Time was when a bug could live swell in a rug!'"

The visiting lady nodded brightly, "Did they interest you?"

"Yes, they made such an impression that I made up my mind no bug should live swell in my rugs, and they don't when you get after them with a vacuum cleaner."

"Then you find electric household helps truly helpful?"

"Yes, and let me tell you something," Mrs. F. lowered her voice to a confidential whisper. "I take for myself the \$25 which would be the wage of a servant;

adding that to my own pin money or personal allowance, I can always bank a neat little sum every month and if you promise not to breathe it to a living soul, I'll tell you what I am going to buy with the money."

The visitor most readily promised and the balance of the conversation is another story.

### A WOMAN'S PSALM

Electricity is my servant; which doeth my work.

It enableth me to take mine ease.

It giveth me longer sleeping hours.

I hold its service in my hand.

I control it with my finger tips.

It prolongeth my life.

It maketh my coffee. It toasteth my bread.

It maketh me live in comfort.

It heateth the water for my husband's shave.

It supplieth my bedroom with cool fresh breezes during slumber hours.

It cleaneth my rugs and my carpets; the walls of my house, and my furniture.

It washeth and ironeth my clothes.

It heateth my rooms. It curleth and dryeth my hair.

My house would be incomplete without it.

It replaceth my hot water bag and easeth my sufferings.

Yea, though I leave the house at nine in the morning,

Lo when I return at six p.m. my evening meal is cooked.

My electric fireless cooker doeth it.

By night it showeth me my way with its light.

It keepeth me from dark places and bad bruises.

At night it warmeth the milk for my baby.

Last but not least it keepeth my husband in a cheerful and happy mood.

Yea, though I sit up nights to read by its light I would not be without it at any price.

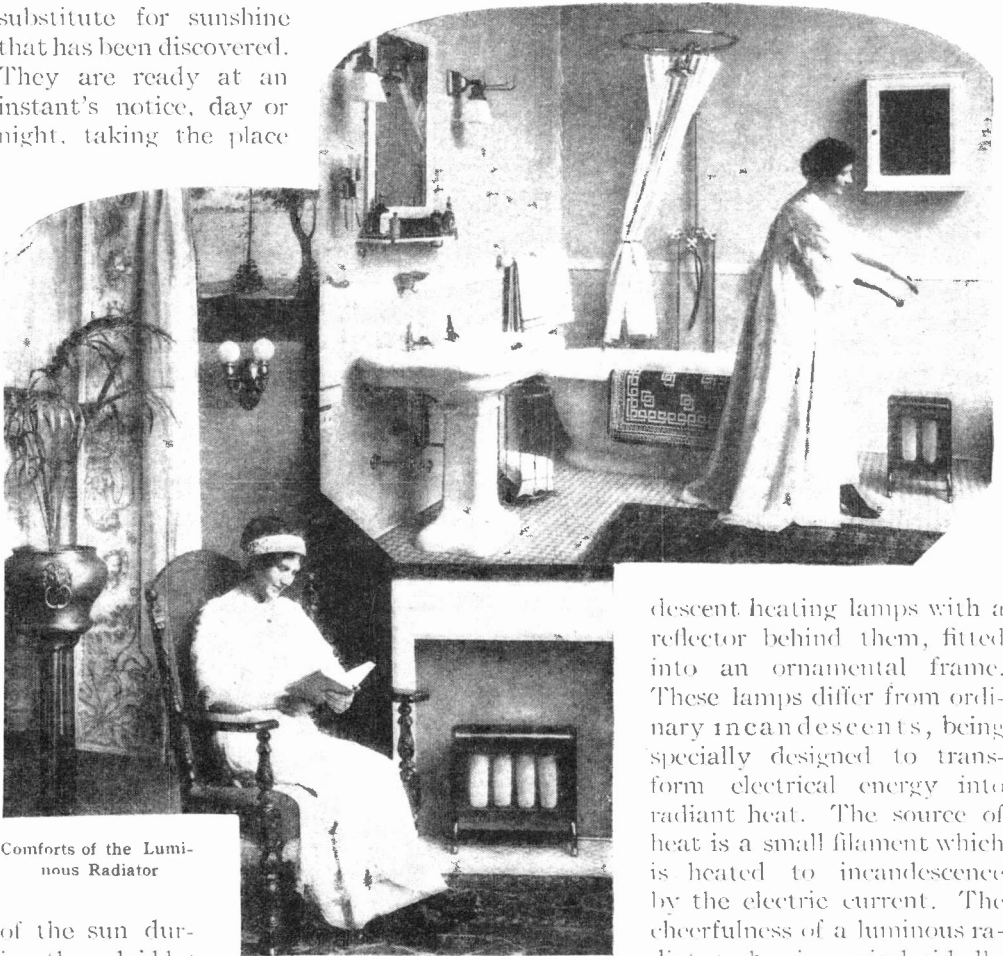
J. H. PETERSON.

## RADIATOR WHICH RIVALS THE SUNSHINE

Electricity now rivals sunshine in warmth as well as light. The sun heats by warming the objects in the path of its rays; that is, it is a source of radiant heat. It heats without danger, fire, dirt or odor. So do luminous radiators. Their heat is the nearest substitute for sunshine that has been discovered. They are ready at an instant's notice, day or night, taking the place

is a luxury, and its cost for operating is not expensive. While considerable power is required, usually 2,000 watts, the time of service, fifteen to 20 minutes, is short. The cost need never exceed ten or fifteen cents for warming the room for the morning bath.

The luminous radiator consists of three or four large cylindrical incan-



Comforts of the Luminous Radiator

of the sun during the chilly evenings and aiding the sun during the day. With luminous radiators one can enjoy the cozy warmth of electric sunshine at any time. They dispel the chill, gloom and dampness by their radiant rays, rivaling the sun in this respect.

The electric radiator in the bathroom

descent heating lamps with a reflector behind them, fitted into an ornamental frame. These lamps differ from ordinary incandescents, being specially designed to transform electrical energy into radiant heat. The source of heat is a small filament which is heated to incandescence by the electric current. The cheerfulness of a luminous radiator when in use is decidedly attractive and by employing

this method of heating, the benefits of an open fire with none of its drawbacks or inconveniences are available. The radiator may be installed permanently in the fireplace, though in such case the chimney should be hermetically sealed up by cement or other effective means.

## RESPONSIBILITY OF THE HOUSE-KEEPER

There is a legend, familiar to all of the older generation, which may profitably be read anew by all. It is the story of the lady who went to her confessor with a tale of domestic trouble. Her beautiful home was ill-kept, her goods were wasted, her servants deceived her, her lord found fault with her extravagance. What prayers might she offer, what holy deed perform, that would bring peace and comfort and prosperity again to her house?

The monk handed to her a little box, with the direction that every 24 hours she was to carry this box to a different part of the mansion and lay it there, and this she was faithfully to do for six months, at the end of which time she was to tell him whether any change had taken place in the affairs she was then lamenting.

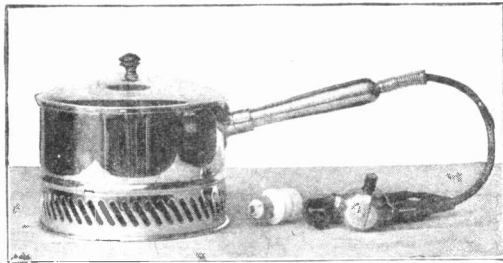
At the end of the half-year the lady returned with joy written on her face. "Father," she said, "what magic is in that little box? All has become order and peace and content in the home where six months ago was naught of either of these." "My daughter, look," said the old man. And lo! The box was empty. "I gave you no magic," he continued, "but in obeying my directions you have daily visited some corner of your house which would otherwise have been an unfamiliar spot to you. In going about thus you have noticed here a slight disorder, here a small repair to be quickly made, elsewhere a suggestion to give which has prevented something being thrown away. Your servants have learned to know that sooner or later whatever they either neglected or did well would fall under your eye, and they preferred praise to blame. Praise has brought content into the servant's hall, order and thrift and harmony have brought peace and comfort to you and to your lord. Give me the box, my daughter. You have learned the lesson

that the mistress' eye must fall constantly upon every corner of the home she would keep happy for those she loves best."

Would you have interest, faithfulness, care of your property on the part of those who serve you? Show interest, be faithful to your own position, care for your own possessions. Carry your box of praise, encouragement, warning, suggestion, daily to some part of the house. —MARY C. SHORTALL.

## ELECTRIC SAUTÉ PAN

The electric sauté pan is a cooking utensil designed to take the place in a large measure of the regular cook stove in the kitchen. It is especially suitable for frying in deep fat. It is made of nickel plated steel with cooking compart-



Sauté Pan

ment formed of heavily tinned copper welded to the frame. The heater is hermetically sealed in the bottom of the cooking compartment. There are three heats controlled by an indicating snap switch.

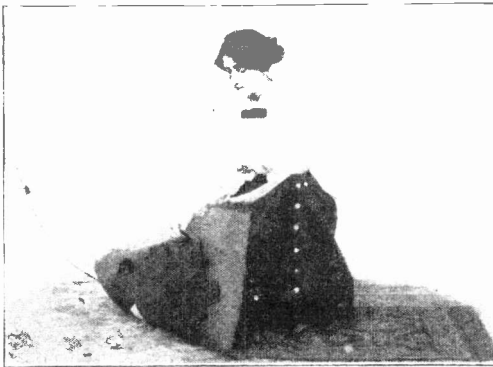
To the woman who takes delight in cooking, there are scores of applications for this utensil which will suggest themselves immediately. Crullers, for instance, are among the number, and the New York Edison Company, which suggests the recipe given below, is authority for the statement that the quantity called for can be cooked at a cost of only six cents for current.

1 cup of sugar	1 cup of milk
½ nutmeg grated	3 eggs
2 teaspoonsful of baking powder	1 quart of flour
1 tablespoonful of butter	½ teaspoonful of salt.

Sift flour with baking powder and salt; cream the butter and sugar, add eggs well beaten and the milk and nutmeg. Stir in the flour. When well mixed this should be a stiff dough. Roll out on a well floured board and cut with a small round cutter. Use electric frying kettle for cooking crullers; have it about half full of lard. Turn current on to full heat and when the lard is very hot, drop in the crullers. When they are light brown on all sides take them out and lay on brown paper and sprinkle with powdered sugar. The fat should be hot enough so that when the crullers are dropped in they will immediately come to the top.

### HEATERS UNDER THE CARPET

The ideal way of heating a room would seem to be to heat the floor itself, for in that way the feet are kept warm, which is essential and with proper regulation the interior could be kept at the proper temperature for comfort. To meet this



The Heater Is Attached to Any Carpet or Rug

requirement, a special type of electric heating pad is now manufactured, to be fastened to the under side of the carpet. Current is taken from the lamp socket through a flexible cord and the arrangement of the resistances is such that the carpet cannot become heated to the danger point. In fact, there are three degrees of heat that can be obtained at will — all perfectly safe.

### NEW USE FOR ELECTRIC FLATIRON

An electric flatiron can, by the use of a simply constructed metal stand, shown in the illustration, be used as an electric



Toasting Marshmallows

toaster stove. The stand holds the iron upside down, so that its hot ironing surface can be used for a number of purposes, as toasting marshmallows, frying bacon, heating water, making toast or frying an egg. The iron, of course, can be attached to any convenient electric light socket. The stand can be made by anyone, from metal strips, at a very little expense and the new convenience is well worth the trouble.

### SUEDE TRAVELING BAG CONTAINS SURPRISE

The latest thing in electric irons, for travelers, comes in a suede bag, with a silk draw string and resembles in its outside appearance, a large pair of opera glasses. The contents of the bag are, however, surprising in their variety.

First, there is a nickel plated iron weighing a little less than three pounds. Then there is a pressed steel band, into which the iron fits upside down, so that it may be used as a stove. Both the iron and the stand fit inside a nickel plated cooking vessel the exact shape of the iron and provided with a cover.

The bottom of the vessel extends downward at the edge, so that when it is placed on the iron, it will not slip off. In the square end of the iron is a hole, into which a pair of curling irons may be

inserted to be heated. The usual length of flexible cord and plug comes with the outfit. Everything packs away neatly inside the cooking vessel, which in turn goes into the suede bag.

## ELECTRIC TABLE RANGE



The electric table range is a completely equipped kitchen for the table. The smallest, most attractive and yet most efficient cooking utensil that can be imagined, a stove, a kettle and a stew pan and the whole of it not larger than five inches by ten, with a detachable cord connection for the usual lamp socket.

The stove mounted on a marbleized base which has rubber tipped feet is equipped with a three heat switch permitting economy of operation. The kettle and stew pan, each holding a pint and a half, are made of seamless copper, finely nicked and furnished with ebonized wood handles. The pans have grooved bases which insure a tight fit when they are in use on the stove and therefore utilize all possible heat for the food, as well as prevent any accidental overturning of the utensils.

It is possible to prepare a whole meal on the table range, in fact one can do anything but bake or roast with it. For breakfast it is extremely convenient and permits the serving of two or three people in the most dainty and appetizing manner. While coffee or some other hot drink is preparing in the kettle, cereal or eggs or sauté potatoes may be cooked in the stew pan. After this the pan may be removed, keeping the coffee on the stove and on the other end a few slices of toast may be browned. Chops may be broiled quickly on the stove or it may be used for griddle cakes or bacon. With the use of a muffin ring the stove may be further utilized for muffins, fried eggs or fish cakes.

The table range is a kind of kitchenette that may be literally carried around from the breakfast room to the drawing room for afternoon tea or wherever one's



ingenuity may suggest and wherever there is a convenient lamp socket. For entertaining in a novel and attractive manner, there is nothing like this and other electrical devices that so successfully meet the requirements of a small company through the intimacy and individuality of their use.

The table range is most convenient for preparing an impromptu supper after the theater and there are the candy feasts and all the delicious variety of chafing dish cookery.

More and more the American housewife appreciates the refinement of personal supervision of table cooking and with the electric table range there is an added zest in what one eats by reason of the absolute cleanliness and lack of trouble in the preparation of food in this way and after that, there is still the fun of doing it in the best possible way.

#### TABLE RANGE BREAKFAST MENU

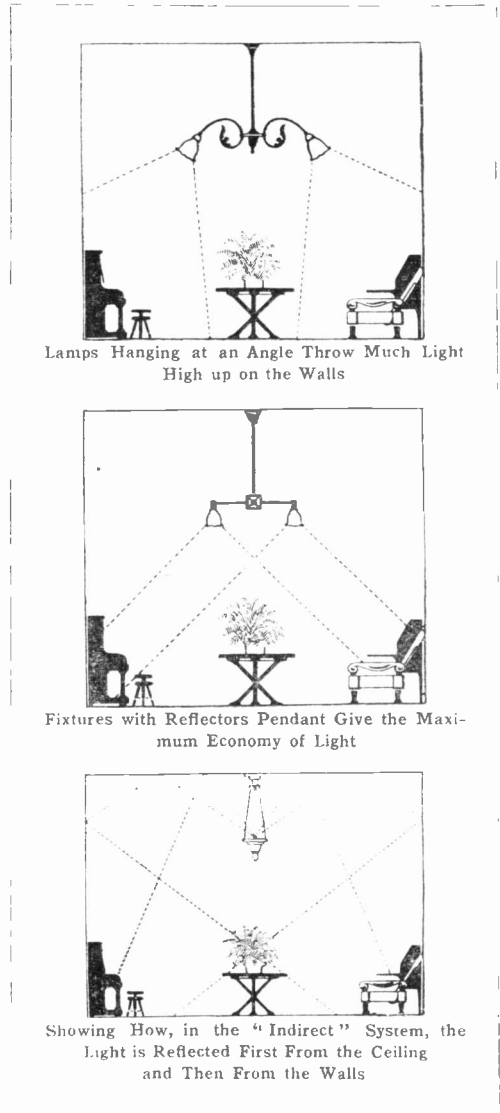
Fruit in season.  
 Favorite cereal.  
 Eggs Just-Rite.  
 Bacon sliced thin.  
 Perfect toast.  
 Electric coffee.

#### CONCERNING FIXTURES

Each season sees new styles in fixtures. One would say, off-hand, that selection of fixtures is wholly a matter of taste, but this is only partly true. A few principles of correct lighting should be remembered in the selection of fixtures, as well as the cardinal rules of good taste.

Ceiling fixtures in which the lamps hang at an angle should generally be avoided. This is because such fixtures do not hold the lamps in a position to secure the greatest practical efficiency from lamps and reflectors.

It will be seen that the light from an angle fixture is thrown largely against the sidewalls and no matter what type of reflector is used, this waste of light continues. On the other hand, with the



lamps hanging straight, as in the second diagram, the light is distributed in useful directions and the reflectors, of course, add materially to the efficiency of the unit.

In the case of "indirect" lighting, practically all of the light is thrown to the ceiling and thence distributed and diffused over the whole room. The resulting illumination is almost shadowless and particularly desirable where a soft effect is wanted.

Combination fixtures, excepting side-wall brackets, are invariably makeshift designs. It is almost impossible to secure such fixtures of sufficient artistic merit to warrant their being installed in any home of refinement. They are a heritage of the "old days" when electric service, being new and in an almost experimental stage, was necessarily unreliable. To-day electric service is even more reliable than gas.

The finish of fixtures is an important item. Practically all finishes change somewhat with age. This point should be remembered by those who expect to duplicate or add to their equipment at some future time. The finishes best suited to residences are those upon which fly-specks and corrosion are not quickly apparent. Hammered finishes, *verde antique* and similar informal finishes look well for years, do not tarnish and give satisfaction.

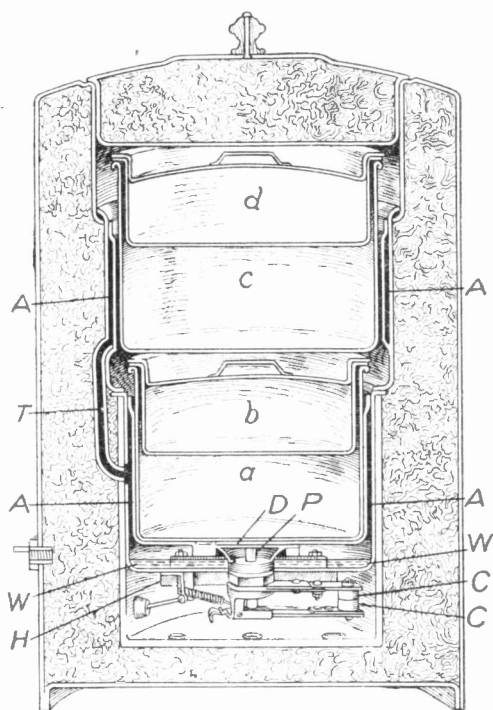
### NEW AUTOMATIC ELECTRIC COOKER

In a new automatic electric cooker, shown herewith in diagram, conservation of heat is carried to the fullest extent and consequently the cost of operation is low. Heat which usually escapes by radiation is conserved by insulation, while the distillation or latent heat losses are kept extremely low by the automatic temperature control employed.

The food is placed in aluminum vessels which, when placed in the cookers, are in close contact with the walls. The current is next switched on and when the food is heated to cooking temperature the current is automatically switched off; the food cooling slightly, the current is switched on again. This automatic feature keeps the food constantly hot and cooking until ready to serve.

In the section shown, the double walled steam chamber is indicated by (A) in the bottom, a small quantity of water (W) is boiled and partially changed to steam by the heat from heat element (H). This

steam fills the space (A). The food compartments (a), (b), (c), (d), being in contact with the walls are heated evenly and at the same time. When the pressure of the steam is sufficient to overcome the spring in the diaphragm (D), which is like the bottom of an oil can, snapping downwards and acting upon pin (P) it forces open the switch contacts (C), thus cutting off the source of heat. When the walls cool slightly the pressure is reduced and (D) snaps back, closing the switch. This controls the temperature so exactly, without any adjustable apparatus, that



Automatic Electric Cooker

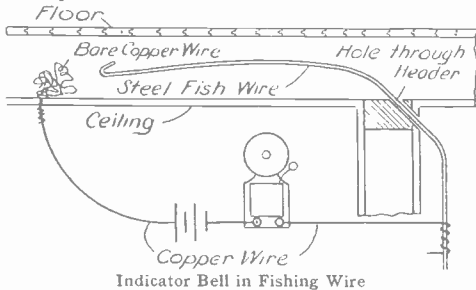
food is kept constantly cooking and distillation, while slight, is constantly going on, so that there is no absorbing of odors by the food. Meat will cook delightfully tender without that shrinkage which always goes with the ordinary method of cooking. Tough meat is made tender, cereals digestible and vegetables delicious. This process of cooking food is clean, efficient and economical.

# For Practical Electrical Workers

## BELL AS INDICATOR IN FISHING WIRE

It is usually difficult when a wireman is working without a helper, to "fish" conductors in partitions and in spaces between ceilings and the floors below. It requires one man to push the fish wire from one end through the wireway and a helper should be stationed at the outlet at the other end of the wireway to catch the fish wire as soon as it comes sufficiently near the opening. The helper usually has another length of fish wire with a hook on one of its ends, which he can insert into the outlet, and thereby engage the main fish wire that is being manipulated by the wireman. The main fish wire usually discloses its location by the noise that it makes scraping along within the plastered space.

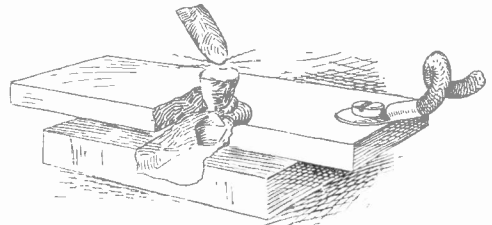
The illustration shows a method that can often be used successfully where a man is working single handed. A bunch of bare copper wire is pushed into the outlet through which it is desired to fish and to this bunch of wire is connected one of the terminals of an electric bell and battery set. The other terminal of the bell is



connected to the main fish wire that is being pushed by the wireman. When he has pushed the fish wire into connection with the bunch of bare copper, the electric bell will give notification by ringing. It is then usually possible by pulling the bunch of copper wire out of the outlet to draw the fish wire with it, after which the conductors can be readily pulled in by attaching them to the fish wire. The fish wire should, of course, have a hook bent in the end that is to engage with the bunch of copper.

## POURING CASTING WITH ARC

Preparations for the casting should be made in the ordinary manner. Form the mold of sand or plaster and then over the pour holes place a tablet or slab of carbon about  $\frac{3}{4}$  inch thick. This should have a round tapering hole, the small end of which opens above the pour hole of the



Mold for Casting with Arc

mold (see illustration). A terminal should be bolted to one side of the carbon slab and lead to the current source through a series of heavy resistances. The carbon slab comprises one electrode of the arc, the other being a  $\frac{3}{4}$  inch hard round carbon fitted with a fiber or wood handle.

A small block of the metal to be melted is placed in the depression of the carbon surface, and touched by the carbon rod to form an arc. The metal will flow into the mold quickly, dependent on the amount of current supplied to the arc. Castings obtained by this method are very smooth and regular.

## UNDERWRITERS BROADEN INSPECTION SERVICE

The Underwriters' Laboratories, Incorporated, has appointed Heap and Digby, engineers, of London, England, as British representatives to perform inspection of material and fittings of British manufacture conforming with the National Electrical Code. Such material, when of approved construction, will undergo inspection when intended for export to Canada or the United States and thereby make inspection unnecessary after arrival at its destination.

# Elementary Electricity for Practical Workers

By W. T. RYAN

## CHAPTER VII.—CALCULATION OF WIRING. LINE LOSSES, NATIONAL CODE

The considerations involved in determining the size of wires for distributing electrical energy are: (1) The wire must be large enough to carry the prescribed current without getting too hot; (2) the wires must be large enough to keep the voltage at the lamps or other receiving apparatus within certain limits; (3) the wire must have sufficient strength to withstand the mechanical stresses to which it may be subjected; (4) in some instances the size of wire chosen should be such that it gives an economic balance between the cost of the power lost in the line and the cost of the wires.

### SAFE CURRENT CARRYING CAPACITY

The temperature of a copper wire carrying an electric current gradually rises until it gives off heat to its surroundings as fast as heat is produced in the wire by the current. Therefore the current corresponding to a certain rise of temperature depends upon the degree of ventilation of the space in which the wire is placed and upon the adjacent materials. Wires encased in wooden mouldings or enclosed in the narrow air spaces inside walls of frame buildings are very unfavorably located. They cannot radiate heat readily and any considerable rise in temperature involves a serious fire risk. All indoor wiring and to a certain extent outdoor wiring must be done in accordance with the rules of the National Board of Fire Underwriters. These rules, known as the "National Electrical Code," are modified annually at the suggestion of the National Fire Protection Association, aided by seven national associations whose interests have to do with electric light and power. These rules are approved and enforced by all national bodies representing insurance and engineering interests.

There is maintained in Chicago, with branch offices in the larger cities of the United States the Underwriters' Laboratories for the testing of all kinds of electrical supplies. Semi-annually a list of approved devices, fittings, etc., is published, which serves as a reference for the use of local inspection bureaus. Most of the larger cities have in addition, city ordinances which are usually somewhat more

stringent than the code. The code rules cover the ordinary requirements of lighting and power service, specifying the allowable carrying capacity of wires and the methods to be used in installing them, in order that the fire risk may be a safe one.

The methods of inside wiring now approved by the National Electric Code include the use of *wooden moulding; knob and tube work; cleats and insulators; armored cable; flexible and rigid conduits.*

Wooden moulding though approved by the code is now forbidden by many city ordinances. It should never be used in any place where there is the remotest possibility of dampness. It should never be used in cellars or directly against a brick wall, as the wall is likely to sweat and thus introduce moisture back of the moulding. It is hardly suitable for either a kitchen or bath room, therefore its use here should be discouraged. Wiring in wooden moulding is not allowed in New York City.

Exposed wires on cleats and insulators are used very extensively in mills, factories, power houses, tunnels, etc. Where the appearance is

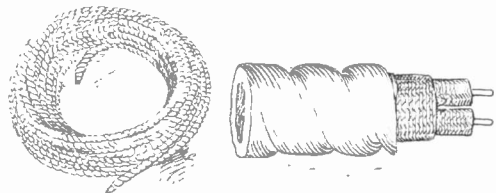


Fig. 25. Flexible Steel Armored Cable

not objectionable, this is one of the cheapest methods of wiring.

The knob and tube method of wiring is used for houses of frame construction where first cost is of the greatest importance. The wires are run concealed under floors and in partitions supported on knobs and insulated by porcelain tubes through floors. This class of work is not approved in Chicago.

Armored cable is made in a manner similar to flexible steel conduit. Fig. 25 shows flexible steel armored cables.

It can be used to great advantage for wiring old buildings. An advantage possessed by it is that it can be run at any angle, and can be fished for long distances.

Its own weight is sufficient to carry it down partitions and it is stiff enough to fish between joints without fish wire. It can also be installed quicker and with less cutting of walls, floors and partitions than wires on concealed knobs and tubes. It is a little more expensive but makes a better job. This cable is best known as Greenfield flexible armored conductor.

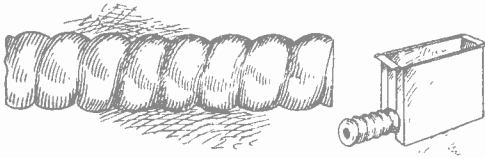


Fig. 26. Flexible Conduit

Flexible conduit, Fig. 26, consists of a continuous flexible steel tube composed of convex and concave metal strips.

These strips are wound spirally upon each other in such a way as to interlock their concave surfaces, both outside and inside, thereby giving a smooth and almost frictionless surface both inside and out. It is approved for fireproof buildings. Its advantages are its flexibility and its continuity. Its flexibility makes it possible to use it where other forms of conduit would be impracticable. It finds its greatest use in completed buildings where it is desired to install electric circuits without greatly disturbing the walls, partitions, etc. Its flexibility also dispenses with a large number of elbow fittings, as a bend of almost any radius can be made. It is very important, however, to securely fasten the conduit at at least three points on each elbow, otherwise the conduit may buckle and make it almost impossible to pull wires through it. It is very strong mechanically although not entirely moisture proof. It is to be strongly recommended for use in frame buildings rather than knob and tube wiring.

Rigid conduit is, of course, approved for all classes of buildings for both concealed and exposed work. All rigid conduit is, of course, fireproof and it should also be moisture-proof. It should be strong enough mechanically to resist hard blows, nails, etc., and when used in fireproof buildings it must resist the action of cement. It should also be able to withstand a short-circuit on the wires which it contains.

There are two general classes of rigid conduits; namely, lined and unlined conduits. The former

are lined with a coating of insulating material. Unlined conduits usually have an inner coat of enamel or some similar material.

Unlined conduit consists simply of an iron or steel pipe similar in every way to ordinary gas pipe except that special precautions are taken to free the inside from irregularities and it is coated inside with enamel; outside it may be either untreated, enameled or galvanized.

Lined, rigid conduit usually consists of a plain iron pipe lined with a tube of insulating material, such as paper treated with an asphaltic compound, cemented to the inside of the pipe, thus forming an integral part of the conduit.

The unlined conduit is cheaper and is also less expensive to install as it can be bent, threaded and cut more easily than the lined conduit. If the inside is enameled it is easier to draw wires in and out than it is if lined conduit is used.

The National Code requires the use of double braided conductors for unlined conduits, whereas single braided conductors may be used with lined conduits. However, this causes but a very slight increase in the first cost of the conductors, and so is not a very great disadvantage. As a matter of fact, with the improvement which has taken place in the manufacture and installation of unlined conduit, it may be used with almost as much safety as lined conduit. Very little lined conduit is now being installed.

The relative cost of the various methods will, of course, differ considerably on different jobs, but as a general rule is approximately as given in the following table:

Method of Wiring	Relative Cost in Per Cent
Wooden moulding	66
Knob and tube	33
Cleats and insulators	35
Armored cable	70
Flexible conduit	85
Rigid conduit	100

The size of wire required to deliver a certain amount of power,  $W$ , to a *concentrated* load at a specified voltage,  $E$ , with a specified drop,  $e$ , in the wire is determined as follows: The current  $I$  is equal to  $W \div E$ . Incandescent lamps are usually rated in watts. The total watts,  $W$ , is equal to the number of lamps multiplied by the watts consumed by one lamp. For example, 200 25 watt Mazda lamps and 20 60 watt Mazda lamps would require  $(200)(25) + (20)(60) = 6,200$  watts. A ten horsepower 220 volt direct current motor with a guaranteed efficiency of 85 per cent would require  $(10)(746) \div (220)(.85) = 39.8$  amperes.

The area of the wire in circular mils is given by the following formula

$$(1) \quad A = \frac{10.8LI}{e}$$

where  $A$  = area of wire in C.M.,

$L$  = length of wire (out and back) in feet,

$i$  = current in amperes.

$e$  = allowable voltage drop.

As an example of the above, assume 300 25-watt Mazda lamps supplied with current from a 120 volt generator 1,200 feet away from the lamps. The voltage at the lamps is to be 110. Find the size of copper wire required.

$$I = \frac{(300)(25)}{110} = 68.2 \text{ amperes.}$$

$$A = \frac{(10.8)(1,200)(2)(68.2)}{(120-110)} = 176,774 \text{ C.M.}$$

The area of No. 000 wire in circular mils is 167,800 and of a No. 0000 is 211,600 circular mils. A No. 000 wire would probably be selected as it is the nearest commercial size.

In most cases the size of wires required for delivering current to a *distributed* load is determined by equation (1) by assuming a concentrated load located near the center of the distributed load.

In determining the size of wires for a complete electric lighting system, a great saving of time may be made by the use of Hering's wiring charts. Their use and construction is explained in detail in a small book entitled "*The Wiring Computer*."

When the lamps of a group, as, for example, in an auditorium, are always turned on and off together, the variation of voltage from lamp to lamp can be very greatly reduced by using the *return loop* system of wiring. The fundamental idea of the scheme is shown by Fig. 27.

It is seen that the distance of any lamp in the group from the mains (assuming uniformly distributed lamps) in terms of the two wires

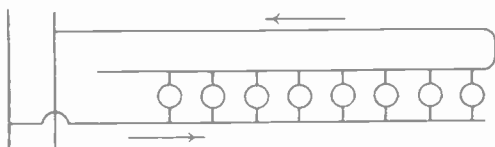


Fig. 27. Return Loop System

between it and the mains is the same. This eliminates a large percentage of the variation in voltage from lamp to lamp which we have when the lamps are wired in the usual way. The return loop scheme as shown in Fig. 27 evidently requires three wires instead of two. However, very often the lamps are arranged in a nearly re-entrant row as indicated by Fig. 28.

The return loop system is quite generally used in wiring theatres, lecture halls, ball rooms and churches, where all the lamps or all of certain groups of lamps are in use at once.

The size of wire for the return loop system is determined as follows:

To get a specified voltage drop between the service point and the middle lamp of a row of

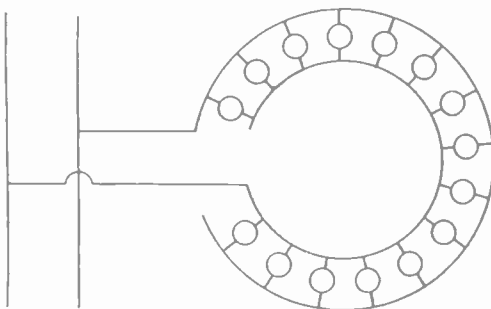


Fig. 28. Re-entrant Arrangement of Lamps

lamps, make the wire of such size that the total current delivered to the lamps would give the specified voltage drop over a length  $L+l$  of wire where  $L$  is the length of wire that carries all the current and  $l$  is  $\frac{1}{3}$  of the length of the wire in which the current is less than the total.

As an example of the above, assume a nearly re-entrant row of 200 25 watt Mazda lamps. The row is 300 feet long. One end of the row is 60 feet and the other end is 40 feet from the service point. The voltage at the service point is 115. Find the size of wire to give 110 volts at the middle lamp of the row.

$$I = (200)(25) \div 110 = 45.4 \text{ amperes.}$$

$$L = 60 + 40 = 100 \text{ feet.}$$

$$l = \frac{1}{3} (300) = 225 \text{ feet.}$$

$$A = \frac{(10.8)(325)(45.4)}{115-110} = 31,870 \text{ C.M.}$$

The nearest commercial size is a No. 5 wire which has an area of 33,100 circular mils. As the odd sizes of wire smaller than No. 4, are not usually carried in stock by the local supply houses we would probably use either No. 4 or No. 6.

The original cost of a transmission line consists of two very nearly independent parts; namely, (1) the cost of the wire, (2) cost of the poles, crossarms insulators and the cost of erection. For example, if we increased the size of wire by one or two sizes we probably would not increase at all item No. 2.

The disadvantage of using the larger wire lies wholly in the extra cost of the wire, or rather in the annual charge, which includes interest, taxes, depreciation, etc., on the wire.

The advantage lies in the decreased loss of power in the line. (Also in the lower voltage drop in the line.)

The economic balance between the annual charge (interest, six per cent; taxes, two per cent, depreciation and repairs, four per cent, making a total of about twelve per cent) on the cost of the wire and the loss of power in the line gives certain size wire and is the size which should be used provided the wire has sufficient carrying capacity and keeps the voltage drop within the required limits. Very often it pays to keep the voltage drop considerably below the specified limit in order to reduce the cost of the power lost in the line. This economic balance is obtained when the annual charge on the cost of the wire and the cost of the power lost in the line are equal. This may be expressed as a formula as follows:

$$A = 600 I \sqrt{\frac{s h}{c t}}$$

where,

$A$  = area of wire in C.M.

$I$  = current in amperes.

$s$  = cost of power in dollars per kilowatt hour at the switchboard.

$h$  = hours per year the current,  $I$ , is delivered to a customer.

$c$  = cost of copper in dollars per pound.

$t$  = annual charge on the cost of the wire, say 12.

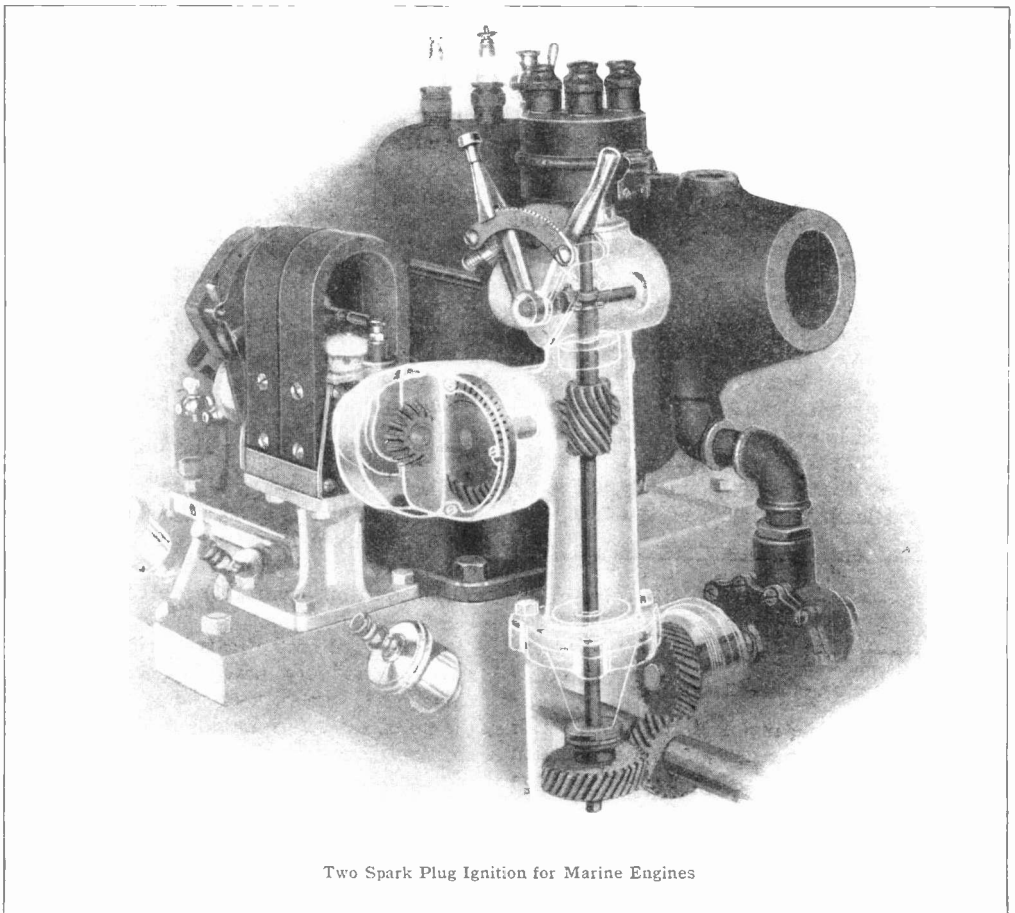
As an example of the above the cost of current at the switchboard is one cent per kilowatt-hour,  $t=12$ , copper costs 20 cents per pound ( $C=0.2$ ) and 100 amperes is delivered to a customer 1,000 hours each year.

$$A = (600) (100) \sqrt{\frac{(.01) (1,000)}{(0.2) (12)}}$$

$$A = 122,400 \text{ C. M.}$$

The nearest commercial size is a No. 00 wire.

(To be continued)



Two Spark Plug Ignition for Marine Engines



### A MODERN IGNITION FOR MARINE ENGINES

Recent advances made in the construction of the internal combustion engines have done a great deal toward the development of the electrical means of producing the explosion in the cylinder.

The original method employed was an induction coil with a vibrator. This was refined from time to time and then came the non-vibrating coil and distributor in combination. The low tension and high tension magneto followed. On the heels of these came the dual or duplex magneto and various combinations of one with another.

There has recently appeared an arrangement that seems to solve mechanical and electrical difficulties formerly encountered. This is the double system used on the Roberts marine motors, and illustrated herewith.

This system consists of a Bosch magneto in connection with a Delco distributor which operates on a battery as a source of current. This double system is unique in that the motor can be operated on either the magneto or battery system separately, or on both simultaneously, as may be desired. Two spark plugs are furnished for each cylinder, one set of plugs carrying the wires for the battery system, the other set carrying the wires for the magneto circuit.

Each system is complete in itself and is absolutely independent of the other, although both are controlled by the same lever.

The value of this arrangement on an engine in a racing boat is apparent. Records of races won and lost in the last few years show that ignition troubles of various kinds have lost more races than faster speed. It is noteworthy that in many races the laurels have gone not to the fastest boat, but to the consistent performer. A broken battery connection or a sticking platinum point on a magneto may lose a race. The chances for damage to two such systems as described are so small that they may be eliminated entirely. Furthermore, two sparks in a cylinder give more power than one, and with the two systems working together in a racer the best possible results are delivered. The benefit of this is just as great in a work boat where the failure of one ignition system may mean a heavy loss.

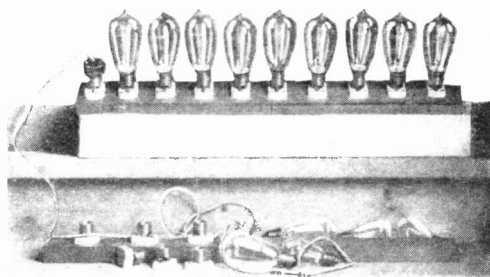
Enamelled wire may be made clean for soldering by dipping the ends in strong sulphuric acid or in cold concentrated lye, then wash in hot water and dip an instant in alcohol.

### HOMEMADE ELECTRIC HEATER

The electric heater here described, is in operation in a hotel in Switzerland where the photograph was taken.

Procure about ten or twelve simple lamp receptacles for carbon lamps. Mount these on a hardwood base. The same should be just a little wider than the lamps measure in diameter. When you mount the receptacles, remember that the width between them should be such as to allow the lamp bulbs to be screwed in and out without trouble.

Connect the receptacles so that all the outside connections will be on one wire and all the inside connections on the other wire. The last socket is left without a lamp as this one will receive the



Electric Heater

plug. The other end of the cord has also a plug for current connection.

When all is so far finished make from sheet iron a hood with three slots on each side to rest on screws in the side of the wooden base. The amount of heat can be varied by using higher candlepower lamps. The heat can also be regulated by partly unscrewing some of the lamps. The more lamps there are on the more heat and *vice versa*.

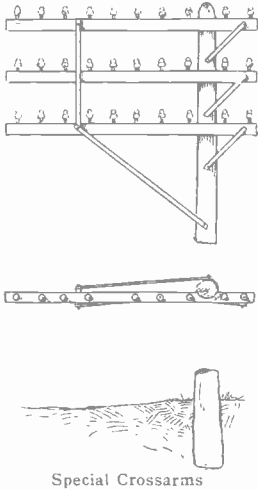
In order to make full use of all the heat produced by these lamps, dip them into metallic paint about three or four times and let them dry each time, then put them on the apparatus and heat them until all the oil smell is gone. The heater is then ready for service.—EMILE RUEGG.

### TO AMALGAMATE ZINC

The chief difficulty one experiences in amalgamating zinc is in rubbing the mercury into the surface. This difficulty can be obviated by using the following method: The surface to be amalgamated is thoroughly cleaned of dirt and grease by dipping into acid. The zinc is now placed in corrosive sublimate. The salt will be decomposed and the mercury will unite with the zinc.

### EXTENSION FIXTURE ON TELEPHONE POLE

In the illustration is shown the most generally used of special crossarms. This one is known as the extension fixture. It is used in order to avoid having the crossarms project over property where the company has been unable to obtain

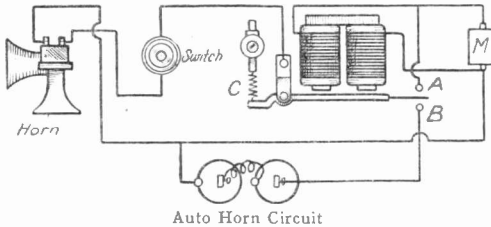


Special Crossarms

the right of way or over highways; also to carry the line wires past trees or other obstacles without setting the poles out of line with the main lead. There are other conditions which require the use of the extension fixture but those mentioned are the principle ones.

### SAVING THE AUTO HORN BATTERY

Instead of using your auto horn battery current continually, use it only when the machine is stationary. While moving use the current generated by the magneto. Shifting from the magneto to the battery or *vice versa* can be



Auto Horn Circuit

accomplished automatically by the use of an old electric door bell.

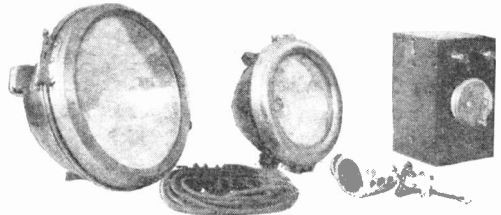
The striking rod is cut off about one inch from the coils, and a binding post placed on each side of it and so arranged that in a backward or forward movement of the armature the binding

posts make good contact with the rod. The diagram shows the arrangement. When the machine is running, the current from the magneto (M) energizes the coils, attracting the armature and forming a circuit at (A) with the magneto as long as the engine runs. When the machine stops the magnet is de-energized, the spring (C) withdraws the armature to the binding post (B) and forms a circuit through the batteries.

### MOTORCYCLE LIGHTING

Motocycling is a sport which is very rapidly increasing in popularity. Not only are thousands of small but speedy and powerful machines in use for pleasure, but they are becoming almost indispensable in conducting many lines of business. It is not beyond probability that sooner or later electric lighting will be furnished with motorcycles, as is now done on all the leading types of automobiles.

Electricity has proved itself far superior to any other form of lighting for automobiles, and it seems quite likely to prove equally preferable for motorcycles. With electric lighting, the difficulties of lighting and extinguishing are reduced



Motorcycle Lighting Equipment

to the simple turn of a switch. Any rider who is unfortunate enough to get a puncture on a country road at night will greatly appreciate the assistance of a small trouble lamp in locating the hole. Such a lamp, which is made possible with the electric system, can be easily and safely moved around. Electric lights also permit the use of a small speedometer lamp, an electric horn, and other useful accessories, making night riding as convenient and satisfactory as day travel.

There are three systems in use: (1) storage battery alone, (2) generator alone, (3) combination storage battery and generator. Both four and six volts are in use, but it is to be hoped that the latter will become standard, thus conforming with present automobile practice and enabling the purchase of lamps at any garage and service station.

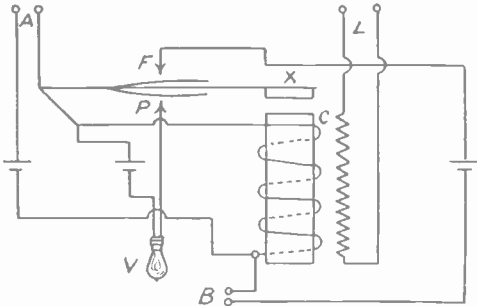
A six candlepower Mazda lamp is ample with the proper reflector for a headlight and a one-

half candlepower lamp is all that is necessary for a tail light and to see the speedometer.

The accompanying picture shows a seven inch and also a 4½ inch headlight, a tail light, wire, and a storage battery and switch.

### TESTING DEVICE

I have used the accompanying arrangement in testing for "shorts" and "opens" and in

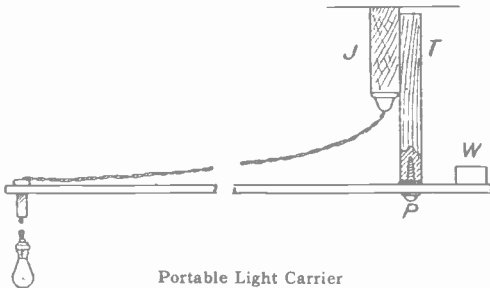


Testing Device Circuit

"tone tests." For example short circuiting wires connected to (A) will operate the armature (X) of coil (C) and light the lamp (V) through contact (P). Current on (B) operates the device as a buzzer. Terminals (L) can be used for cable testing when a tone test is wanted. The lamp is a small 1½ volt battery lamp and the device can be compactly arranged to be carried about.—JESSE GOOSTREE.

### PORTABLE LIGHTS FOR MACHINE SHOPS

A simple apparatus for swinging incandescent lights from one machine to another may be cheaply made as in the accompanying sketch.



Portable Light Carrier

A piece of timber (T), about 2 by 4 inches and two feet long is secured to the ceiling joist and a wooden arm of any desired length is pivoted to the timber with a lag screw and washers (P). Portable or reinforced lamp cord is carried from a

rossette on the joist, through a porcelain tube in the long end of the arm and thence to the lamp socket. A counterbalance weight is fastened on the shorter arm.

This arrangement will keep the cord clear of the work, free from knots and permit swinging the lamp to any point around the circle.—C. K. THEOBALD.

### LICORICE IN ELECTROPLATING

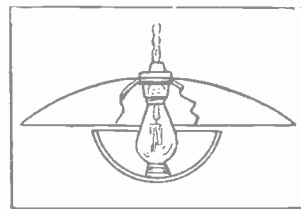
In baths for electroplating it has been found highly advisable to have an organic substance as one of the components and one which has been found specially desirable is extract of licorice.

The process is carried out by Classen as follows: Eleven pounds of licorice wood are rasped fine and macerated in three successive lots of 42 quarts each of water. To the hot extract add 44 pounds of crystallized zinc sulphate; 9 pounds of crystallized sodium sulphate; 2.2 pounds of zinc chloride and 1 pound of boric acid.

The whole is boiled and cooled, and then filtered, sufficient water being added to make in all 105 quarts. This is said to yield better results than using the licorice extract alone but even this latter gives good results. Of course, the cathode must be well cleaned in advance and the amount must not be too strong, 3½ amperes per square inch of surface plated being sufficient. The organic substance must be added slowly while the bath is stirred, and in the case of zinc the deposit must be cold, else it will be brittle. It has been shown by E. Müller and Bahntje that the deposit contains a very slight quantity of the organic substance.—DR. GRIMSHAW.

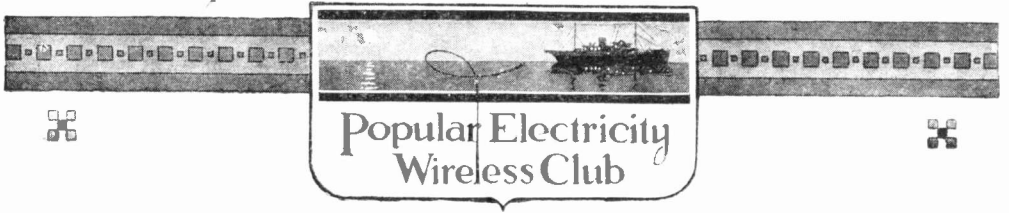
### ODD INDIRECT LIGHTING FIXTURE

An Oregon inventor has applied for a patent upon an unusual indirect lighting fixture shown



Odd Reflector

in the accompanying illustration. The lamp supports a reflector which throws the light upward to a shade. The lower end of the lamp bulb is to carry a support for the indirect reflector thus doing away with supporting rods and chains.



## WORKING WIRELESS ON THE SAND BANKS

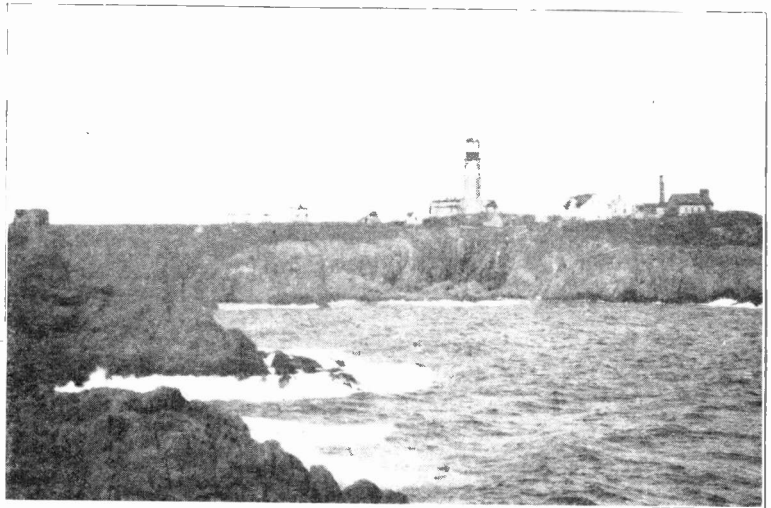
To sit beneath an aerial on a fog-bound coast, listening to the incessant hissing of the spark, day after day, month after month — eating a lonesome lunch at noon with the monotonous group of faces and the repetition of stale news — that's the everyday life of the average wireless man up and down the perilous ocean coasts of Canada.

At other stations, an operator has the knowledge that he stands on *terra firma*. At Sable Island he knows that the hungry Atlantic has

gobbled up 20 miles of his foothold and some day may swallow the balance.

This island which for long years bore the title "the graveyard of the Atlantic" has now forfeited that ugly reputation through the coming of wireless. Previous to 1904 when the first Marconi station was erected by the Government of Canada, 200 known wrecks on this treacherous reef had been recorded at Lloyd's shipping offices in Liverpool and no one knows what the past hundred years might total. No more terrible

Cape Race



Sand at Sable Island is Hardly Distinguishable from the Water

spot exists in the whole sweep of the Atlantic. Ocean currents of tremendous power roll into the deep bays and sweep far out beyond the headlands, changing from month to month the old demarkations of sand bars. It is a curious fact that the color of the sand about Sable Island is not distinguishable from the water except at close range and ship after ship has been drawn to destruction without a second's warning. Since 1873 a lighthouse and life-saving station have been maintained, the wireless adding its wonderful service nine years ago.

Sable Island's total population is just 46, consisting of superintendent, coastguardsmen, lighthouse keepers, wives and children and the wireless operators. Under the resistless power of the Atlantic gales even the island itself is feeling the terror of its constant battle, and since 1863 has shrunk to half its size. It once was 40 miles long; to-day it is but 20. The lighthouse has been moved to the east three times and will probably be an itinerant structure unless the desperate efforts to stop the erosion with thousands of trees and shrubs prove effective.

The wireless service at Cape Race on the island of Newfoundland came into prominence through the sinking of the *Titanic*, when the first messages of the catastrophe were relayed through that point and flashed eastward. A Marconi station equipped with the most powerful apparatus yet manufactured and manned by a crew of picked operators is supplemented by a lighthouse in which the lighting mechanism weighs twenty tons and casts a ribbon of white out over 20 miles of ocean. The post is barren, forbidding, damp and as ugly as a choppy granite architecture can make it. It has no railway connection with other points on the island and a meager population — merely enough individuals to man the government service and a few fishermen. Here in apparent contentment dwells from year to year a colony of men whose single concern is the guarding of that procession of human treasure crossing and re-crossing the Atlantic.

Time and again, an observer might see the wireless man in the thick of a mid-day fog or the darkness of a Newfoundland night thrust aside his headgear and telephone the life-saving station, which with its crew of trained men is held for instant service.

On another day a message is received from the captain of a liner whose decks are crowded with passengers. His port propeller is broken and he wants help from Halifax. In five minutes the message, caught so weakly from 300 miles at sea, is repeated to Halifax, where relief ships are always

ready for just such emergencies. When the wireless men at these sentry boxes on the outer edges of ocean commerce find a moment from their work to fill a pipe and recall a story of their past experience, it is only to catalogue a bleak outline of fact, like a government report and leave the balance to the listener's imagination.

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### FIRST WIRELESS BETWEEN GERMANY AND AMERICA

Experiments have been made since the end of January last, between the Telefunken station at Nauhen near Berlin and the station of Sayville, Long Island, which is owned by the Atlantic Communication Company of New York. These experiments have given satisfactory results and have for the first time since the inception of wireless telegraphy allowed radiotelegraphic messages to be sent across the ocean on the route New York-Berlin. The distance bridged is about 4,000 miles, whereas the distance between Ireland and Canada, where a Marconi service has for some years been in operation, is only about 2,000 miles.

The experiments are being continued to collect all necessary data for establishing a regular New York-Berlin radiotelegraphic service.

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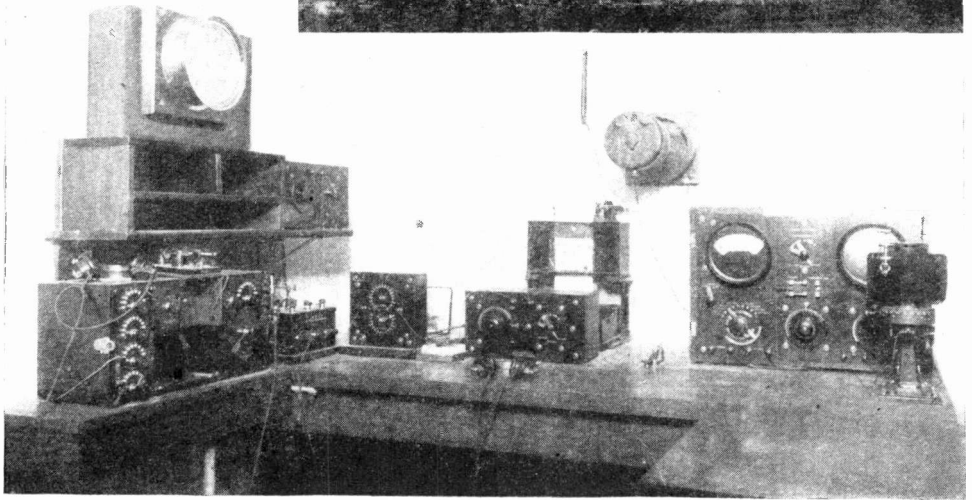
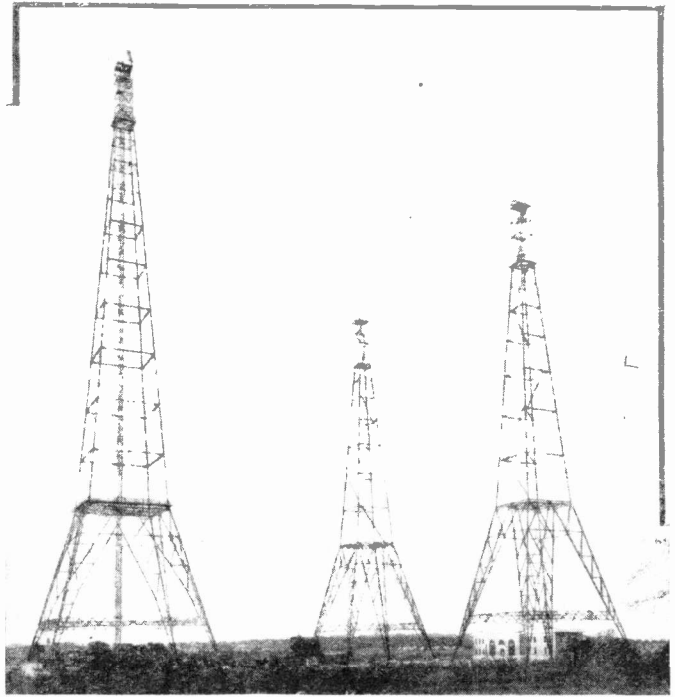
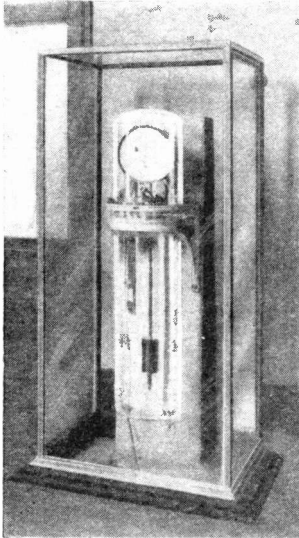
### WIRELESS ON WORLD'S LARGEST SHIP

Not the least important feature of the Hamburg-American ship *Imperator*, which recently completed her maiden trip across the Atlantic, is the wireless telegraph equipment on both the main vessel and the motor operated lifeboats. The motor boat equipments have a working range of 200 miles, while the range of the main vessel equipment is 1,500 miles. The ship has two reserve antennas and two receiving instruments for long and short waves, designed for news service and rescue work. The station is directed by three operators, one of whom is always at the key. The *Imperator* will be within direct communication with land all the way across the Atlantic.

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Direct wireless communication between America and Asia is now an accomplished fact, the United States Army Signal Corps Station at Nome, Alaska, having been in nightly communication with the Russian station at Anadyr, Siberia, 500 miles west of Nome.

Standard Time Clock



Arlington Station Towers

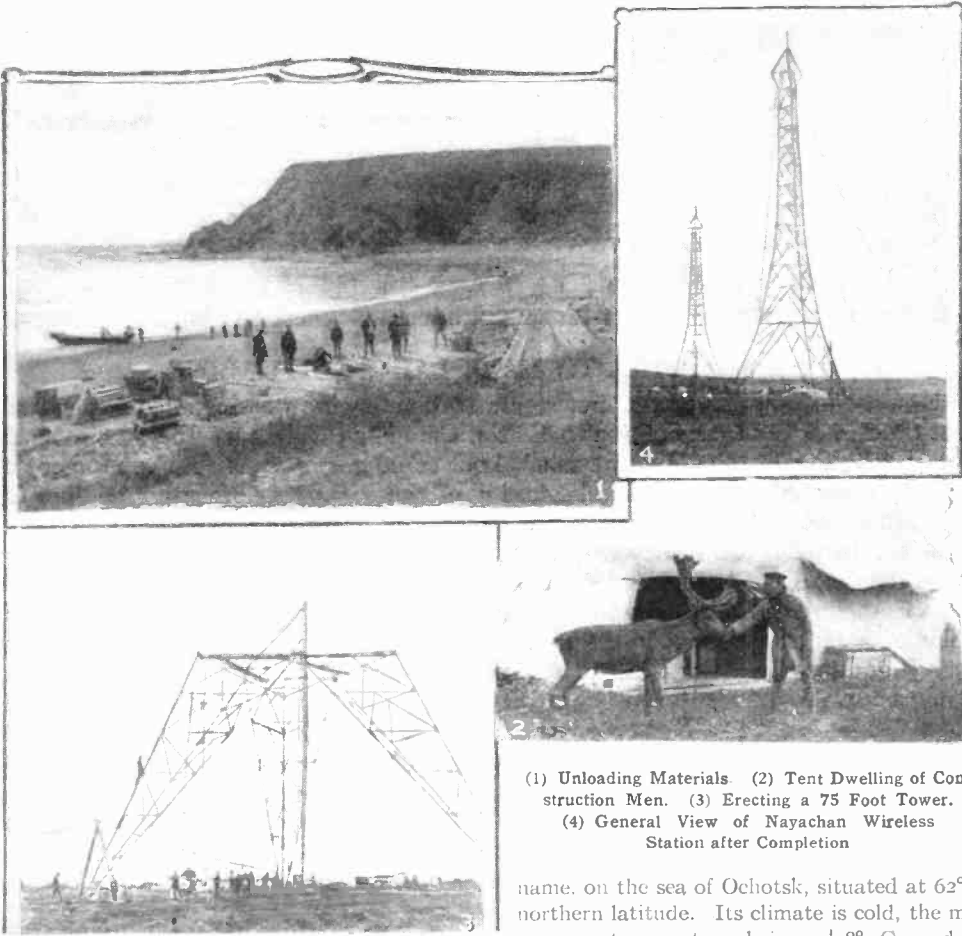
Time Receiving Room

### FLASHING TIME OVER THE OCEAN

At noon every day the time signal known to mariners as the "tick" is flashed from the Naval Observatory in Washington. Five minutes before 12 o'clock Washington meridian time, the huge standard time clock, which controls the United States Observatory time throughout the Atlantic and Middle Western States, is connected with the Arlington Wireless station.

Every tick of the clock instantaneously closes the key of the sending apparatus and the Hertzian waves are released to be picked up by stations within the three thousand mile sending radius of this powerful station.

Through the Naval Hydrographic Office, all warships and merchantmen of the various nations have been notified of the time signal and most of them prepare for it some few minutes previous to the time of the first signal.



(1) Unloading Materials (2) Tent Dwelling of Construction Men. (3) Erecting a 75 Foot Tower. (4) General View of Nayachan Wireless Station after Completion

### ERECTION OF SIBERIAN WIRELESS STATION

The installation of the Telefunken station at Nayachan, Siberia, by order of the Russian Postal Department, is a remarkable feat of engineering skill.

The construction crew with the whole of the apparatus and materials, sailed from Vladivostok on June 19, 1912, on the S. S. "Sichan," chartered for the purpose. The steamer arrived at Nayachan on June 26, but on account of the unsteady weather and unfavourable tides, the materials could not be unloaded before the 4th of July. The unloading was rendered even more difficult by the fact that the steamer had to come to anchor at about two miles from the coast, small boats being used to transfer the material to the land.

Nayachan is a small village of about 30 inhabitants at the mouth of the river of the same

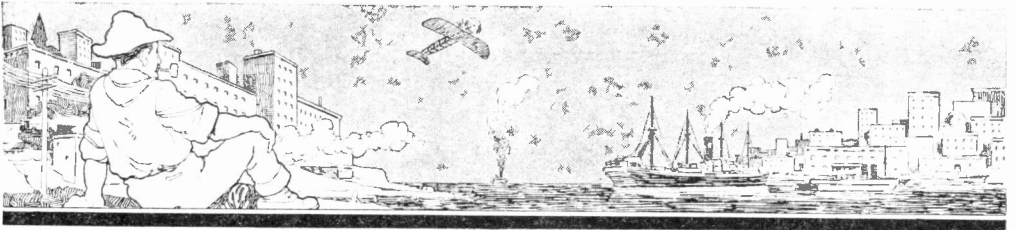
name, on the sea of Ochotsk, situated at  $62^{\circ} 30'$  northern latitude. Its climate is cold, the mean summer temperature being  $+8^{\circ}$  C. and the mean winter temperature  $-30^{\circ}$  C.

When all the material had been landed and the tents put up, the erection of the two iron towers 246 feet high was commenced. In 51 days both towers were completed and four days later the antenna had been stretched and the first provisional receiving tests were made.

Since the ground even in summer only thaws to a depth of about  $1\frac{1}{2}$  feet the laying of the tower foundations offered much difficulty. No concrete foundations were used, the feet of the towers being anchored on substantial wooden planks covering the bottom of the foundation pit and in the frozen ground. These were embedded in a concrete layer about two feet in thickness covered by a peat layer five feet thick to protect the ground about the tower bases from thawing in summer.

On October 13, that is, in the extremely short time of 20 days, the plant was completed and three days later was placed in service.





## On Polyphase Subjects

### PHILADELPHIA TO HAVE LARGEST TURBINE

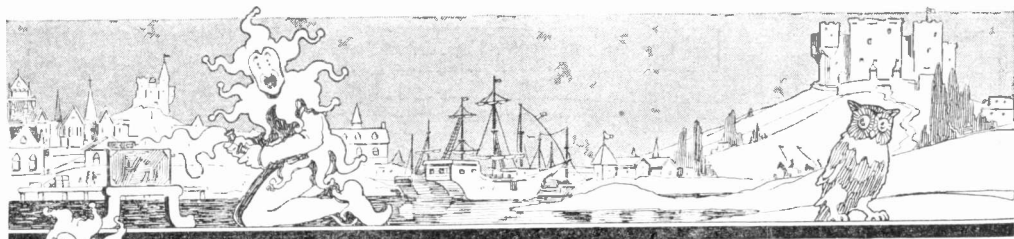
It is now ten years since the first steam turbine engine was installed in the Fisk Street Station of the Commonwealth Edison Company, Chicago. It was a monster in its day, developing 5,000 kilowatts or about 6,700 horsepower. An experiment at the time, it turned out to be the beginning of the end of reciprocating engines for large power units. Since then the capacity of the units has been advancing until now steam turbines are in operation, or on order, of a size so tremendous as to be beyond the dreams of engineers a decade ago. For the last year or so the New York Edison Company has held the record in the size of a single unit, with its great Curtis turbine of 30,000 horsepower in the Waterside Station. Then this summer, as stated in our July issue, the Commonwealth Edison Company announced that a still larger one had been ordered for its Northwest Station — one of 30,000 kilowatts or a trifle over 40,000 horsepower. That seemed to be a record likely to stand for some time; but now, only three months later, the Philadelphia Electric Company comes forward and gently but firmly insists upon holding the record — announcing a colossus, a turbine of 35,000 kilowatts or 46,666 horsepower, which will go into a brand new powerhouse adjoining its present Main Generating Station.

### THE SOCIETY OF ELECTRICAL DEVELOPMENT

Progress in the electrical business during 30 years (notwithstanding that less than 30 per cent of the population is electrically served) has been one of the wonders of the world: its contribution to the comfort, happiness and efficiency of our modern life are so great that we wonder how a preceding generation did without it. In connection with the work of the newly organized Society of Electrical Development, the purpose of which is to still further popularize the use of electric current, Mr. J. Robert Crouse has very clearly and forcefully expressed the object of the Society in these words:

“The age of business (in which someone has said we live to do business, instead of doing business to live, in the base sense) is in the order of social development the successor of the period when war — the extreme of competition — was the principal occupation. Business has inherited from this prototype many habits of enmity, antagonism and waste, which only the persistent cultivation of good-fellowship, harmony and economy will gradually supplant. The most successful organizations, which I have observed, have given the greatest attention to the cultivation of harmony among their men, and the spirit of progressive, constructive effort.”

“The Society for Electrical Development proposes a broad, common organization of our entire industry: central stations, manufacturers, jobbers, dealers and contractors (controlled by a balanced representation from each), through which a part of the present \$80,000,000 of unorganized and competitive sales effort can be more effectively exerted through co-operative effort in popularizing electrical service.”



## Short Circuits

"What do you mean, sir?" asked the indignant maiden as she extricated herself from her eager lover's arms.

"That you are my chance for happiness," he cried rapturously, "and I always embrace an opportunity."

"Nay," she returned coldly, "in this case you were but hugging a delusion."

\* \* \*

"You are getting very bald, sir," said the barber.

"You, yourself," retorted the customer, "are not free from a number of defects that I could mention if I cared to become personal."

\* \* \*

Student—Surgeon, what did you operate on Mr. Mann for?

Surgeon—Three hundred dollars.

Student—No, I mean what did he have?

Surgeon—Three hundred dollars.

\* \* \*

Little Minnie—Oh, mama, what's that dreadful noise?

Mama—Hush, darling! Papa's trying to save the price of a shave

\* \* \*

Guest—Delightful party you are having tonight, old fellow.

Host—Yes, I am giving it to my wife. It is the twelfth anniversary of her thirtieth birthday.

\* \* \*

"What you need," said the doctor, "is an operation."

"Very well," replied the patient. "Which operation are you cleverest at?"

\* \* \*

"Perhaps you are familiar with the works of Ingersol?" smilingly inquired the book salesman, as he reached under his coat for the sample bindings.

"Sure, I am," replied the jeweler; "undt it's a good vatch for der money!"

\* \* \*

Passerby—What's the fuss in the schoolyard, boy?

The Boy—Why, the doctor has just been around examining us an' one of the deficient boys is knockin' the everlastin' stuffin's out of a perfect kid.

Employer—Do you know the duties of an office boy?

Office Boy—Yes, sir; wake up the bookkeeper when I hear the boss coming.

\* \* \*

The hotel guest had taken a kindly interest in the bright faced bellboy who answered his summons so promptly.

"What is your name, my boy?" he inquired.

"They calls me Billiard Cue," replied the youth. "Because I work so much better wid a good tip."

\* \* \*

The health officers came around to take down the sign.

"Sholy you-all ain't a-goin' to take down dat sign, is yuh?" she asked plaintively.

The officials replied in the affirmative.

"Now, ain't dat too bad! Dere ain't been nary a collector roun' dis place for weeks while dat sign 'uz up dere. Kain't you-all leave it dere, boss?"

\* \* \*

The Woman—Here's a wonderful thing. I've just been reading of a man who reached the age of forty without learning how to read or write. He met a woman, and for her sake he made a scholar of himself in two years.

The Man—That's nothing! I know a man who was a profound scholar at forty. Then he met a woman, and for her sake he made a fool of himself in two days!

\* \* \*

"There was one man whose life was perfect," said the Sunday-school teacher. "What one of you can tell me who he was?"

Little Mary Jane's hand went up and the teacher nodded to her.

"He was mamma's first husband," she said.

\* \* \*

The old lady from the country and her small son were driving to town when a huge automobile bore down upon them. The horse was badly frightened and began to prance, whereupon the old lady leaped down and waved wildly to the chauffeur, screaming at the top of her voice.

The chauffeur stopped the car and offered to help get the horse past.

"That's all right," said the boy, who remained composedly in the carriage, "I can manage the horse. You just lead mother past."

IF BASEBALL HAD BEEN AN ANCIENT ROMAN PASTIME



FRIENDS, ROMANS COUNTRYMEN - THE BAT-TREES FOR TO-DAY WILL BE - UMPH DE-XYZ - AND K2P UM-LA-XPP SIS KP- ETC ETC.

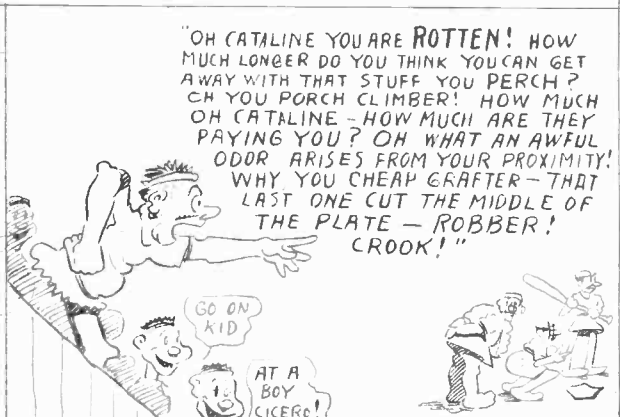
ROMAN ORATORS



ROBBERUM! ROBBERUM! OS CAPITA! EUM CEDITE!



CÆSAR CROSSING THE RUBBER



CICERO BAWLING OUT CATALINE



# Which ?

## \$6,000 for Your Head \$600 for Your Body

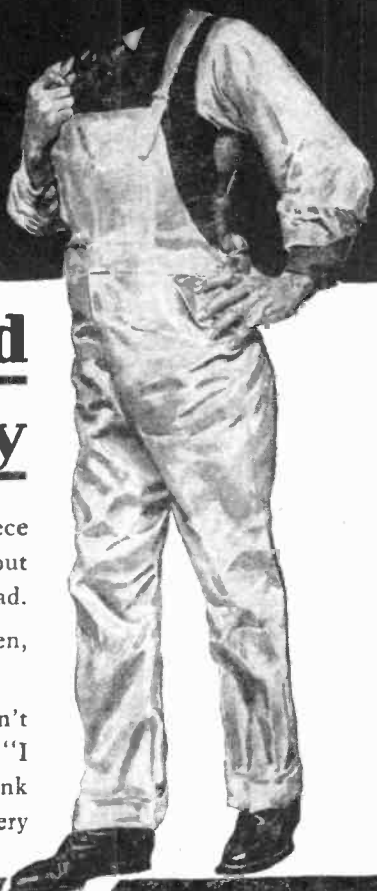
As a member of the headless army you are a piece of mechanism with an earning capacity limited to about \$600 a year—with the scrap heap at the end of the road.

As a *head* man you can multiply that income by ten, and more—and meet *success now*.

You *can* join the *head* class. Don't argue, don't hesitate, don't compromise with failure by saying "I can't." Get on the *positive* side of yourself. Just think of the four hundred men, once poorly paid, who, every month voluntarily report to the International Correspondence Schools advancement in salary and position *due to I. C. S. help*. Some of these stories of success read like veritable romances. Back of them is the sturdy "I can" spirit, and the ability to read and write.

The same road is open to you—no matter who you are, what you do, where you live, what you earn, or for what well-paid occupation you wish to qualify.

It costs nothing to find out how *you* can qualify through I. C. S. training—*Mark this coupon and learn how to make your HEAD earn ten times as much as your BODY.*



### INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 1102, SCRANTON, P.A.

Explain, without further obligation on my part, how I can qualify for the position before which I mark X.

Electrical Engineer	Civil Service
Elec. Lighting Supt.	Railway Mail Clerk
Electric Car Running	Bookkeeping
Electric Wireman	Stenography & Typewriting
Telephone Expert	Window Trimming
Architect	Show Card Writing
Building Contractor	Lettering & Sign Painting
Architectural Draftsman	Advertising
Structural Engineer	Salesman
Concrete Construction	Commercial Illustrating
Mechan. Engineer	Industrial Designing
Mechanical Draftsman	Commercial Law
Refrigeration Engineer	Teacher
Civil Engineer	English Branches
Surveyor	Good English for Every One
Mine Superintendent	Agriculture
Metal Mining	Poultry Farming
Locomotive Fireman & Eng.	Plumbing & Steam Fitting
Stationary Engineer	Sheet Metal Worker
Textile Manufacturing	Navigation
Gas Engines	Languages
Automobile Running	Chemist
	German

Name \_\_\_\_\_

Present Occupation \_\_\_\_\_

Street and No. \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



## Fairy Magic—Telephone Reality

A tent large enough to shelter his vast army, yet so small that he could fold it in his hand, was the gift demanded by a certain sultan of India of his son, the prince who married the fairy Pari-Banou.

It was not difficult for the fairy to produce the tent. When it was stretched out, the sultan's army conveniently encamped under it and, as the army grew, the tent extended of its own accord.

A reality more wonderful than Prince Ahmed's magic tent is the Bell Telephone. It occupies but a few square inches of space on your desk

or table, and yet extends over the entire country.

When you grasp it in your hand, it is as easily possible to talk a hundred or a thousand miles away as to the nearest town or city.

In the Bell System, 7,500,000 telephones are connected and work together to take care of the telephone needs of the people of this country.

As these needs grow, and as the number of telephone users increases, the system must inevitably expand. For the Bell System must always provide a service adequate to the demands of the people.



**AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
AND ASSOCIATED COMPANIES**

**One Policy**

**One System**

**Universal Service**

For our Mutual Advantage mention Popular Electricity when writing to Advertisers.



© N. C. MOSER, FROM UNDERWOOD & UNDERWOOD

## Proved by Broadsides

**T**HE terrific shock that accompanies the firing of a broadside on a man-of-war is the most destructive test that can be applied to incandescent lamps, yet National MAZDA Lamps stand it fifty per cent better than old fashioned carbon lamps, and in addition give three times as much light and better light at the same cost—current and lamp included.

You can have at home exactly the same kind of lamps as are used in modern battleships, trains and street-cars, if you buy National MAZDA Lamps in the Blue Convenience Carton of five. You won't need to worry about fragility if National MAZDA is etched on every bulb. Replace all carbon lamps with National MAZDA Lamps before you pay your next light bill and triple the lighting value of your electricity. Prices reduced again last July.

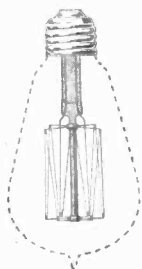
# NATIONAL MAZDA

THE QUALITY LAMP

### Give Your Home the Hospitality of Ample Light

Note the inside construction of the lamp at the left—the greatest achievement of the Research and Development Laboratories of the General Electric Company at Schenectady and Cleveland, which Laboratories, by co-operative arrangements, have access to all the developments and improvements made in the principal lamp laboratories of the world. It is this construction that at present characterizes all National MAZDA Lamps made for general illumination. The Blue Convenience Carton at the right is the carton in which five of these lamps are packed for your convenience.

Send for free booklets, of proper house lighting and wiring, and the selection of lamps. Address



**NATIONAL LAMP WORKS**

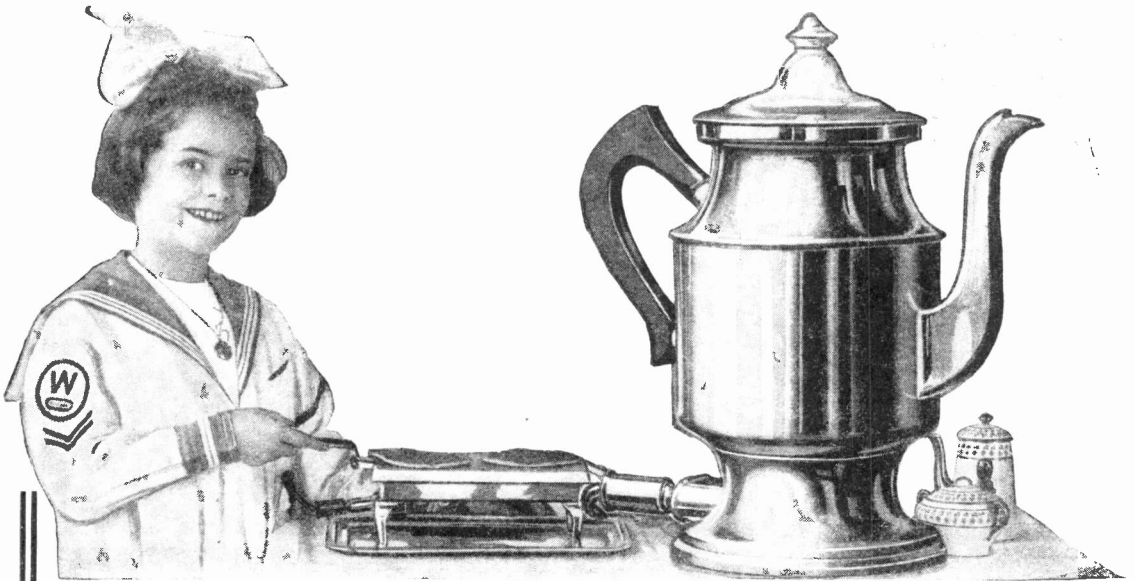
OF GENERAL ELECTRIC COMPANY



66 Nela Park, Cleveland, Ohio

Be sure that "National MAZDA" is etched on every bulb, and that every lamp bears one of these labels—each a guaranty of National Quality.





## Delicious Electrically Percolated Coffee

NOT necessarily high priced coffee, but "made right" coffee.

You have tasted it. You want it every "coffee meal," but you have said a first-class electric percolator was too expensive.

Here is a first-class percolator (Westinghouse quality throughout) substantially made of the best materials, graceful in design, beautifully finished—a percolator that your friends will admire when they see it on your table.

**The price of this Westinghouse Percolator is \$8.00**

Think again of the flavor of electrically percolated coffee, and ask your dealer to show you one of these new Westinghouse percolators.

This percolator and the Westinghouse toaster-stove are the only utensils required for preparing breakfast on the table.

**Westinghouse Electric & Mfg. Co.**  
East Pittsburgh, Pa.

Offices in 45 American Cities

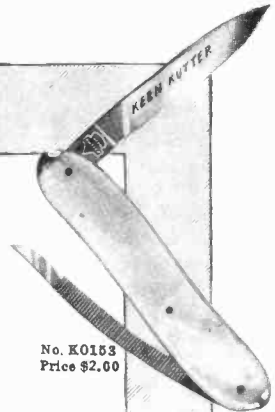




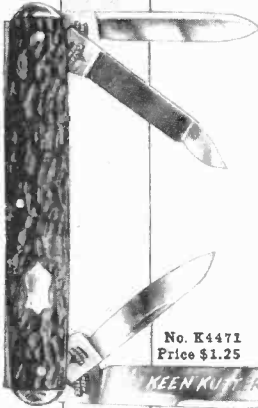
# Edges that Cut Clean

The high quality of Keen Kutter steel produces blade edges that cut clean—cut easily—cut quickly.

Keen Kutter pocket knives have blades of rare cutting qualities. They are firmly pinned and the handles do not loosen or crack.



No. K0183  
Price \$2.00



No. K4471  
Price \$1.25



No. K3036  
Price \$1.75 each

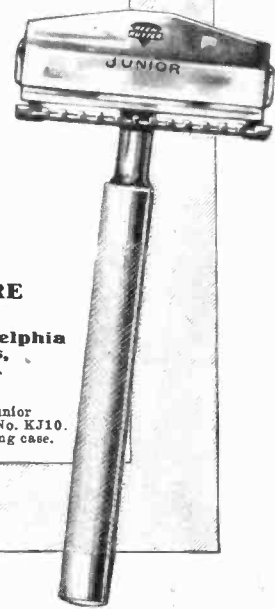
## KEEN KUTTER Pocket Knives and Razors

Keen Kutter Safety Razor blades are made of the finest Swedish Cutlery Steel. The Keen Kutter Safety and Keen Kutter Junior Safety are set at the correct cutting angle which enables the most inexperienced man to start in shaving right away without any practice whatever. At \$1.00 the Keen Kutter Junior is a wonderful value.

Every Keen Kutter article is not only guaranteed, but your dealer will refund its cost if it is in any way unsatisfactory.



No. K2651  
Price \$0.85



If not at your dealer's, write us.

*"The Recollection of Quality Remains Long After the Price is Forgotten."*  
Trade Mark Registered. —E. C. SIMMONS

**SIMMONS HARDWARE COMPANY, Inc.**

St. Louis, New York, Philadelphia  
Toledo, Minneapolis,  
Sioux City, Wichita.



Keen Kutter Regular Safety Razor and Case  
No. K1. 12 blades.  
Price \$3.50.

Keen Kutter Junior Safety Razor, No. KJ10.  
In neat traveling case.  
Price \$1.00

# These Building Material Prices Limited To 30 Days

**Design No. 73**  
Eight Rooms and bath all rooms convenient and roomy. Size 28x24 feet.



**\$890**

**Design No. 93**  
Seven Rooms and bath, very attractive exterior; sleeping porch, balcony. Size 30x22 feet.



**\$899**

## Freight Prepaid No Money Down

Here is an opportunity for any man to own a home of his own, no matter how limited his means. Even if you have not definitely settled on any building plans for the Fall, it will pay you big to take advantage of this sensational offer. Order material NOW—build later. We are determined that the summer of 1913 shall be the biggest, busiest season in the history of this company. Hence these unprecedented offerings, the like of which have never before been made in the history of building material business.

## Think of the Enormous Saving

Nowhere else, in all the world, can you duplicate these prices. We will save you from  $\frac{1}{2}$  to  $\frac{1}{4}$  what you would have to pay elsewhere. Look well at the illustrations of the 4 homes here shown—note the brief descriptions. We will furnish you the material needed to construct any of these homes strictly according to our Plans, Specifications and Material list at the prices quoted for each. But that is not all. We will deliver all of this material right to your railroad shipping point, FREIGHT PREPAID BY US—no charges to be paid by you at all. You are not even required to pay one cent down. We ship subject to examination wholly at our own risk. We positively guarantee every item we send you to be high grade, clean, brand new stock. We would not dare ship from \$500 to \$1,000 worth of material on these liberal, no-money-down, freight prepaid terms, were it otherwise.

**Special Notice:** These freight prepaid prices for all points in Ill., Ind., Ohio, Southern part of Mich. and Wis. and Eastern part of Ia. and hold good for these 4 designs only. Special freight prepaid prices to any point outside of above territory.

## These Prices Good Only For 30 Days

Please remember, the prices quoted in this advertisement hold good only for 30 days. After that they will positively be withdrawn. If you are wise you will not let this chance go by as it may never come again. So be sure to write us today.

### 50c Buys Complete Set of Blue Print Plans

This is the first time we have ever offered a complete set of plans for only 50c. Plans offered at this price are only for the designs shown in this advertisement. This is a part of the building material offer and like it, is good only for 30 days. Usually, when you go to an architect, plans like these would cost you about \$50. If you buy the bill of material from us we will absorb the 50c charge and the plans will cost you nothing.

### Plumbing Material

Write for price on our complete bath room outfits. We guarantee a saving of 30% to 50%.

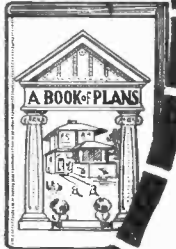
### Heating Plants

Steam, Hot Water, and Warm Air. Let us Estimate on your requirements. Big saving.



### \$10,000 Book of Plans Free

The houses here shown are four of our regular designs taken from our Wonderful Book of Plans, containing 100 pages of beautiful, modern homes. Let us send you a copy of this magnificent book FREE. Not only do we save you from 25% to 50% on your complete building, but we give you all the assistance you need for its proper and economical construction free of charge.



**\$736**



**Design No. 57.**  
Six Rooms and Bath. Note the handsome exterior appearance of this design—the well arranged front porch and manner in which gable ends are finished. Sloping front and rear and the dormers give a most pleasing roof effect. Large living room with cased openings to reception hall and dining room. All bed rooms have square ceilings—no cut-off corners. Plenty of closet room. Size 24 ft. x 26 ft.

**Our Guarantee Your Protection** We guarantee all brand new stock, sufficient quantity, prompt shipment, \$10,000,000 capital backs Guarantee.

## CHICAGO HOUSEWRECKING CO.

Prominently known to the public for 20 years as the great "Price Wreckers," and now owned by the Harris Brothers Company, have decided that their best interests require that the name of the principal owners of the company be more prominently brought to the public's notice. There is no change in our business, except that the four Harris Brothers will, in the future advertise and sell their goods, heretofore advertised and sold under the name of THE CHICAGO HOUSEWRECKING COMPANY, under the name of the Harris Brothers Company.

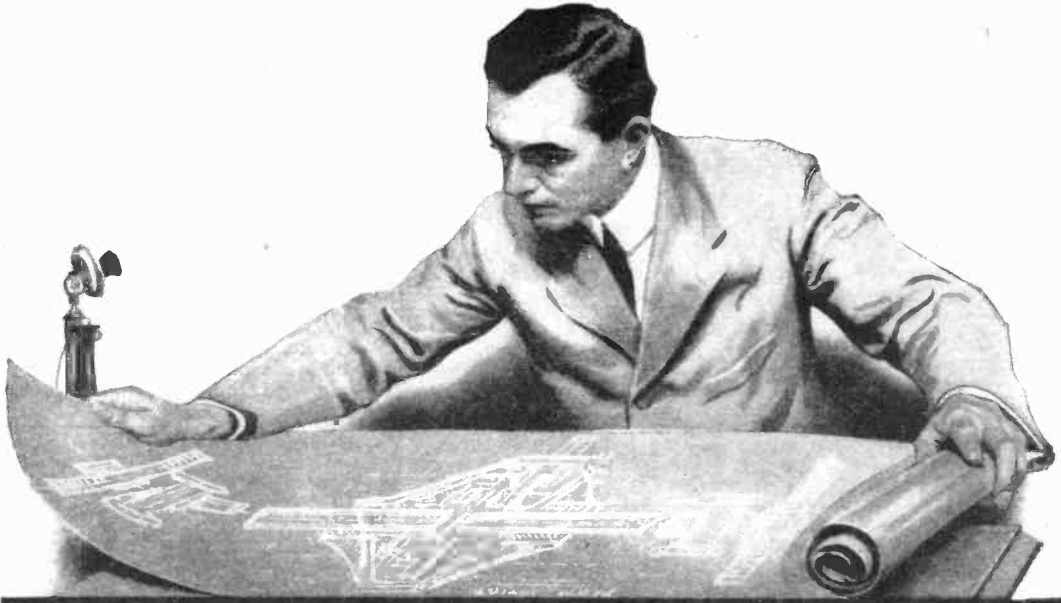
**\$762**



**Design No. 60.**  
Five Rooms and Bath. Large living room; private porches. Designed to be built without waste, either in material or labor. Splendidly arranged interior. Exterior, with its gables, exposed rafters, wide projecting eaves that keep out wind and weather and ample porch room, has all the charm of a modern California bungalow. Size 37 ft. x 29 ft.

**Harris Bros. Co. 35<sup>th</sup> & IRON Sts. Chicago** Dept. BJ-145

For our Mutual Advantage mention Popular Electricity when writing to Advertisers.



## Could YOU Make Good On a *Trained* Man's Job?

Ability counts. *Push*—not pull—is the thing that gets a man ahead. What the business world wants today is men who can DO things—and do them RIGHT. And the *trained* man—the man who can do what the world wants done—can always command a big salary.

Examine yourself. Find out whether you could hold down a job as Foreman, Superintendent, or Chief Engineer if it were offered to you—whether you can do *any* work that would command a big salary. If you can't hold down a really good job now, let the International Correspondence Schools train you so that you can.

You won't have to leave home or give up your position. If you can spare as little as half an hour a day you can get this training right in your *own home* during your *spare time*.

For 22 years the I.C.S. have been going wherever the mails would carry and training ambitious men for better jobs and bigger salaries. *You've* got just as much spare time, just as good schooling and just as strong a determination to make something of yourself as these men had. What they have done *YOU can do*.

If you really *want* a good job and are willing to make a determined effort to get it—just mark and mail the attached coupon and the I.C.S. will show you how they can help you.

### Mark the Coupon—NOW

#### INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 1102-W, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for the position before which I have marked X.

Electrical Engineering	Mechanical Engineer
Electric Lighting	Mechanical Draftsman
Electric Railways	Shop Foreman
Electrician	Concrete Construction
Electric Car Running	Architect
Dynamo Foreman	Contracting and Build'g
Wireman	Architectural Draftsman
Mining Engineer	General Illustrating
Telephone Expert	Chemist
Surveyor	Bookkeeper
Automobile Running	Advertising Man
Agriculture	Civil Service Exams.
Poultry Raising	Salesmanship

Name \_\_\_\_\_

St. and No. \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Present Occupation \_\_\_\_\_

# CLASSIFIED ADVERTISEMENTS

THE COST OF ADVERTISING IN THIS SECTION IS 5 CENTS PER WORD

Remittance must accompany order, or advertisement will not be inserted.

Forms for the November issue close October 1st.

## AERONAUTICS

BICYCLE MONOPLANE PRINTS 30c. Easily put on and taken off. Thomas Hofmeister, Overlea, Maryland.

CURTISS FLYING BOAT, THREE-FOOT Model. Plan and instructions, 25c. Ideal Aeroplane Co., New York.

COMPLETE PLAN, DRAWN TO SCALE, with concise instructions for building a 3-foot Nieuport Monoplane, 25c. Other Plans; Bleriot, 15c; Wright, 25c; Curtiss, 35c; "Cecil Peoli" Champion Racer, 25c. Set of five, \$1. 40 pp. Model Supply Catalog, 5c. Ideal Aeroplane Co., 82½ West Broadway, N. Y.

## AGENTS WANTED

AGENTS—COST 3c, SELL 25c. SIGN LETTERS put on with roller. Samples free. Embossed Letter Co., 237 West Illinois St., Chicago.

AGENTS WANTED TO SELL GUARANTEED hosiery. Write for particulars to Manheim Hosiery Co., Manheim, Pa.

AGENTS WANTED TO SELL OUR POLISHES. Easy to sell, and good profits. Send for particulars including free sample. Colonial Supply Co. No. 201, Newburyport, Mass.

I MANUFACTURE THE "BEST" DOOR-plate. Get my sample case of sparkling "CELLULOSIA" signs. Lettering, XX pure gold. La Fontaine, the Sign Man, Sherburne, N. Y.

BIG PROFITS IN CANDY MAKING. OUR special \$15 course \$2.50 for 30 days only. Send for literature. Barnett Co., 1601 Hyde St., San Francisco.

AGENTS, EARN \$10 PER DAY. SELL three 50c ties \$1.00. Free Monogram gold cuff links and stick pin. Bowden cleared \$71—5 days. Cooper \$40—4 days. Free samples. Comer Neckwear Co., 8 First St., Dayton, Ohio.

VELVET WALL MOTTOES, VERSES EMBOSSED in letters of ivory whiteness. Panels and floral designs in beautiful colors. Quick sellers. Samples and prices 10c. Reese Motto Concern, Mt. Pleasant, Pa.

AGENTS—SELL 25c JAR SHAVING CREAM for 25c. Give free with every sale, 25c. jar tooth powder. 12½c. profit each sale. Exclusive territory. Samples prepaid 21c. Particulars free. Thos. J. Mears, 1148 La Salle Ave., Chicago, Ill.

AGENTS—NOVELTY KNIVES AND RAZORS are lightning sellers. 100% profit. Exclusive territory. Goods guaranteed. Novelty Cutlery Co., 27 Bar St., Canton, Ohio.

## AGENTS WANTED

SEE WHAT I SAY UNDER "TYPE-writers." ATCHISON.

SALESMEN:—WORKING FOR US MEANS cash in your pocket every day; Household Device; duplicate orders; profits big, experience unnecessary. Write immediately. Specialties Supply Co., 31 Willoughby Street, Brooklyn, N. Y.

\$5.00 TO \$20.00 DAILY TO AGENTS WHO are hustlers selling our new and wonderful line of goods. Large concern. Complete selling outfit free. Exclusive territory. Wm. J. DICK, Manager, Dept. B-3, Chicago, Ill.

\$2.50 PER DAY SALARY AND ADDITIONAL commission paid man or woman in each town to distribute free circulars and take orders for concentrated flavorings in tubes. Ziegler Co., 445-B Dearborn St., Chicago.

\$35.00 WEEKLY EASILY MADE AS OUR Sales Representative for automobile supplies and devices. No experience necessary. Exclusive territory to wide awake salesmen. Economy Auto Supply House, 609 Crilly Bldg., Chicago.

AGENTS—MAKING \$10 DAILY SELLING Miller Lawn Mower Sharpeners. Sharpens mower in five minutes. Last lifetime. Sample, exclusive territory, "Stamp" Miller Sharpener Co., Aurora, Ill.

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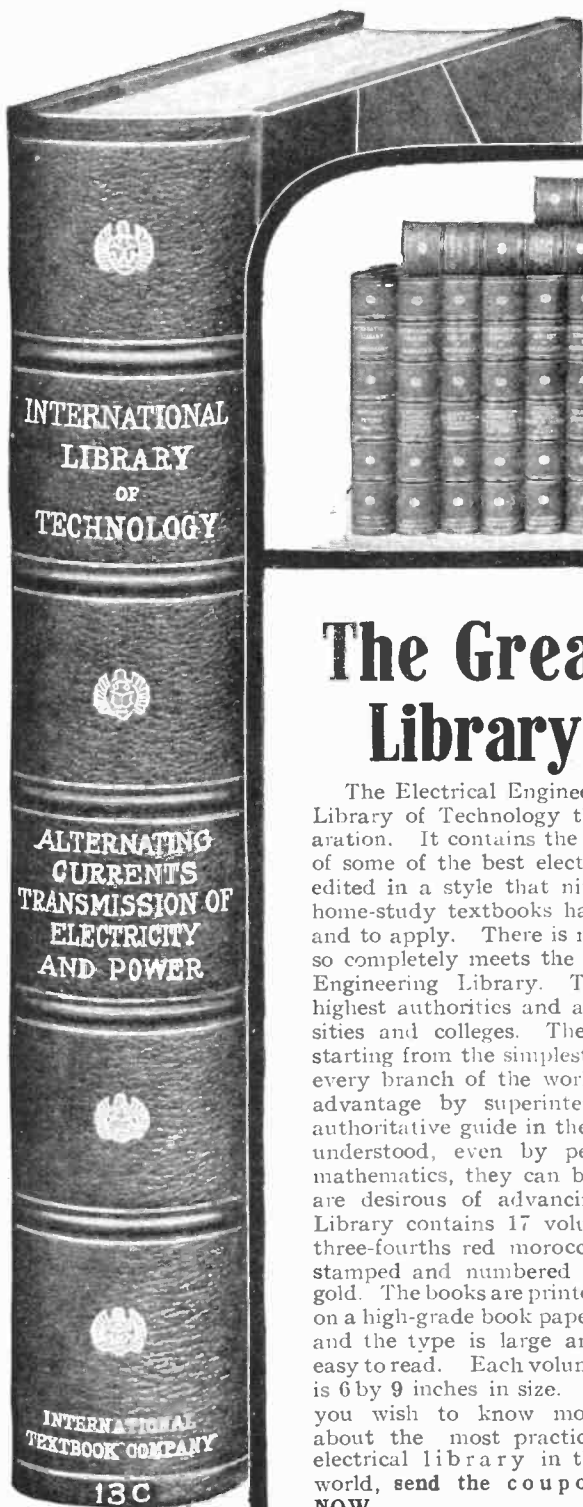
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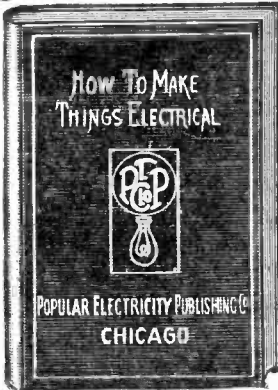
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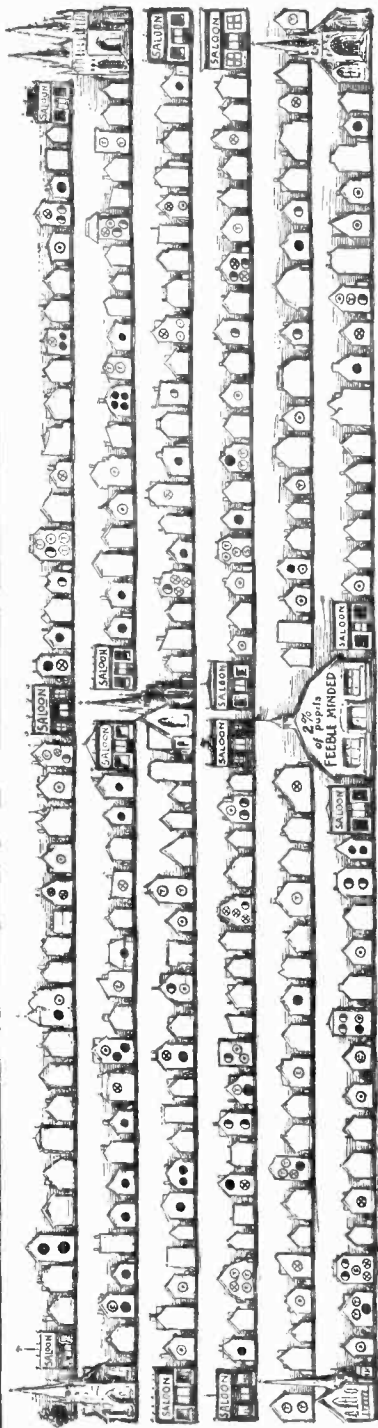
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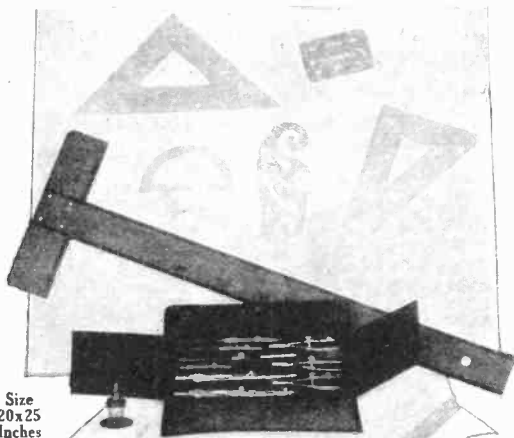
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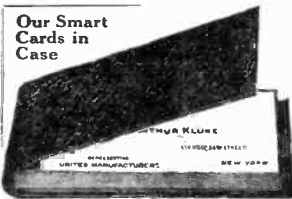


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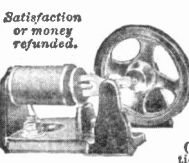
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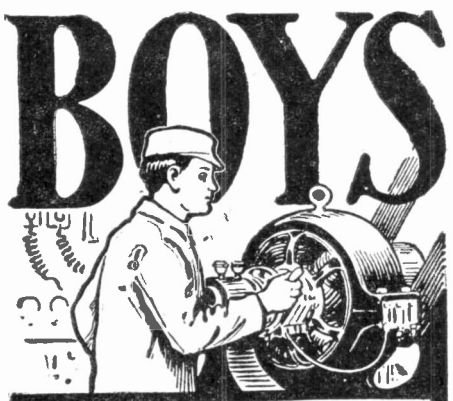
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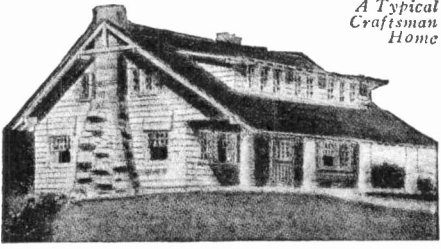
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Name \_\_\_\_\_

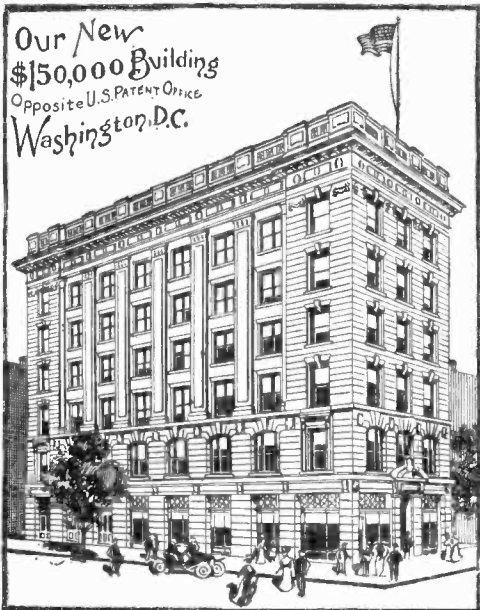
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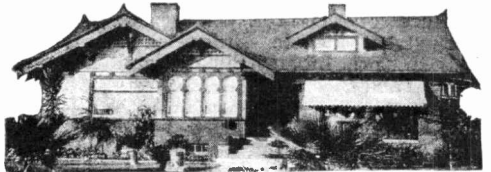
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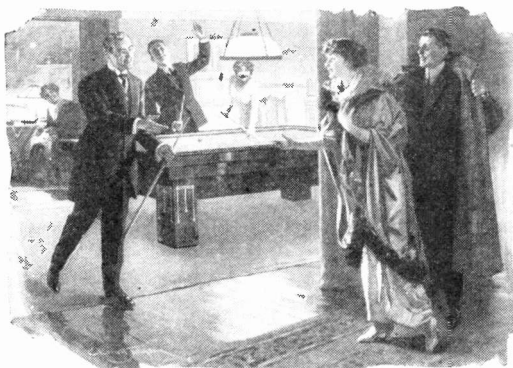
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**ALL YOURS! Strength**

that is more than mere muscular strength. The strength of perfect health, abundant nerve force—the strength of keen relish is now within your reach through vibration! Nine out of ten people are only half alive. How about yourself? Listen! All the joys of life, strength and youth may be returned

to you by vibration. Send the free coupon for the big new book that will tell you all about it.



This wonderful instrument gives you

three of nature's greatest curative agents—vibration, faradic and galvanic electricity. We will send this wonderful machine to you on free trial. Feel its health-giving vibrations for yourself. Don't be weak. You can be strong and healthy if you will by using the White Cross Electric Vibrator.



White Cross Electric Vibrator and its Attachments.

## Vibration Is Life



It will chase away the years like magic. Every nerve, every fibre, of your whole body will thoroughly tingle with the force of your own awakened power. All the keen relish, the pleasure of youth, will fairly throb within you. Rich, red blood will be sent coursing through every vein and artery, you will be made over—new from head to foot. You'll sleep the health giving restful sleep like you used to. Your self-respect, even will be increased a hundred fold.

**LINDSTROM-SMITH CO.**

Dept. 1407

1100 S. Wabash Av. CHICAGO, ILL.

### Send the Free Coupon

Just your name and address

on the free coupon or a letter or post card is enough. We will send you absolutely free and prepaid, our new book, "Health and Beauty." It's a full trial offer on the White Cross Electric Vibrator. I assume no obligation of any kind.

Please send me, absolutely free and prepaid, your new book "Health and Beauty," and full particulars about the free trial offer on the White Cross Electric Vibrator. I assume no obligation of any kind.

Lindstrom-Smith Co.

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We also manufacture electric irons, electric hair driers, electric stoves, etc.

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Address .....

My Electrical Dealer's Name is .....

For our Mutual Advantage mention Popular Electricity when writing to Advertisers.

# 2c a Week Pays Wash Bill!

Electricity or Water-Power Does the Work

Write for  
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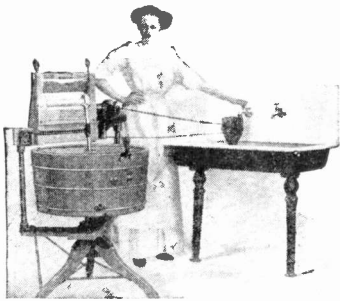
## Just a "Twist of the Wrist" Starts or Stops the Machine!

The 1900 Motor Washers are now at work in thousands of homes. They are doing the work formerly done by women, at a cost of 2c a week for power! Saving thousands upon thousands of dollars in wash bills. Saving worlds of wash-day troubles. Leaving the women free to do other work while the machines are doing the washing.

# The 1900 Motor Washer

**Washes a Tubful in Six Minutes!**

1900 Water Motor Washer  
Can be connected with  
any water tap instantly



**Handles Heavy Blankets or Dainty Laces**

The outfit consists of the famous 1900 Washer with either Electric Motor or Water Motor. You turn on the power as easily as you turn on the light, and back and forth goes the tub, washing the clothes for dear life. Then, turn a lever, and the washer does the wringing. All so simple and easy that it is mere child's play.

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The motor runs Wringer. We guarantee the perfect working of both. No extra charge for Wringer, which is one of the finest made. Write for FREE BOOK and 30 Days' FREE TRIAL OFFER! Don't doubt! Don't say it can't be done. The Free book proves that it can. But we do not ask you to take our word for it. We offer to send a 1900 MOTOR WASHER on absolute Free Trial for an entire month to any responsible person. Not a cent of security—not a promise to buy. Just your word that you will give it a test. We even agree to pay the freight, and will take it back if it fails to do all we claim for it. A postal card with your name and address sent to us today will bring you the book free by return mail. All correspondence should be addressed to (23)



Doing the wringing with  
1900 Electric Motor Washer

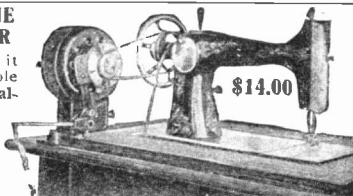
**1900 WASHER COMPANY**  
6085 COURT STREET, BINGHAMTON, N. Y.

Or, if you live in Canada, write to the Canadian Washer Co., 355 Yonge St., Toronto, Canada.

**SEWING MACHINE ELECTRIC MOTOR**

Anyone can attach it to machine. Simple and durable. \$14.00 alternating or direct.

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are equipped with Universal Motors which enables them to operate equally well on either direct or alternating current. Let us send you our catalog.

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## The Original Electric Vibrator—Costs Less than Imitations

Everybody knows the wonderful results that have been achieved by massage, and almost everybody knows that the ARNOLD Electric Vibrator is the most scientific way of giving this beneficial massage in the home.

It is the most widely used electric vibrator in the country—solely because it is the BEST. It is the original electric vibrator.

**Arnold Massage Vibrator**

ARNOLD Features--Die mold motor casings, high nickel plate finish, keeps lustre and good looks, every part interchangeable, U. S. Government high speed motor bearings for hardest kind of usage, speed control by new, unique patented device in handle; ARNOLD armatures give maximum power without overheating; light, compact and easily handled.

Why not get an ARNOLD for use at home? It's concentrated exercise that keeps muscles and mind in good trim. Write at once for our free 80-page book called "ARNOLD Vibratory Massage,"—gives full details of the ARNOLD.

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For our Mutual Advantage mention Popular Electricity when writing to Advertisers.



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can be operated by a child. A pull on the cord gives *Five Changes of Light*, from "full on" to "full off". It is not a lamp, but a miniature rheostat that makes any lamp a "turn down lamp." Solidly made, finely finished, will not break or burn out. Saves current, nerves and eyes. Approved by underwriters.

\$1.00, postpaid. Liberal trade discount.

Agents Wanted  
**Wirt Company**  
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## SO EASY

To repair an auto break at night with this little lamp throwing its rays directly on the work. Clamps on the cap. Worth its cost for one night's breakdown. Nickel plated with Tungsten lamp and battery. Postpaid, U. S. \$1.50, M. O. B.

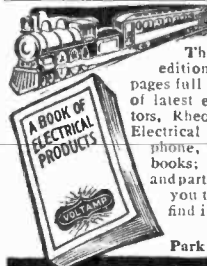
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Sole Owners  
**REDINGER & METCALF**  
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Also has pencil holder so you can write at night anywhere.



Pat. 5-6-13



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At last a suction cleaner a woman can handle as easily as a carpet sweeper. Weighs no more. Takes up only two-thirds as much room. Can be packed away in small box. Rolls on rubber-tired wheels—moved without effort. More powerful than big unwieldy machines.

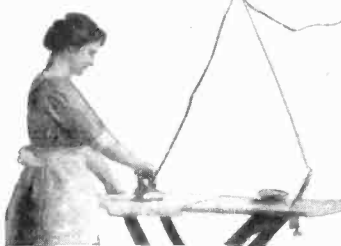
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We take all the risk. Write today for our Free Book. Just send a postal with your name and address.

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## The Paragon Electric Iron Cord Holder

Every user of an Electric Flatiron has been bothered and delayed by the cord getting in the way of the iron when in use. This handy device eliminates all this trouble and annoyance. It consists of a jointed, nickel plated steel rod, with a clamp for attaching to ironing board or table.



The arm is pivoted at lower end, with a spring holding it an upright position. The cord from iron is looped over the rubber covered "V" at top of arm. The spring is so adjusted that it will hold

the cord up taut without imposing the slightest pull or drag on the iron. When iron gets too hot and it is necessary to pull the plug from it, the arm carries the cord and plug to the side where it is out of the way, but within easy reach when wanted again. The cord holder comes in three pieces to facilitate packing and shipping.

Price complete prepaid 75c.

Illustrated Circular FREE.

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Dept. P10

9 South Clinton St.

Chicago, Ill.

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Perfect health for the entire household. Every nerve and every fibre in the whole body awakens through this wonderful vibration. Feel the exhilarating joys of youth; make every muscle in your body fairly tingle with new force.



### BE YOUR OWN DOCTOR

Give yourself the same treatments that are given by the world's greatest specialists. You can do this right in your own home. Any speed can be obtained from the very lowest, for the baby, to the very highest, for the adult. With the GOOD HEALTH vibrator you can treat yourself for rheumatism, indigestion, headache, soggy complexion, catarrh and hundreds of other ailments.

If your house is wired for electricity, simply connect it as you do an electric lamp. If not, we have the same machine that runs perfectly on 15 cells dry batteries. In either case it costs less to run than one electric lamp.

### SPECIAL OFFER

For a short time only we are making an amazing special introductory offer on the GOOD HEALTH vibrator—so write today for FREE book and special free trial offer.

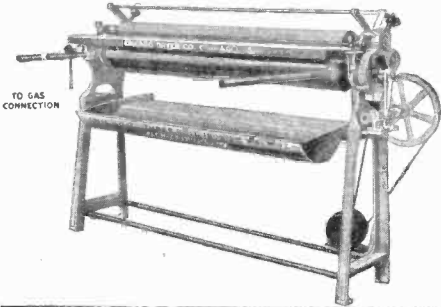
**GUARANTEE**  
Every part of the GOOD HEALTH vibrator is made of the finest material and workmanship and a guarantee for 5 years is sent with machine.

**GOOD HEALTH VIBRATOR CO.**  
802 N. CLARK ST., CHICAGO, ILL.

**AGENTS** Men and Women: We have a wonderful offer to make to you. Write at once for our new proposition and unassigned territory. Remember we want a representative in every town and country so write at once.



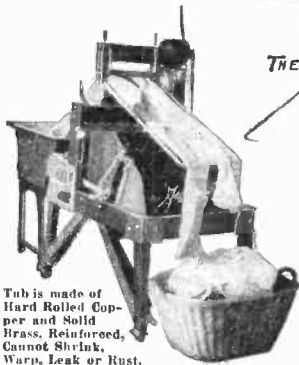
## Chicago-Three-Roll Ironing Machine



Does exquisite work. The goods roll through in being ironed and no friction or wear of the linens take place. Used in many of the best residences, hotels, hospitals and institutions.

Made in four sizes, with rolls 37", 42", 50" and 75" long. Heated by gas or gasoline. Operated by means of  $\frac{1}{6}$  H. P. Electric Motor. Best, most efficient, and economically operated ironer on the market. Write for prices and booklet R-I.

**Chicago Dryer Company**  
503, 630 So. Wabash Ave. CHICAGO



Tub is made of Hard Rolled Copper and Solid Brass, Reinforced, Gunned Shrink, Warp, Leak or Rust.

## THE "Judd" Won't Wear Out the Clothes

The Reason Why? It's Perfectly Smooth Inside

Blankets and finest fabrics are all the same to THE JUDD, for the water is forced through the clothes a hundred times per minute. Ten or fifteen minutes will thoroughly cleanse a tub full.

Two hours to do a family washing! The electricity from any light socket will do the work at a cost of about four cents.

The special motor operates the reversible wringer and washer at the same time. Let us show you how THE JUDD works. Descriptive literature for the asking.

**JUDD LAUNDRY MACHINE COMPANY**  
Room 335 People's Gas Building, CHICAGO

## J-M Electrotherm

### Takes the Place of the Hot Water Bottle



It consists of a thin, light and flexible pad containing wires insulated and protected with Asbestos. When attached to an ordinary incandescent lamp socket, it offers sufficient resistance to the current to produce a constant and uniform degree of heat. It is provided with a regulating switch by means of which three different temperatures can be obtained.

Made for any voltage from 7 to 125 volts and can be used with either direct or alternating current. Indispensable in treating such diseases as pneumonia, neuralgia, bronchial affections, rheumatism, etc. Made regularly in blankets, collars, caps, chest and back pads, mats for operating table, sweating jackets, etc.

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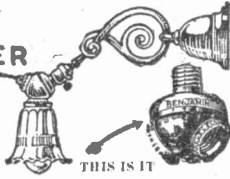
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## BENJAMIN TWO-LIGHT PLUG CLUSTER

For Doubling the Capacity of Your Sockets Without Extra Wiring



THIS IS IT

It just screws in, and the work is done. You have one light, but want two. Or you want to run an extra wire to another point for connecting some electrical appliance—fan, heater, curling-iron, flat-iron, chafing dish, etc., and still keep your light burning. You need not rewire the place to do it.

*A Benjamin Plug Cluster Does the Work of Two Sockets*

Ask your electrical dealer to show you samples, or write for our descriptive list.

**BENJAMIN ELECTRIC MFG. CO.**  
120-28 S. Sangamon St.  
Chicago, Ill.



## IRONS BETTER THAN THE FLATIRON



HAND OR POWER

YOU get through with your ironing in one-fourth the time, obtain a perfect and more uniform finish with no liability of scorching and practically no expense for fuel when you use a

### Simplex Ironer

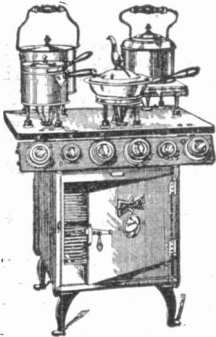
*"The Practical Household Machine"*

Ease takes the place of tiring effort. It soon saves its cost. The Simplex does 80% of the ironing and presses men's trousers to perfection. Run by hand or any power. Heated by gas, gasoline or electricity. Sizes to suit needs of any family, institution or hotel.

Write today for FREE Catalog, 30 days' FREE Trial Offer and name of local dealer.

**AMERICAN IRONING MACHINE CO.**  
510, 168 N. Michigan Ave., Chicago, Ill.

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The Simplex Electric Range makes *good* cooking easy and certain.

Kitchen so clean and comfortable you may dress for dinner and then cook. No coal, no ashes, no grime.

The roast, neither basted nor turned, is well browned and juicy.

Equally fine for bread and pastry, broiling, etc.

Booklet 157-F sent on request. It tells the best and cheapest way to cook by electricity.

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Manufacturers of Everything for Electric Cooking and Heating  
CAMBRIDGE, MASS.

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Simplex Electric Iron—highest grade—cheapest to use. On trial—"on its merits"—of your dealer or write to us.

The only iron that has no obstruction at the front.

## It Irons Where Others Can't

The open front—an exclusive feature of the Pelouze Electric Iron—makes it ideal for ironing sleeves, pockets, arm holes, etc. It also keeps you from burning your fingers on hot metal.

### PELOUZE ELECTRIC IRON

It heats evenly, never sticks and holds the heat, thus saving electric current. Beautifully finished in nickel; French gray cord and attachment plug. No stand required. Simply tip iron on end.

SPECIAL—\$3.75—SPECIAL

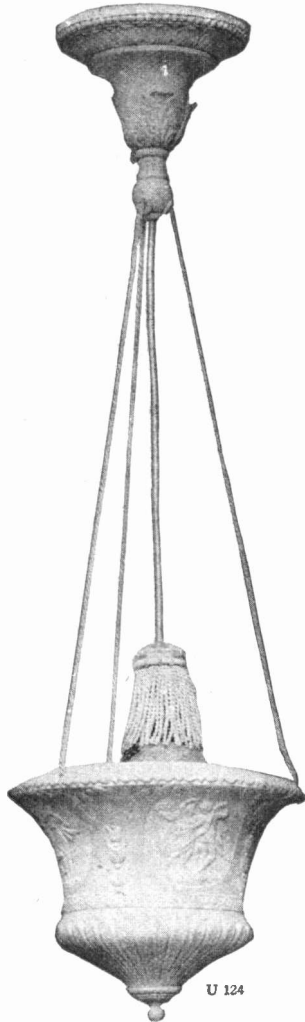
This Pelouze Progressive Iron is guaranteed and is an unusual value at this price. At your dealer's. Or write to us direct and the iron will be sent to you postpaid.

Our Catalogue of 28 electric heating and cooking utensils sent free upon request.

### Pelouze Manufacturing Company

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Dealers—it will pay you to handle our full line because Pelouze appliances in the home insure pleased customers and orders from their friends.

## Lighting Fixtures



Fixtures that delight the eye. Fixtures to harmonize with any interior.

There are so many "Williamson" Fixtures to suit your particular need and taste that you'll have the widest possible range in price and style.

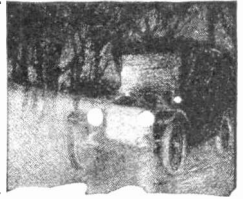
We are the largest manufacturers of fixtures in the world. Our designs run into the many thousands, with hundreds of varying materials, finishes and sizes. This includes gas fixtures as well as electric.

Electric companies, gas companies, fixture dealers, and department stores almost everywhere carry our lighting fixtures. Whatever else seems good to you, don't buy until your dealer shows you the complete "Williamson" catalog.

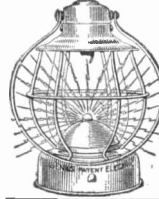
**R. WILLIAMSON & CO.**  
609 W. Washington St. Chicago

## APLCO ELECTRIC LIGHTING SYSTEM

makes night riding safe and delightful. It is "The Right Way to Light the Way" Ask your dealer about it or write us. **THE APPLE ELECTRIC CO.** 77 Canal St. Dayton, Ohio



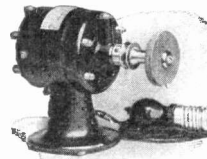
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You have thought about it, have been looking for it. Fire proof. "Lights and stays lit." Solid brass, nickel plated. Will furnish light 5 minutes a day for 6 months. New batteries; cheaper than coal oil. No grease, dirt or smoke. Only \$3.75. For railroads, farmers' homes, everybody.

Good, live county agents wanted; big profit. Write immediately. **JENKS LANTERN CO.** 70 W. Madison St. Chicago, Ill.

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That the little Gem Grinder and Power Motor is the handiest tool that is on the market for the home; for grinding knives, scissors, screw drivers, etc. The Motor has sufficient power to operate mechanical toys, window displays, sign flashes, sewing machines, eight inch fan, buffing wheels, small lathes, and is especially adapted for use with rotary spark gap. Motor is universal, operating on either direct or alternating current, 100 to 130 volts, other voltages to order. Rated at 1-16 H. P. Price \$6.00 f.o.b. Milw. Jobbers please write for price. Checks or P. O. money orders must accompany order. **Howard Electric Co., 18 W St., Milwaukee, Wis.**



## MAKE YOUR BIKE A MOTORCYCLE

at a small cost by using our Attachable outfit. **FITS ANY BICYCLE.** Easily attached. No special tools required. Write today for bargain list and **FREE BOOK** describing the SHAW Bicycle Motor Attachment. Motorcycles, all makes, new and second-hand, \$35 and up.

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### General Agency

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Sells for \$2.50, \$3.50, \$5.00 and saves the purchaser an investment of \$25.00. Write for particulars.

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NO EXPERIENCE NECESSARY.  
DOUBLES ILLUMINATION.  
NO WORK TO INSTALL.**

















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**Thordarson's  
Junior Bell-Ringing Transformers**

The Thordarson always works perfectly. It costs nothing to operate—the current consumed does not register on an ordinary meter.

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Induction A. C. Motors on 30 Days' Free Trial.  
Sold Direct from Our Factory to Your Hands. Prices that Talk for Themselves

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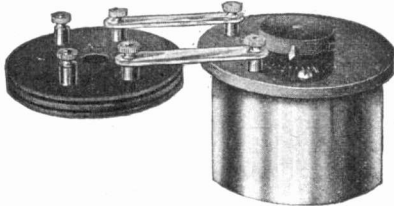
**The Best Guarantee on Earth:**—We will ship to you any size Dynamo or Motor desired, on a 30 day free trial basis, and after you have used and tested same for that length of time and find that same is not satisfactory, you can return the Motor or Dynamo to us, Freight Prepaid, and we will Promptly Refund your Money without question.

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Manufacturers of Electrical Machinery

For our Mutual Advantage mention Popular Electricity when writing to Advertisers.

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Range 150-650 meters - - - \$ 8.00  
 Range 150-2000 meters - - - 11.00  
 Rotary Variable Condenser - - 5.00

For courteous attention, prompt deliveries and unequalled service, insist on purchasing wireless instruments manufactured in the Clapp-Eastham shops, in the Clapp-Eastham way: a little better than the best.

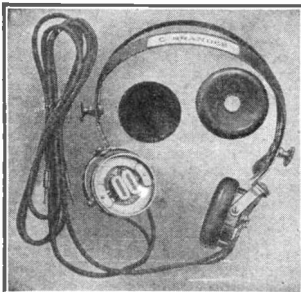
The most complete wireless catalog in America and a catalog of parts and materials for the construction apparatus sent for 4c. stamps.

**CLAPP-EASTHAM COMPANY**  
 141 Main St., Cambridge, Mass.

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## BRANDES WIRELESS RECEIVERS



Complete Set \$5.00

Pacific Coast—Aylsworth Agencies, 149 New Montgomery St., San Francisco  
 Chicago—Winger Elec. & Mfg. Co., 711 So. Dearborn St.

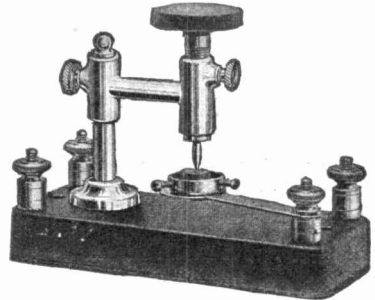
For sensitiveness and tone, these receivers cannot be matched by any others at their price. Light in weight and substantially built. Guaranteed to give satisfaction, or money cheerfully refunded.

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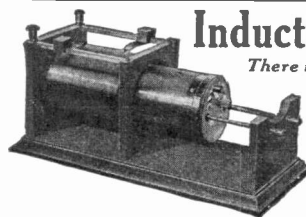
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Try this Tuner against any loose-coupled tuning device that is being sold at the present time, and if it is not better than any other to be had at even twice the money, return to us, (in as good condition as sent out), within 10 days, and money will be refunded. Parts unassembled, woodwork stained, tubes wound, taps made, etc., \$5.50. 5c in stamps for 1913 Catalogue. None sent otherwise.

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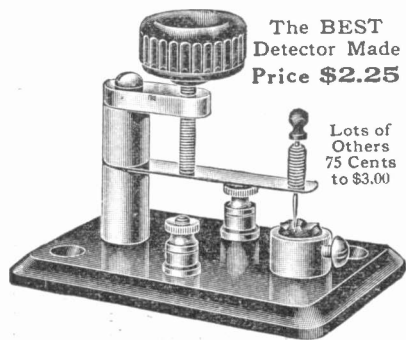
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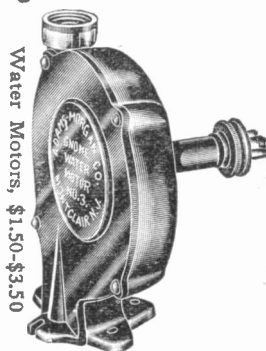
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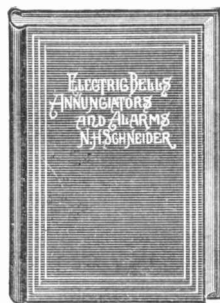
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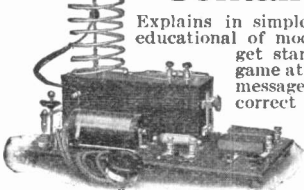
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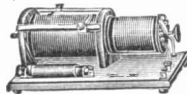


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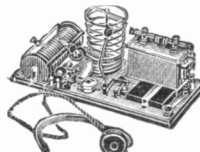
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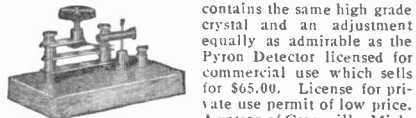
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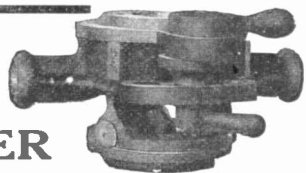
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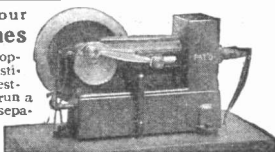
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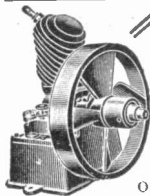
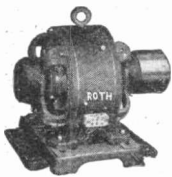
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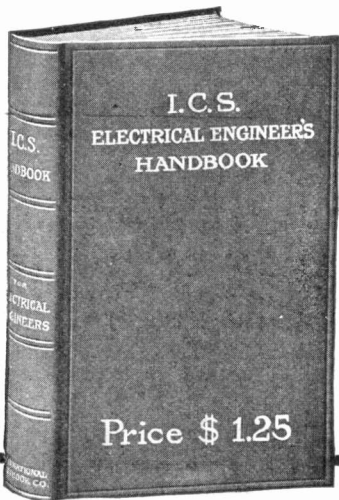
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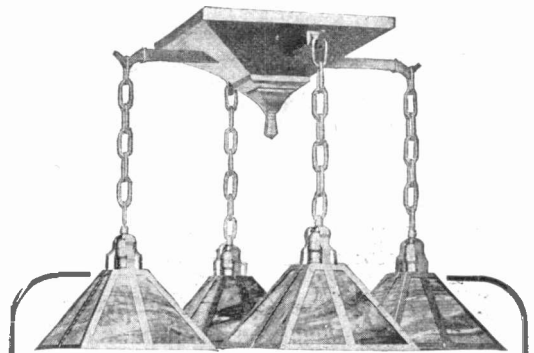
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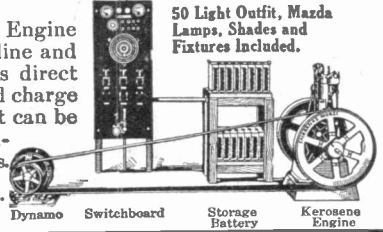


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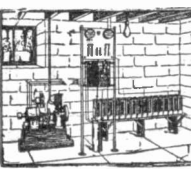
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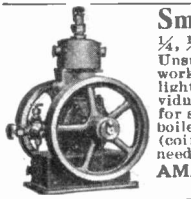
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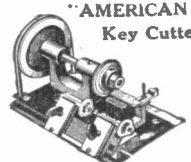
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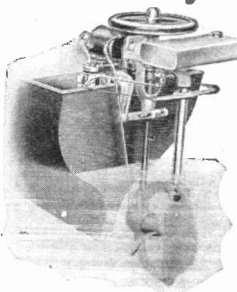


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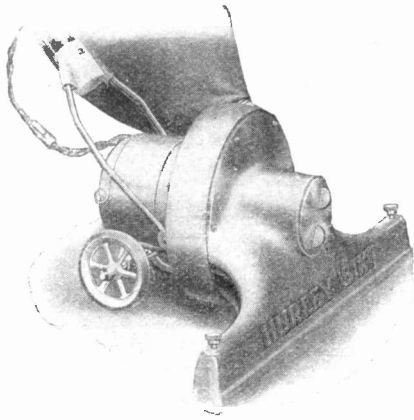
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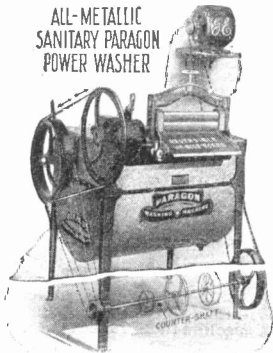
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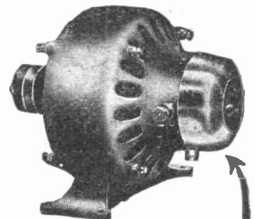
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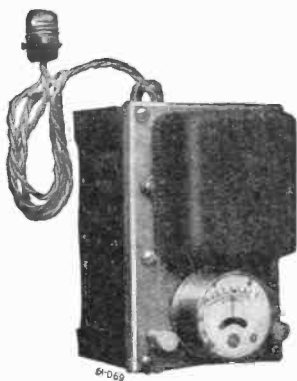
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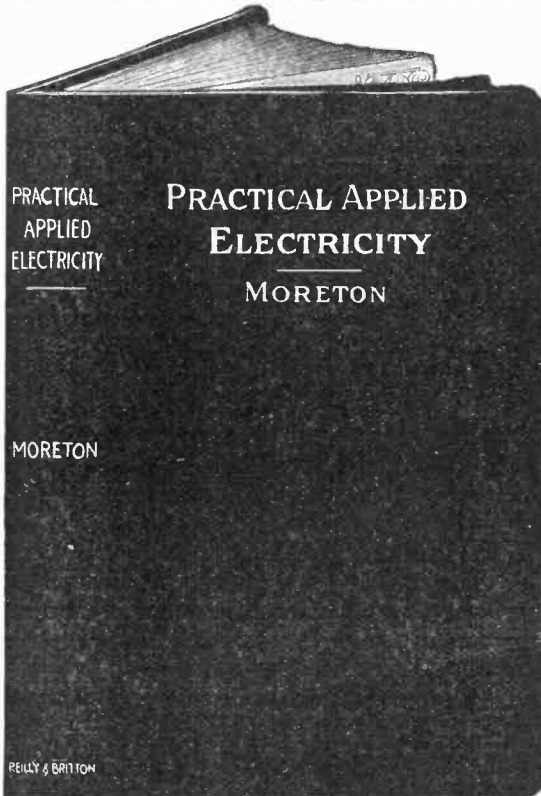
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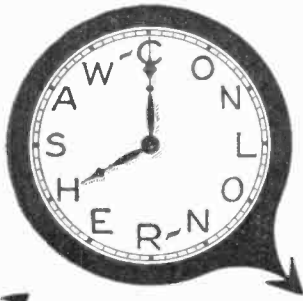
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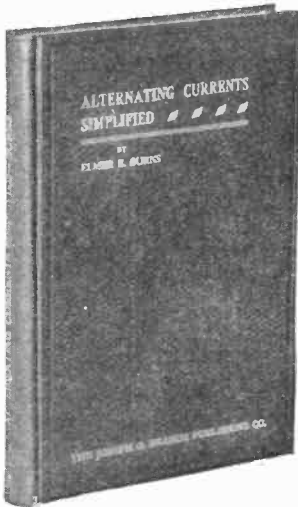
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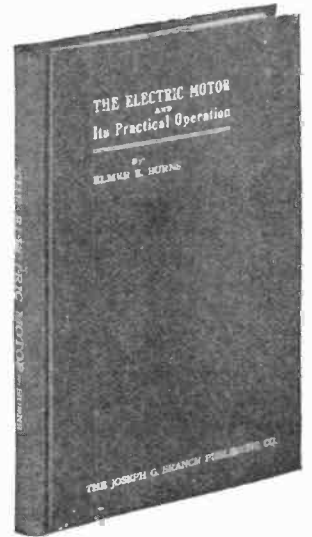
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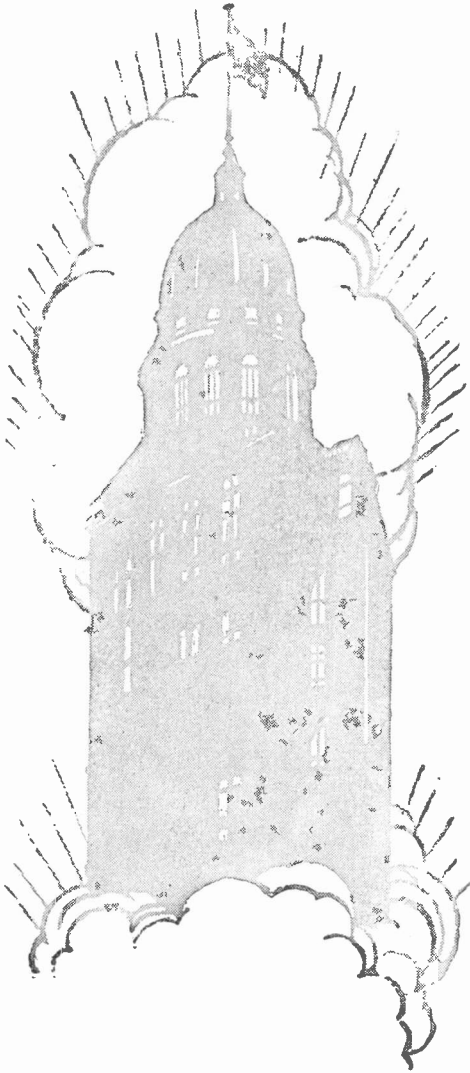
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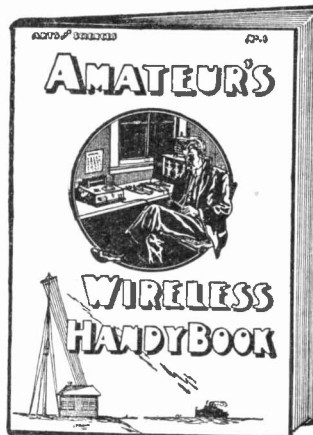
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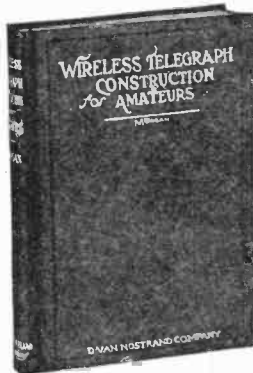
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A new chapter discussing the Wireless Law and its relation to the amateur will be found especially interesting and valuable to the experimenter, for it not only tells how to comply with the new regulations, but also how to secure a license.

Several of the old illustrations have been replaced by new ones of direct interest to any one interested in Wireless Telegraphy. Photographs and working drawings of a great many new instruments accompanied by full descriptive matter explaining the construction of new types of Audion, Silicon and Crystal Detectors, Oscillation Helixes, Rotary Gaps, Quenched Gaps, a Variometer, etc. A full copy of the Wireless Law is included in this edition.

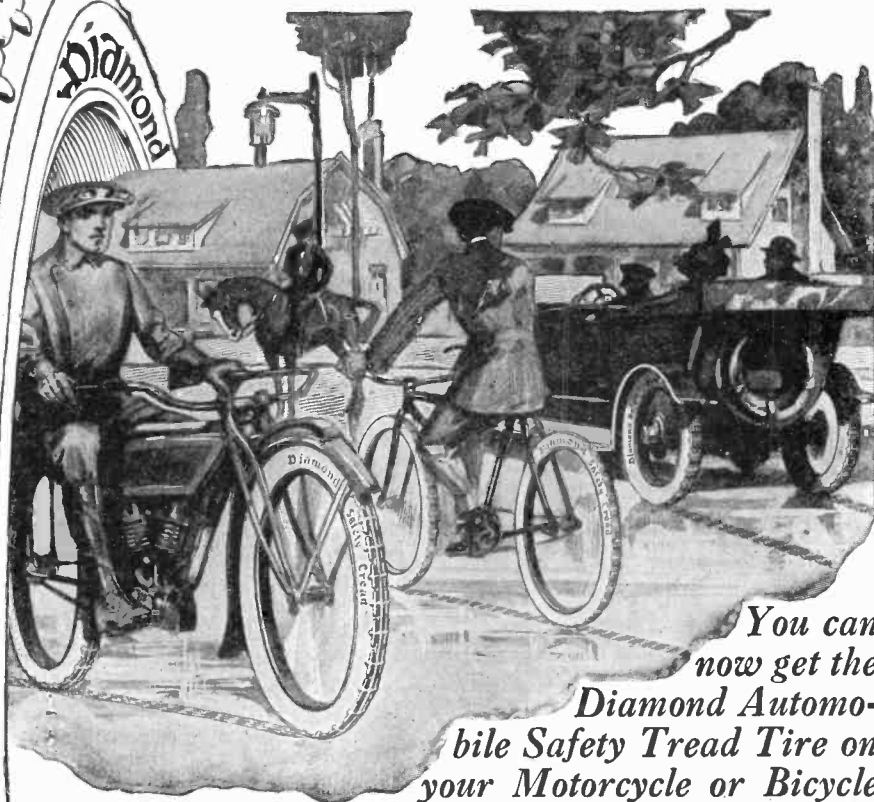
### **Contents of Chapters**

Introductory; The Apparatus; Aerials and Earth Connections; Induction Coils; Interrupters; Transformers; Oscillation Condensers and Leyden Jars; Spark Gaps or Oscillators; Transmitting Helixes; Keys; Aerial Switches and Anchor Gaps; Hot Wire Ammeter; Oscillation Detectors; Tuning Coils and Transformers; Receiving Condensers; Telephone Receivers and Headbands; Operation; The Amateur and Wireless Law; What It Is; How to Comply; How to Secure a License; Appendix; Index.

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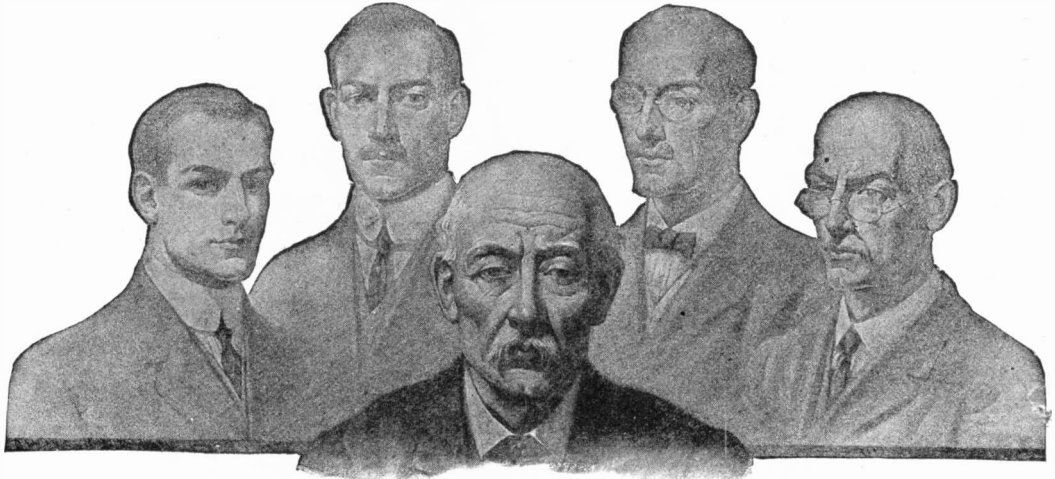
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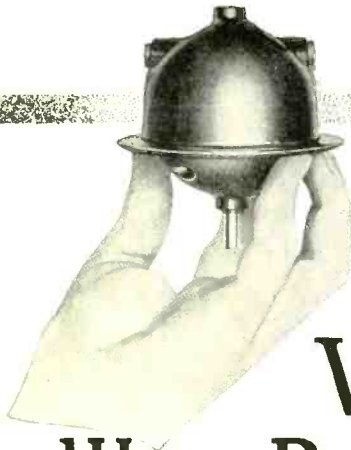
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