

# POPULAR ELECTRICITY

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200 SUBJECTS AND  
200 ILLUSTRATIONS  
IN THIS ISSUE





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## Efficiency's First Aid —Good Light

"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 "They were pretty poor to begin with, and they're entirely out of date. They're out of date because we're living in an age of really good light.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.

Perhaps you have realized this fact in your business without guessing exactly how the thing might be worked out to meet your special needs and opportunities. It is possible that you have not ascertained the cheapness and facility of modern wiring—that you may not know of the growing cheapness of electric light itself.

These are matters which an electrical engineer knows, and can lay before you.

The electrical expert will tell you about the Edison Mazda lamp. He will show you the comfort—for you personally and for your force—and—he will show you the real economy that lies in modern ways of lighting.

Take up the matter today with your electric power and light company, or any General Electric Company's agent in your vicinity. You will find them more than glad to co-operate with you, and no matter how complex your problem may be, they have at their command the service of any part of our organization that may be most helpful to them and to you.

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I knew a young fellow who would like to have improved his conditions in the world and had thought shorthand a possible vocation, but this young man was under the impression that shorthand was a difficult thing to learn and he doubted his ability to master it.

He did not feel like paying out any of his hard-earned money to experiment, and so kept along in the rut until I learned of his case. Just to prove to him that he could learn shorthand, I sent him a couple of lessons at my expense. I charged nothing for them, and did not ask him to obligate himself in any way.

Within fifteen minutes from the time he received the lessons, he understood the simplicity of shorthand, the principles of shorthand and could actually write some words in shorthand and could read them readily.

His doubts immediately disappeared and he eventually became an expert writer, filling a far better position than he had ever held before.

So I thought that there must be hundreds of other young fellows who were in the same condition—young men who had it in them to make a big success in the world if they were just started, and this is the reason for the remarkable offer that I am now making to readers of this magazine.

If you will write your name and address plainly on the attached coupon and mail it to me, I will send you absolutely without charge—even the postage paid—two lessons in shorthand, enough to enable you to actually write in shorthand and to give you an understanding of the principles.

Please understand that this is not a scheme to send you lessons on trial. There is absolutely no charge for these lessons they are given to you.

After you have received the lessons and learned how easy shorthand is and learned of the possibilities of shorthand as a stepping stone to a business career, and a desire to enroll in my College, I shall be very glad to have you do so but you are under no obligations nor will you be put to any expense by accepting these two lessons.

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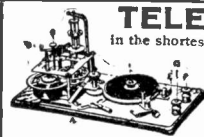
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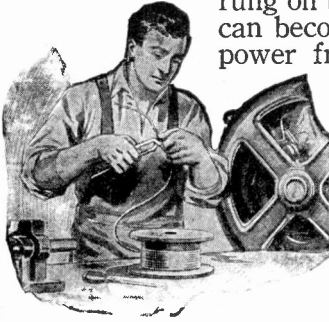
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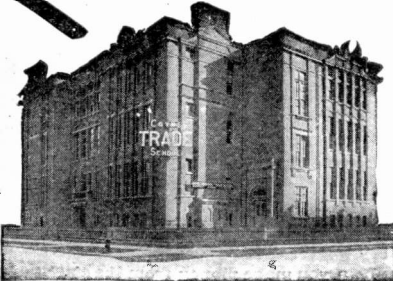
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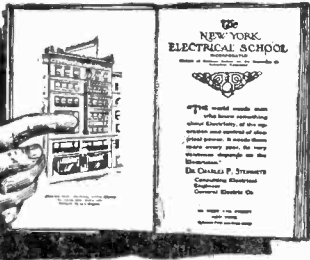
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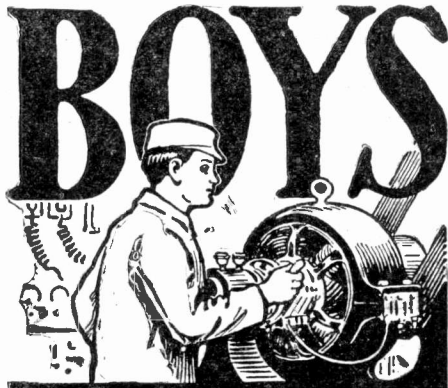
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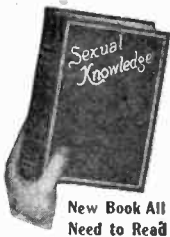
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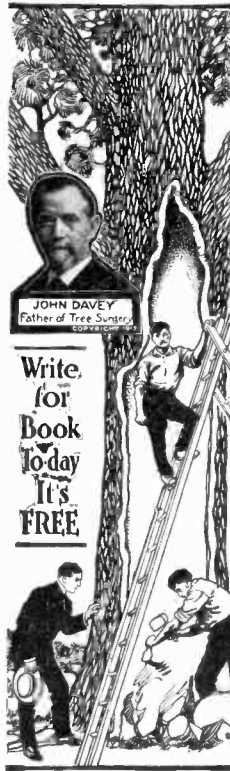
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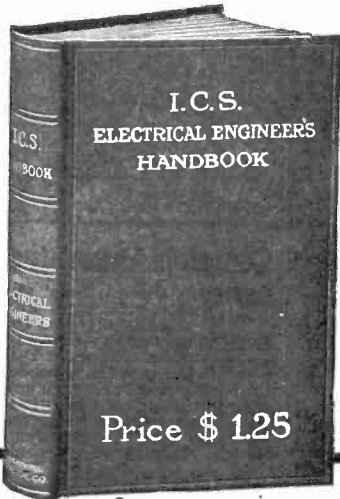
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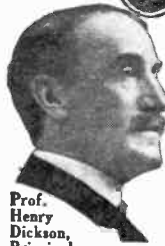
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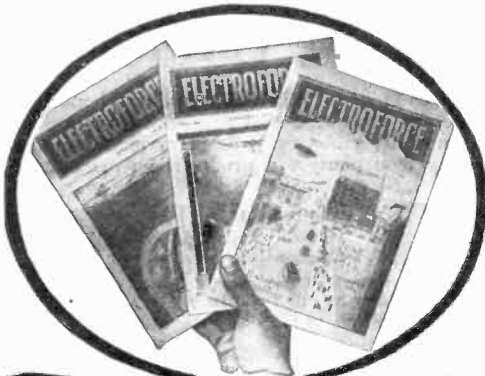
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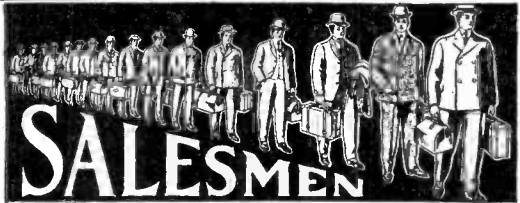
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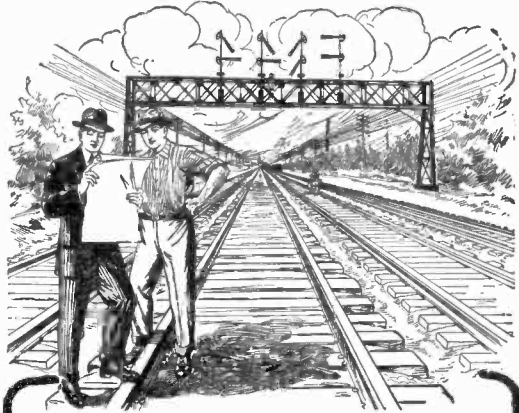


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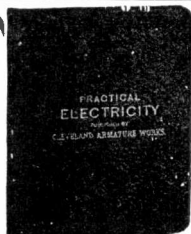
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NOVEMBER, 1913

No. 7

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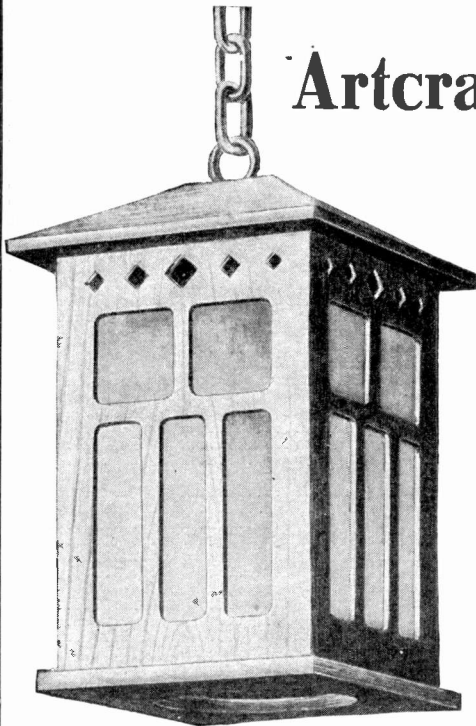
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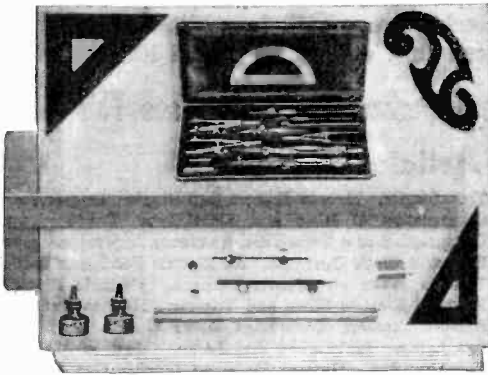


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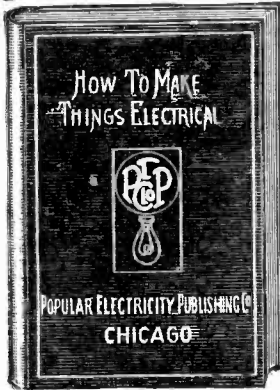
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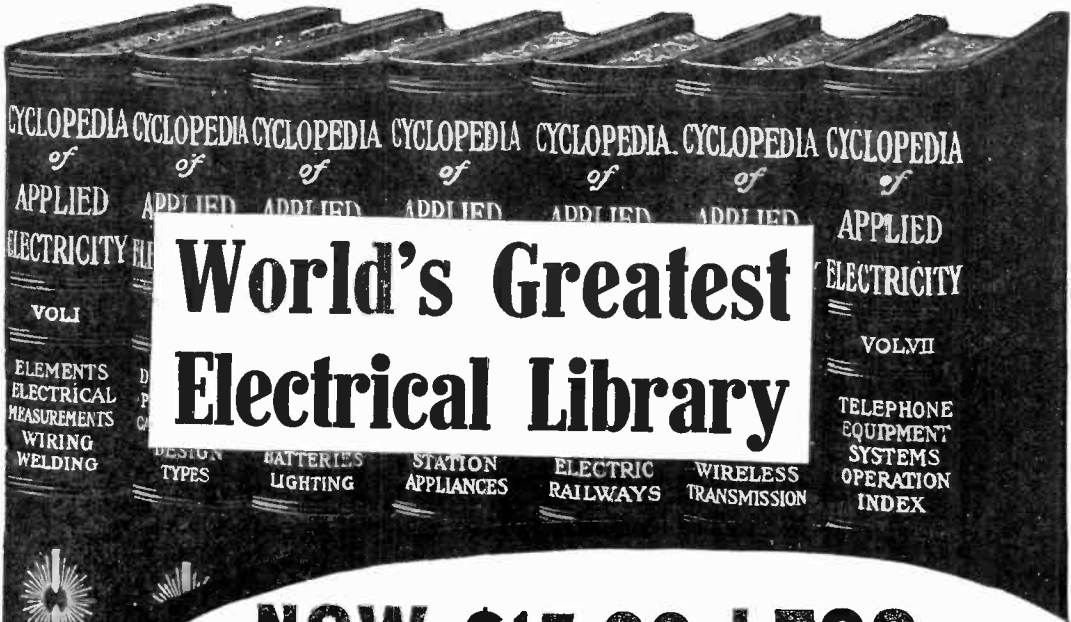
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# POPULAR ELECTRICITY

AND THE

## WORLD'S ADVANCE

VOL. VI

NOVEMBER, 1913

No. 7



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## The "Dream of the Ages" Fulfilled

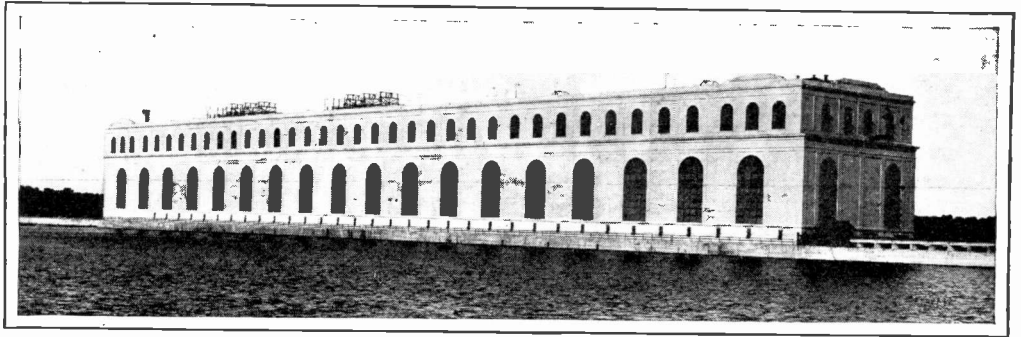
BY CAROLYN WILSON SUMMERS

At the dedication of the greatest hydro-electric power development in the world, the Keokuk plant of the Mississippi River Power Company, the tens of thousands of visitors who attended witnessed the completion of one of the engineering marvels of the century. The exercises, which were held August 25th to 28th, embodied the best features usual to such affairs, together with the oratory of famed and learned men.

The celebration was held under the auspices of the Industrial Association of Keokuk, a local organization, co-operating with the Mississippi Valley Motor Boat Association, which held its annual regatta at that time.

The first day was called Governor's Day, and the particular ceremonies were held at Hamilton, Ill., where Governor Dunne of Illinois was the guest of honor, and made the principal address.

Tuesday was announced as the "Great Day" of the celebration and was inaugurated, first by a reception at the Elks Club by the ladies of Keokuk to the wife and daughter of Governor Clark of Iowa. This was followed by a parade on Main Street to Rand Park, consisting of the governors in attendance, with staff of Governor Clark, visiting delegations, a flower parade by the school children under the management of Prof. Hayden, Director of Music of the Public



Here are Installed the Largest Hydraulic Turbines, in the Largest Electrical Power Plant in the World; 200,000 Horsepower Will be Generated in this Building, Which is 1,718 Feet Long, 138 Feet High and 176 Feet Six Inches Wide

Schools, Ferulla's Italian Band, the Civil War Veterans Band and other bodies of musicians. The parade proceeded to the Park, where speeches were made by Mayor Elder of Keokuk, Judge Logan, to whom much credit is given for the successful consummation of the work, Governor Clark and Lieutenant-Governor Painter of Missouri.

About noon the park presented the appearance of a Fourth of July picnic, with people placidly eating their lunches and seeking their pleasures in their own way, together with all the usual features of the country picnic. There was no crowding, no unusual congesting of the traffic: the wonder was that among so many, there seemed to be so much room, thus proving that the fears that Keokuk could not handle the crowds that would

come to the celebration were groundless. In the afternoon, the first of the races of the Motor Boat Association was held, and a large crowd was seated in the grand stand long before the races began, patiently awaiting the beginning of the greatest event of the celebration.

Races were also held on Wednesday and Thursday afternoons.

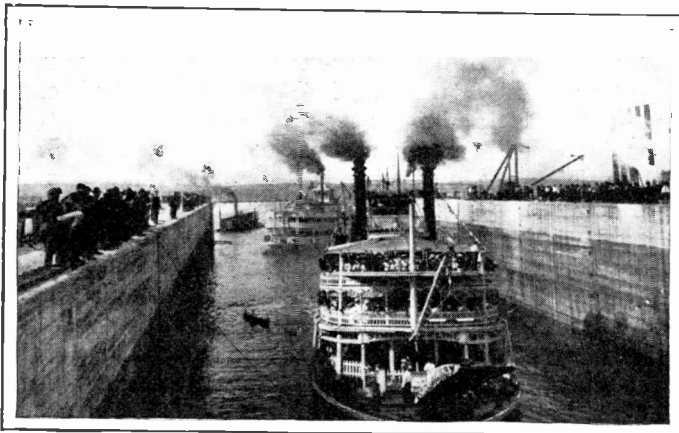
On Wednesday afternoon, Tony Janus, in his hydro-aeroplane entertained the watching multitudes with his wonderful flights both on water and land.

Although several articles have appeared in this magazine in the past, touching upon the great plant and its electrical installation, some few facts may be here restated to refresh the memory.

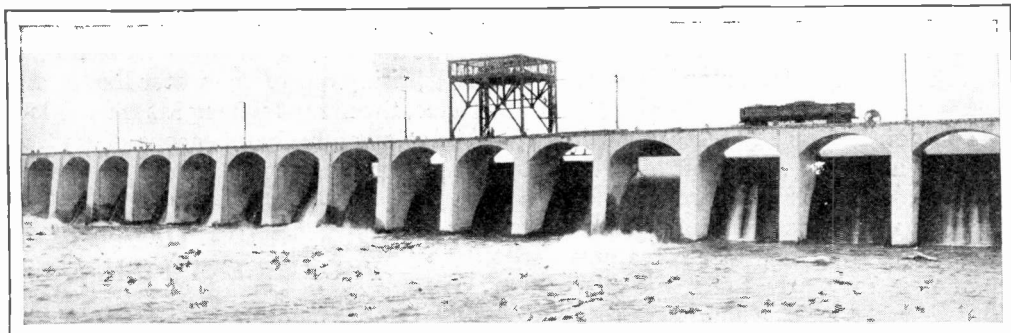
The work was begun in March, 1911, by a corporation known as the Mississippi River Power Company.

The great name in connection with the celebration of this work is that of Hugh L. Cooper, who was the chief engineer of the power company.

The co-ordinating of the almost infinitesimal details of the thousands of things necessary for economical construction, the assembling of millions of dollars' worth of tools for construction, the necessity for perfect accuracy in every order



The First Boat Through the Lock at Keokuk



Partial View of the Monster, Concrete Monolith Dam, the Longest Ever Built; it Provides Deep Water Navigation for 65 Miles up the Mississippi from Keokuk

of material used, the preliminary preparations for the casting of the immense monoliths of concrete, the positive necessity of everything being done just at the right time and in the right way, formed the actual problems of this construction.

One of the most remarkable features of the work was the construction of the dam. The first part of the dam from the Illinois side to the real bed of the river, which included about 36 spans, was built on the land, but as soon as the water was reached, it was necessary to unwater the river bed there. It was accomplished by a cofferdam of different construction from the large one enclosing the power house site. A cofferdam a little wider than the big dam was made ahead of the dam proper and was built in convenient sections of length at a uniform width of 78 feet. When one section was traversed by the progressing concrete dam, the next section was completed and ready for use. This feature was the great pride of the chief engineer, as both speed and economy were gained and the idea was an original one and carried out with great success.

The dam is 4568 feet in length, or about seven eighths of a mile. It is 42 feet at the base and

32 feet in height above the river bed; each pier is six feet thick and the distance between the piers is 30 feet.

The power house is a little over 1700 feet in length, 123 feet in width, with a height from foundation to roof of about 170 feet.

The substructure is now entirely under water, of course, and is also made of solid concrete. The superstructure is reinforced concrete, and is "fearfully and wonderfully made." It consists of row upon row of vast arches and walled chambers, column upon column converging to minuteness in the vast spaces in which are confined the forces of operation. Every known means and every possible precaution has been used to prevent accident, delay or cessation in the operation of the power. There are 30 generating units, each with its own



Thirty Generating Units Like so Many Personalities

speed governor and all other apparatus necessary to the performance of its functions; just like so many individualities.

The new lock is 110 feet in width and 400 feet in length with a lift of 40 feet at low water. It is as large as those at Panama and it has been said by the chief engineer that the new lock is really larger than necessary. It takes the place of three smaller locks which were formerly used for navigation at this point in the river. Like the dam, it has its foundation in the solid bed of the river, and is as enduring as the ages.

The whole Mississippi Valley in this section already feels the influence of this great work.

The power is now transmitted through the transmission towers extending all the way down the line to St. Louis, furnishing that city with its lights and transportation.

In time, the power generated here will light the towns for many miles around, trolley lines will connect the villages now separated and isolated. The beautiful scenery of this section will become as famous as that of the Berkshires. Commerce will begin to grow; factories are bound to spring up, as they are already beginning to do about Keokuk. Population will increase, which is the one much needed thing. By a comparison with eastern sections, it is the sparseness of the population that is almost terrifying. What is needed here is people and something for them to do.

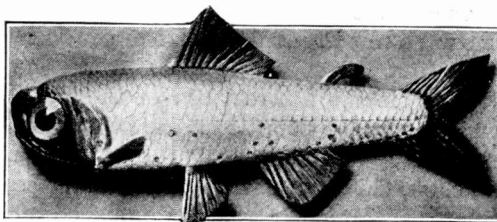
This work has been called "the dream of the ages," because it has been foreseen and talked about for many years and by many generations, and now a vision has been materialized, a dream realized.

The army of workmen who toiled for its completion have silently "folded their tents" and gone away. The monolith stands, not only a monument to the Master Mind that has executed it, but also to Labor which is ever King, and without which it would never have been possible. Nothing is more beautiful than

the view of the power house, the lock and all the adjuncts to the work lighted up at night, rising out of the water like a fairy palace, the many triple lights on the lock shining steadily, like beacons of civilization welcoming the world.

### LUMINOUS MODEL OF A PHOSPHORESCENT FISH

Certainly among the most remarkable of fishes are those which are provided with lanterns of their own and which swim around the dark recesses of the bottom of the deep ocean where no ray of natural light from above can penetrate. A model of one of these fish, notable for its phosphorescent organs, a specimen of *Ethopora effulgens*, is on exhibition in the United States National Museum.

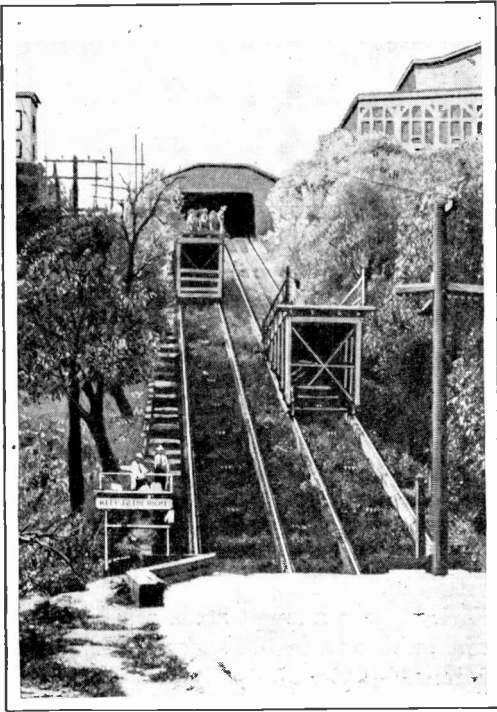


Model of the Luminous Fish

The sides of the fish are dotted at regular intervals with luminous spots, which may be seen in the photograph, while in addition there is a large luminous area like a lantern on the top of the head. This extraordinary creature must present a singular appearance when swimming in the dark abysses of the ocean.

In the model the luminous spots on the sides are represented by buttons of glass, connected with the interior by tubes. The luminous protuberance on the head is modeled in gelatine and tinted. When in operation the model is so connected with electric current that a distinct glow, appearing in the side spots and the frontal "lantern," produces a very striking and, it is believed by fish experts, a quite accurate representation of the appearance of a living phosphorescent deep sea fish.





Elevator for Teams in Hoboken

### CARRYING TEAMS UP A HILL

The illustration herewith shows a pair of large elevators operated by powerful electric motors for carrying teams from the foot of Ferry Street, Hoboken, to Jersey City Heights. These elevators are capable of taking two three-horse teams with full load thus saving a long drive.

### PHOTOGRAPHING VALUABLE DOCUMENTS

The process of taking photographs of written or printed matter so that its peculiarities are preserved as in the original has been perfected in the apparatus called a Cameragraph.

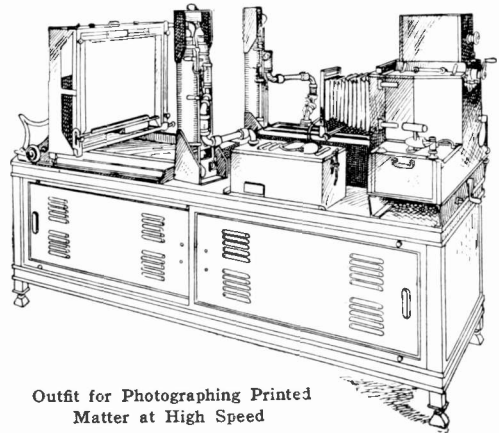
One feature of the device is that it does not require an expert in photography to operate it. The book or document is placed in a holder opposite the camera and the machine is focused mechanically, an enlargement or reduction in size of the reproduction being made by simply turning a crank.

After exposure the print is turned directly into a developing chemical within the machine while an unexposed sheet is rolled into position for the next exposure. A plunger now submerges the print in a fixing bath. Throughout the operation the work is done within the machine, no dark room being necessary.

Another important feature of the Cameragraph is that it photographs two pages of a book, each upon opposite sides of the same sheet of photographic paper, with only one exposure. An unusual service to which it has been put is in making copies of curtains, rugs and laces.

### NEW YORK WILL TALK WITH SAN FRANCISCO

New York City and Denver have been connected for long distance telephone communication for some time. Plans have now been completed for the stringing of four heavy copper wires from Denver to San Francisco, which, with the phantom circuit established on them, will give three



Outfit for Photographing Printed Matter at High Speed

complete circuits between these western cities and put into actual realization telephone service across the continent.

A double track electric interurban railway is being built between Tokyo and Yokohama, Japan. When completed next year it will be the most up-to-date railway in the Far East.

# TEL-AUTOMATICS IN BY EDWARD

How every one of the great Powers is utilizing wireless wizardry in an attempt to become more terrifying than the others. :: :: ::

Not six years ago an uncanny spectacle was seen in the Bay of Antibes. A submarine boat without a soul on board ploughed through the blue waters, circling, turning and churning away across the surface without human agency controlling it. It was the climax of a series of experiments by two Frenchmen, Lalande and Devaux. Their craft, known as the Lalande-Devaux submarine was operated by Hertzian or wireless waves that, reaching through space from the deck of a French cruiser, laid hold of the big black metal cigar and made it do their will.

That was the beginning. To-day the science of tel-automatics has reached a state of development that is of the utmost importance to the admiralties of the world's greatest nations.

The German government, for the last few years, has been carrying on some astonishing experiments in the harbor of Kiel. There a small boat, a submarine, was guided from the shore by means of wireless control. On board that craft there was not a human being. Just before that, on the Wannasee, not very far from Berlin, a Nuremberg man named



Gabet Wireless Wave Transmitting Machine Set up on a Small Boat

# THE GAME OF WAR

## LYELL FOX.

Wirth gave further proof of what Germany is doing with tel-automatics. Wirth exhibited privately a dirigible that worked by wireless. Closely watching its movements were representatives from the

machinery. So, by working the wireless accurately, by agitating the "relay" at just the right time, the craft was made to do the bidding of the man on shore.

After the Lalande-Devaux experiments it was natural to expect Germany to seize upon tel-automatics and develop the science in her own way. With the French government perfecting wireless controlled submarines, Germany, in self defense, had to evolve some similar engine of modern warfare. Hence the recent experiments at Kiel, every detail of which doubtless



Dirigible Boat of John Gardner

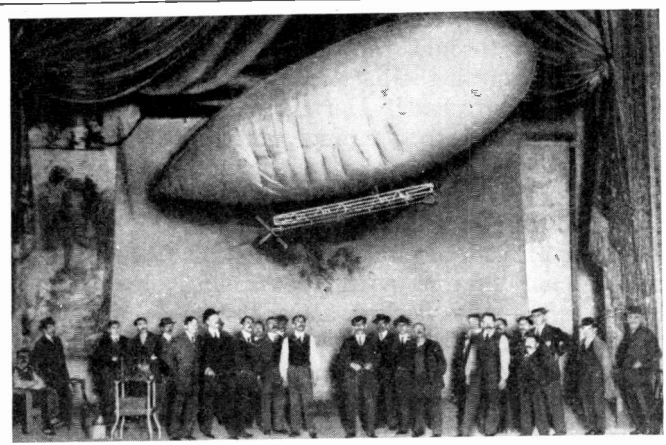
Germany army and navy departments. To those who understand the new science of tel-automatics, it is comparatively simple. Wireless telegraphy, as you know, is the transmission through space of impulses of electric origin which irritate sensitive apparatus responsive to these peculiar disturbances. Tel-automatics is the employment of wireless vibrations in starting and stopping certain mechanisms which in turn control greater mechanisms.

For instance:

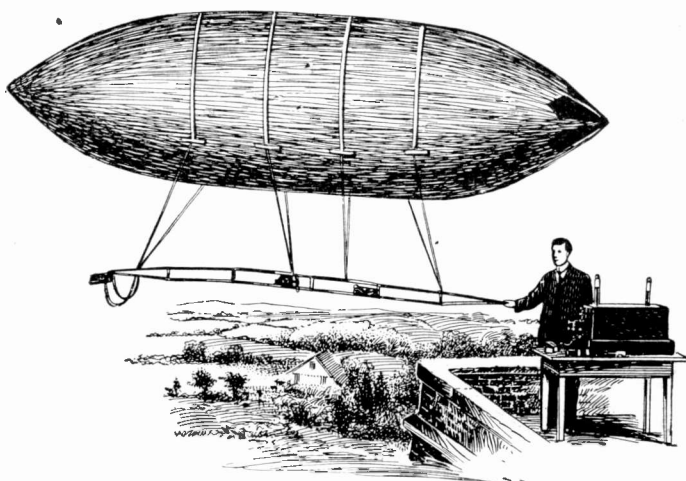
On Wirth's dirigible there was a little receiving station. The wireless from the shore aroused a "relay." This in turn was strong enough to open a valve, swing a lever or turn an electrical switch, which movements are all that is necessary to start most forms of

reposes to-day in the office of the French Minister of War, brought there by the international spy system.

But while Germany has been going ahead, France has not been standing still. Only a few years ago we heard that a man named Gabet had invented a wireless dirigible torpedo, an instrument far in advance of the Lalande-Devaux sub-



First Test of the Marco Wireless Controlled Dirigible Designed to Drop Bombs



Model of the Roberts Balloon which He can Control by Wireless

marine. Recent experiments have shown the Gabet torpedo to be responsive to Hertzian waves. The first tests did not entirely satisfy the French military. While the torpedo obeyed the impulses of a controlling station, it was not perfect. The government insisted upon perfection. So Gabet kept on working. The latest reports from Europe, leaking in the way that the closest guarded secrets of governments will leak, now indicate that the French have brought their wireless controlled torpedoes to a high state of perfection. Gabet is said to have brought out a dirigible capable of making a speed of 20 knots and of carrying a ton of gun cotton, a terrible explosive mass. This dirigible torpedo, leaving its launching place, speeds through the water toward a battleship and if the battleship moves, the torpedo, controlled by Hertzian waves, shifts its course correspondingly and follows direct to the mark. Obviously, its superiority over the automobile torpedo that shoots through the water at higher speed, but that often misses its mark, is tremendous. So long as the controlling station is properly worked, a Gabet torpedo can never miss.

The effect of these inventions upon the war offices of the world was first to throw them into a state of excitement and then into a cool study of how they too might

equip themselves. Right on the heels of the others followed England. France is her ally, Germany is not. Suppose the Kaiser's Armada equipped with long range dirigible torpedoes, sailed against an English fleet? Is it any wonder that the British Admiralty lost no time in conducting a series of experiments at Portsmouth?

The Portsmouth experiments led Britain a step ahead of Germany and France. They found

that contrary wireless impulses from a hostile fleet would so affect their own impulses that the submarines would be impossible to control. To overcome this difficulty, they "synchronized." That is, electrical experts tuned the receivers on board the submarines to such a pitch that they would only respond to one impulse and not to another. It is the same as if you sing into a piano holding one note, then only one string vibrates. If you sing other notes, different strings vibrate.

Working on this principle, John Gardner demonstrated to his government a submarine which employs sound waves. Knowing the air to be an uncertain carrying medium, Gardner sent his waves under water where they travel four times as far and as fast as through the atmosphere. He used the basic principles of submarine sound signaling. Aboard his submarine is a sensitive strip of metallic tape. This is tuned to a certain pitch and the tape will not vibrate unless its synchronized tone irritates it. Thus when the proper note is sounded at the controlling station, the waves produced under water set the thin tape to vibrating. Instantly the continuous flow of the current in the submarine's receiver is broken. The balance is upset. The relay circuit is closed by a mechanical hand swinging over. Then this more powerful



energy produces the mechanical movements that control the submarine.

But the United States for once has kept pace with new inventions suited to war. To understand the work of John Hays Hammond, Jr., it is necessary first to consider briefly the wireless telephone of Professor Rühmer of Berlin. Rühmer has been able to use his instrument a distance of ten miles. He can use it, however, only at night, as his connecting medium is a searchlight beam. The current for the searchlight was, as you doubtless know, tapped to provide the small energy needed for the telephone. The loss of this electricity, though small as it was, caused the searchlight's carbons to vary in their luminosity. The human eye could not detect this, but ten miles away the receiver of Rühmer's telephone could. This receiver, a small bar of selenium, a rare metal, is extremely sensitive to the most delicate changes of electric light. Thus when the telephone was in use, and the searchlight's intensity varied, the selenium recorded minutely the variations reproducing speech at the receiving station.

In his laboratory at Gloucester, young Hammond has employed Rühmer's principals in tel-automatics. Hammond has created a very formidable instrument of coast defense, a semi-submerged torpedo capable of a speed of 40 miles an hour and of responding to every order from his controlling station. Because of their national importance the details of his invention have been suppressed. It is known, however, that Hammond employs a combination of the Rühmer light beam transmission and Hertzian rays. Also, it is fully as effective by daytime as by night. Moreover, it has an advantage in that the waves issuing from the station are not scattered over a wide arc, but are held within narrow bounds, like the stream of water from a hose. The advantage of this is that an enemy setting up counter waves would have little chance of interfering with the Hammond system.

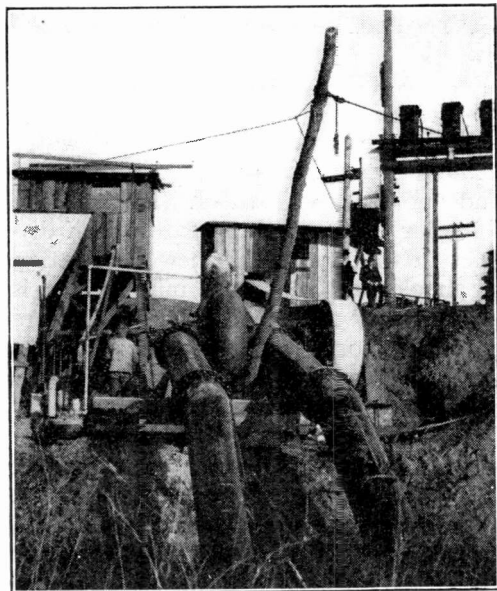
Within the last few weeks have come reports from France of the work of Marco,

who has just made tests of his wireless controlled war balloon. These balloons, laden with bombs, would in case of war be directed from a safe vantage point out over the enemy's troops, fortified city or fleet, as the case might be, dropping death and destruction at the throw of a switch.

If tel-automatics progresses much further there will be, as Frederick Palmer, the noted war correspondent says, "One more war, and that so terrible that civilization will never permit another."

### ELECTRIC IRRIGATION LOW IN COST

Near Princeton, Butte County, Calif., is an example of what electricity is accomplishing in irrigation. The pump illustrated is driven by a motor utilizing current generated eighteen miles away by the Pacific Gas and Electric Company.



Electrically Operated Pump Which Irrigates 1,500 Acres

It will deliver enough water to irrigate 1,500 acres of beans, barley and wheat. The cost of the installation was not over \$15.00 an acre, and the cost of operation does not exceed \$1.25 per acre per year, including labor.



In the Lake Superior Country the Application of an Old Gold Mining Idea is Used in Mining Iron Ore

### HYDRAULIC IRON MINING

Mining iron with a stream of water at high pressure is a method rarely used and one seldom heard of. In the Lake Superior country, the greatest iron district in the world, this new application of an old and successful mining idea is used in only one place. The results are so satisfactory that three more outfits are in process of installation.

We ordinarily associate the thought of hydraulic mining, as used in the gold and silver fields, with the idea of a pipe line extending down a mountain side so that the necessary pressure is obtained by gravity. But in the mine shown in the accompanying illustration, the pressure is obtained by an entirely different method.

In the wooden shack is a powerful electric pump. Through the pipe line, water is obtained from Little Rabbit Lake, located conveniently nearby, and the pressure is raised to a point at which the water is thrown in a solid, irresist-

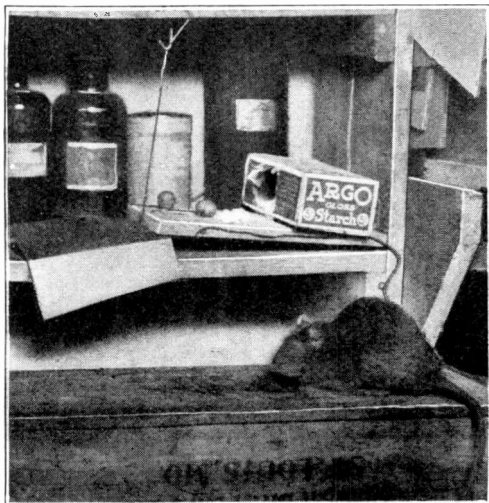
ible stream from the giant nozzle. The force of the water tears or "strips" the iron bearing soil out of place and deposits it some distance away in loose piles easily handled with shovels.

So great is the "kick-back" of the nozzle that it is securely lugged down to a base of heavy timber and the play of the stream is directed by a large wooden lever in the hands of the operator.

### THE QUICKNESS OF A RAT

This photograph is *prima facie* evidence that a rat is quick in action. A small trap was rigged in such a way that when a rat nibbled the bait an electrical connection was made which released the shutter; the shutter making another connection set off the flash powder — the whole action taking place almost instantaneously, an almost infinitesimal space of time only being required to transmit the motion through the strings and levers.

The photographer set the shutter of the camera and left the room. The rat ap-



The Rat's Feet Sprung the Trap Arrangement Above, but the Camera Caught Him in this Position

proached the bait, the flash occurred; but the rat was so quick that it leaped to the ledge in the position shown before its picture was taken.

### CONGRESS MAY VOTE BY ELECTRICITY

A member of the House of Representatives has devised a scheme by means of which roll call and the registry of votes in the two legislative bodies would take practically no time.

By pressing a button at his desk each member's vote would be registered on a bulletin board by means of colored lamps which would be visible to all.

### WHAT IS ELECTRICITY?

Thomas A. Edison has recently said, "Electricity is not power; electricity is a method for transporting power."

Ernst Haeckel has said, "There is only one thing in the world, and that is energy. Energy takes a myriad million forms, and the method of transmission from one form to another, when we finally understand it, will be discovered to be electric."

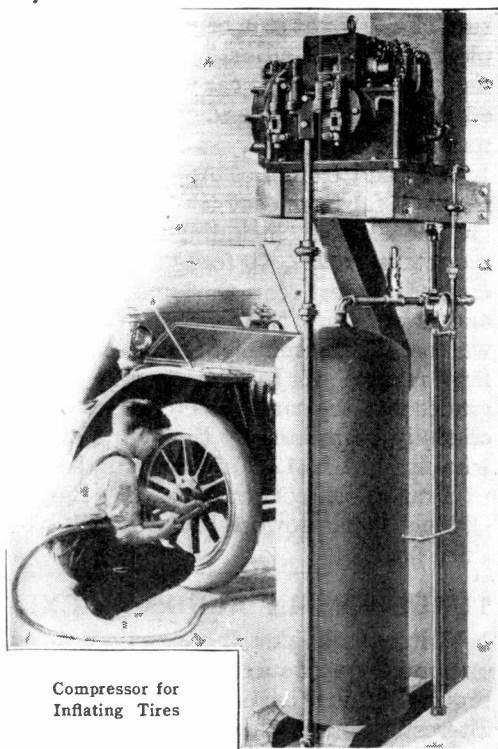
"When we know the secret of electricity, we will know the secret of life," says Doctor Charles P. Steinmetz.

"Electricity occupies the twilight zone between the spiritual and the material," says Lord Kelvin. "God is the Great Electrician; we are born, cry, dance, live, play, work, toil, enjoy, suffer, love, die, as He touches the electric keys."

### AUTOMATIC COMPRESSOR FOR GARAGES

This motor driven air compressor for garages is built in the most compact form possible, with two cylinders, each provided with a single acting plunger piston. It requires absolutely no attention. The oiling system is entirely automatic and positive and by filling the oil reservoirs about once a month constant lubrication is insured.

An automatic governor is utilized



Compressor for Inflating Tires

whereby the air pressure is maintained practically constant at all times and by which the motor is automatically started or stopped as often as the necessity of the work requires.

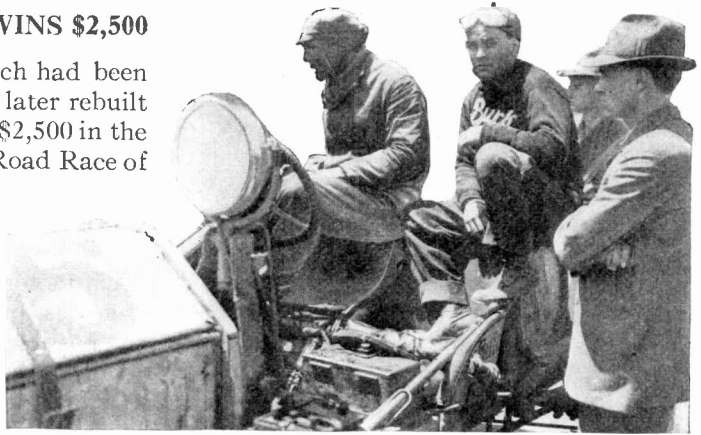
### FIFTY DOLLAR CAR WINS \$2,500

A second-hand car which had been bought as junk and was later rebuilt as a racer, won a prize of \$2,500 in the Los Angeles-Sacramento Road Race of July 4th. The car was a 1910 Buick which had been used for motor stage service in the California oil fields for years and finally was damaged by fire so seriously that the owner was glad to sell the remains for \$50. It was bought by Ed. S. Waterman of Fresno, a student in the University of California with a taste for mechanics and a knowledge of motor cars. Without the expenditure of any great sum of money, but with plenty of expert adjustment and rebuilding, the former stage car was reconstructed on racing lines and was entered as number 48.

The road from Los Angeles to Sacramento is far from easy traveling, as there are 444 miles including very heavy mountain grades, 40 fords and stretches of sandy desert road that make both car and driver show their mettle. The start was practically midnight, that is, on the first minute of July 4th. The heavy grades and the sandy stretches were successfully negotiated by the young driver, who finished in 12:50:25 running second to Frank Verbeck and beating Barney Oldfield in his powerful Fiat, which won third place.

### TUNGSTENS IN BUDDHAS' EYES

Visitors to Nikko, Japan, who note an unwonted sparkle in the eyes of the big bronze Buddhas in the temple area will be interested to know that it is because the flickering candles, which have been used to bring a glow to the optics of the "Great God Budd" for untold centuries, have, through the installation of a hydro-electric plant at one of the finest of the many beautiful waterfalls of Nikko, been



The \$50 Car and Its Owner at the Wheel

replaced with incandescent lights. The half veiled eyes of the largest of the Buddhas are made of gold and alabaster, through which the light from within the hollow of the god's head, throws a spec-



Buddhas with Electric Eyes

tral glow that gives the calm eyes of the figure an awesome expression of slumbering life.

### FOUR SIGNS IN ONE

The prismatic sign, something out of the ordinary in electric signs, is composed of a series of prisms each having four faces. In operation it displays a series of painted advertisements, one following another at regular intervals, these being shown on a large and apparently unbroken

display surface, which in reality consists of several separate and interchangeable parts.

The change from one advertising surface to another is made quickly by the use of the four sided prisms, a series of four changes following one another in regular rotation.

During the changing process, which is accomplished by a small electric motor, a number of attractive illuminating effects are taking place. When the sign is not in motion there is a glare of white light which brightly illuminates the advertisements. At the moment of the change of surfaces this white light is



The Prismatic Sign

replaced by various spectacular flash effects. By means of lenses placed around the framework of the sign a changing color scheme is carried out.

### CHILDREN GIVEN LESSONS IN SAFETY

In New York City a children's safety crusade has been carried on since last December by the American Museum of Safety with the hearty co-operation of the Board of Education. Its object is street safety for children and the basis of the campaign is daily class room talks followed by the distribution of pamphlets containing "safety fairy tales," which the children are encouraged to take home and discuss with their parents.

Never fail to look both ways before crossing a street. Keep eyes to left until the middle of the street is reached, then eyes to right until the curb is reached.

Never play any kind of a game in street where automobiles, heavy trucks or trolley cars are passing.

Never hitch on behind a trolley car, automobile or motor truck.

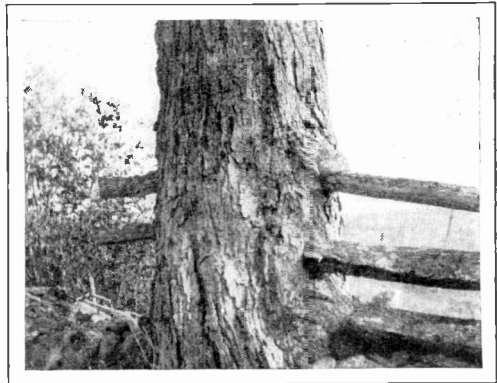
Never step from behind a trolley car without looking for another car coming from the other direction.

In addition to street safety, the children are taught what to do in case their clothing catches fire or in case there should be a fire in the house, and are also warned against cluttering the fire-escapes of their homes with household effects.

Caution and self control are at the root of the lesson taught; to train the children of to-day to be the prepared workers of to-morrow, to meet modern industrial conditions where the element of danger is always present.

### FENCE RAILS THROUGH CENTURY OLD TREE

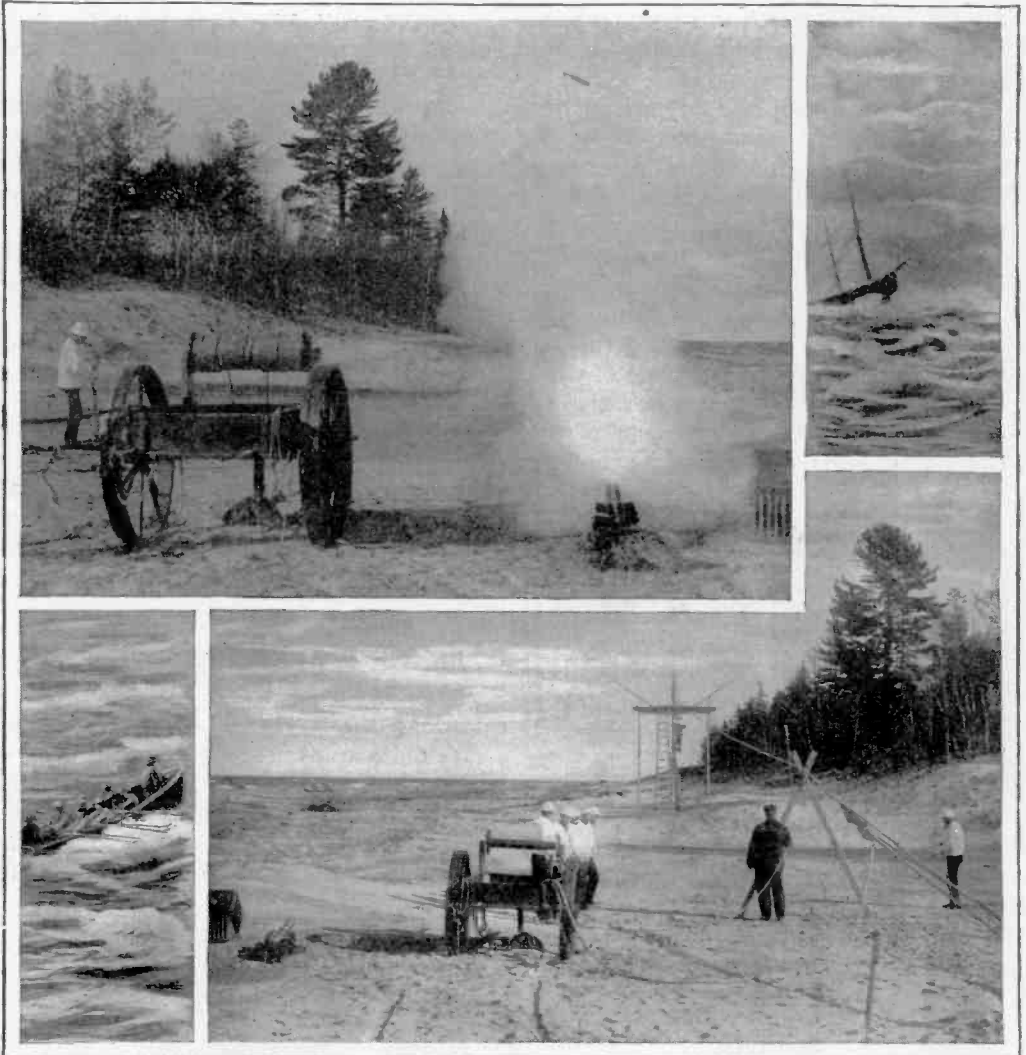
Along the roadside between two century old maples near Skowhegan, Me., is a length of old cedar rail fence, mossy and weatherbeaten, but still well preserved. This length of fence consists of three rails one above another with no trace of the



The Rails are There to Stay

rest of the original fence. A mammoth maple is the fence post and the ends of the three rails extend through the middle of the tree, showing that the fence was put up some 75 years ago.





In the Upper View is Shown the Projectile Leaving the Cannon. The Lower Picture Shows the Breeches Buoy in Use

### SAVING LIVES WITH A CANNON

Saving peoples' lives by shooting at them with a cannon sounds paradoxical, but that is the first step in the method of rescue followed by life saving stations all over the world.

When a ship runs on a shoal near shore, life savers shoot an iron projectile attached to a coil of rope or fine steel cable over a cross arm of the vessel by means of a small brass cannon. Those aboard the ship haul in the rope to which is

attached a heavier one. The heavy rope is stoutly secured at both ends and, by a breeches buoy, the passengers are permitted to coast to the shore and to safety, one at a time.

The first illustration shows the projectile leaving the cannon. The same string which discharged the cannon was attached to the shutter release of the camera; exposure 1/1200 second. The second photograph illustrates, by a roughly constructed incline, the breeches buoy in use.

### MONUMENT HOLDS PHOTOGRAPH

The monuments in the cemetery of Norridgewock, Me., are made with a place in which to put a photograph of the deceased. A hole is chiseled in the granite



Tombstone Holding a Photograph of the Departed One

or marble and the picture, which is usually a tintype, is inserted, a watertight cover is made for the opening and one wishing to see the likeness of the person as he was when alive has only to lift the cover. This is an old custom in Norridgewock and one monument here shown was placed in 1865 and the picture is as plain as though it had been taken recently instead of 48 years ago.

### EQUIP "FAST MAIL" WITH SEARCHLIGHT

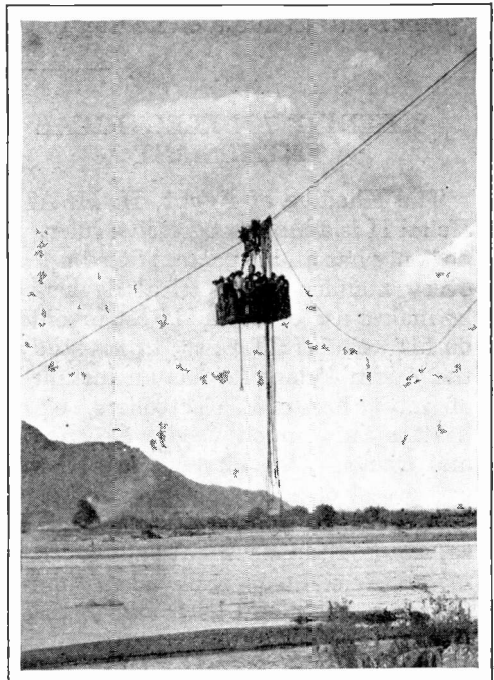
A new feature on American railroads has been introduced by the Chicago, Milwaukee & St. Paul railway. "The Fast Mail," leaving the Twin Cities in the evening, has been equipped with a

new type of marine searchlight of 3,000,000 candle power that throws a ray of light for a distance of three miles. The searchlight is adjusted on the observation platform and is in charge of an experienced operator. The light can be swayed 90 degrees from right to left.

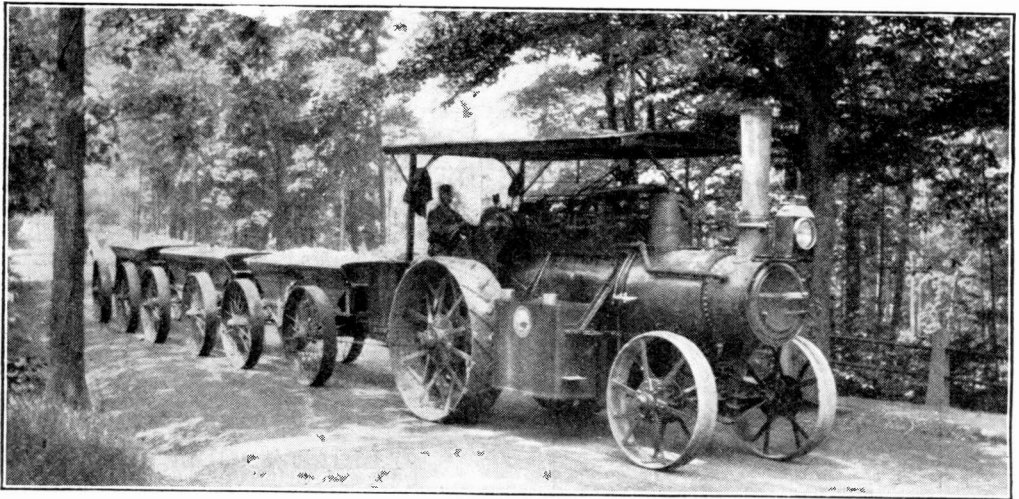
The road parallels the Mississippi for over 100 miles. The river boats, curious shaped rock formations and a wealth of green foliage furnish an intensely interesting panorama upon which to play this wonderful light.

### AERIAL TROLLEY RIDE

The men enjoying this exhilarating trolley ride do not have to pay any fare, notwithstanding that the trolley is an expensive affair and situated in a remote desert region in Arizona. Of course, the riding which the men do back and forth across the river is merely incidental, for the trolley is being used in the construction of one of Uncle Sam's great irrigation dams in the southwest.



Riding 50 Feet above the River



### MINIATURE HAULAGE TRAINS

The newest idea in traction engine work for parks and roadways is the "haulage train," as it is termed. Instead of using many cumbersome traction engines to get in each other's way, miniature trains have been devised with little cars, each a perfectly appointed dump-car and equipped with broad steel tires so that it may not help cut up ground that the steam roller has so slowly and ponderously smoothed down.

The photograph shows one of these novel "haulage trains" at work in the famous Tuxedo Park, New York, where so many wealthy families have their city residences. The trains, it is needless to state, have attracted almost as much attention as the "John Bull" train did on its way to Chicago in 1893.

### KHEDIVE AN ELECTRICAL ENTHUSIAST

The Khedive of Egypt, H. H. Abbas Helmi II is a most progressive ruler. He not only has all his palaces fitted up with every manner of electrical device, but he makes use of all the latest inventions on his wonderful farms. In his study at the Abdin Palace he has an installation of most beautiful electroliers, electric heaters (not much used), electric fans and clocks. The kitchens are all fitted up with electric conveniences and it may be mentioned that his yacht, the *Mahroussa*, is a floating electrical palace. It is a magnificent boat and takes him to Constantinople and back and forth over the Mediterranean.

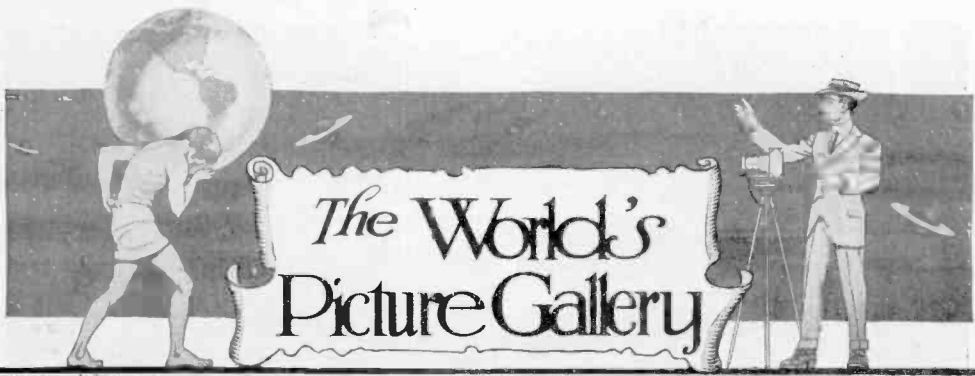
The Khedive was educated in Switzerland and at Vienna and most of his uncles

and cousins were educated at the English universities and military colleges. His huge estates are managed by American and English experts, who have succeeded in placing the Khedive and all the members of his family among the very richest men in the world.

### BETRAYED BY A ROOSTER

Two people talking on a party line heard the click of another instrument and they immediately suspected some one was listening to them. Then they heard the crow of a rooster.

An investigation resulted in the discovery that only one person, a woman, on the particular line owned a rooster. It is said the rooster was in the backyard at the time it crowed, but the crow was distinctly heard over the telephone.

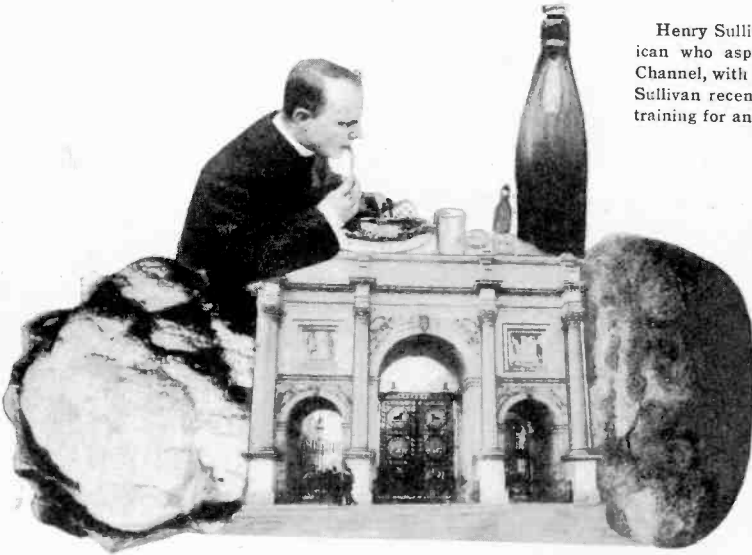


COURTESY OF THE ILLUSTRATED LONDON NEWS

Among the picturesque petty kings of Dahomey is his dusky Majesty of the Dassas. He made his appearance recently in state, mounted upon a fine example of the wooden horse set upon a wheeled stand and drawn along by his Ministers.



Henry Sullivan (in the lead) an American who aspires to swim the English Channel, with his trainer Jack Weidman. Sullivan recently tried and failed but is training for another trial.



Eighty-one thousand cwt. of meat is consumed annually on board the North German Lloyd steamers. One picture shows this volume as compared with Nelson's Column in Trafalgar Square. The other photo shows the gigantic proportions of the aggregate number of passengers carried and the amount of food consumed annually, the comparison in this case being made with the Marble Arch, London.



PHOTOS BY PAUL THOMPSON, N. Y.





Messrs. Flower and Day of Brighton Beach, England, riding a bicycle boat which they have perfected.



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An aeroplane converted into a passenger transporter capable of carrying six children. As seen at an English resort, it skims the air a few feet above the ground.

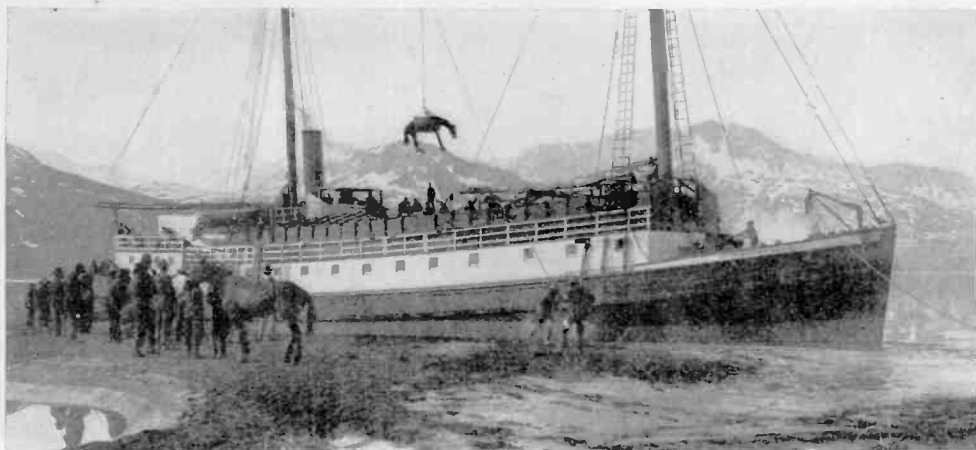
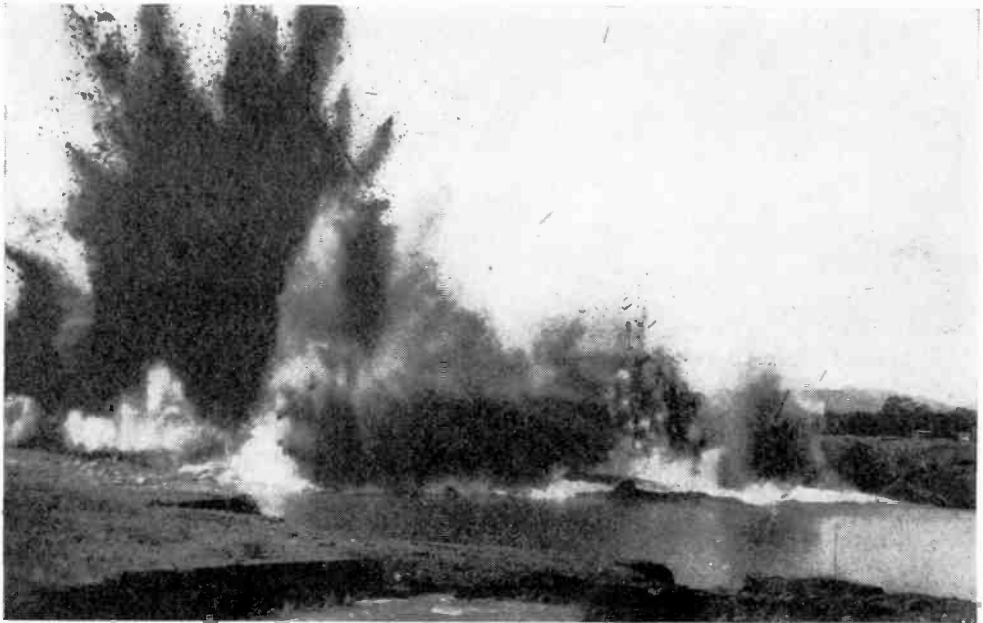


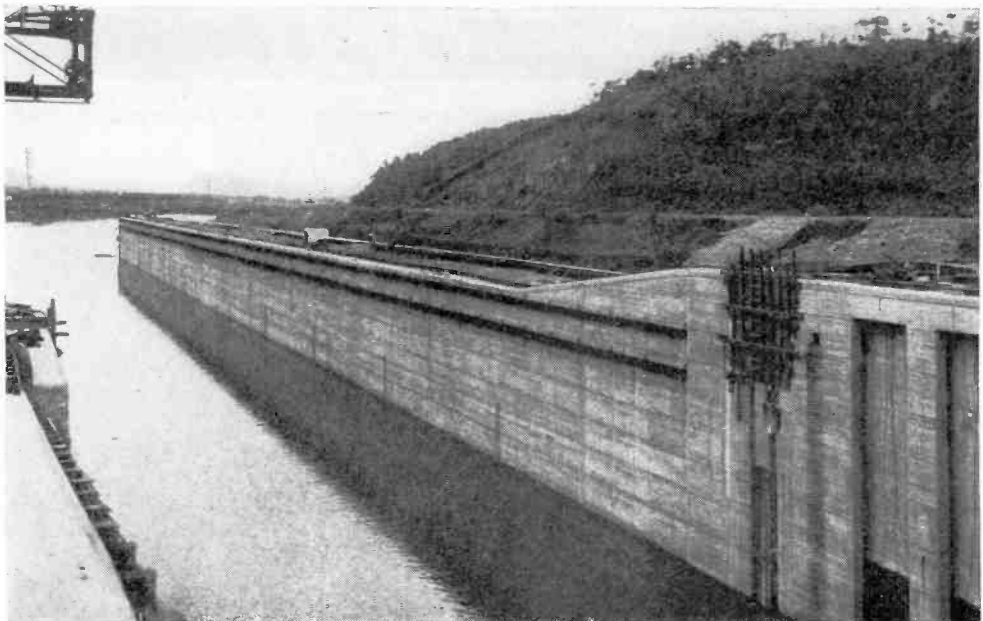
PHOTO BY GUY E. MITCHELL

Loading Horses onto a steamer bound for Alaska.



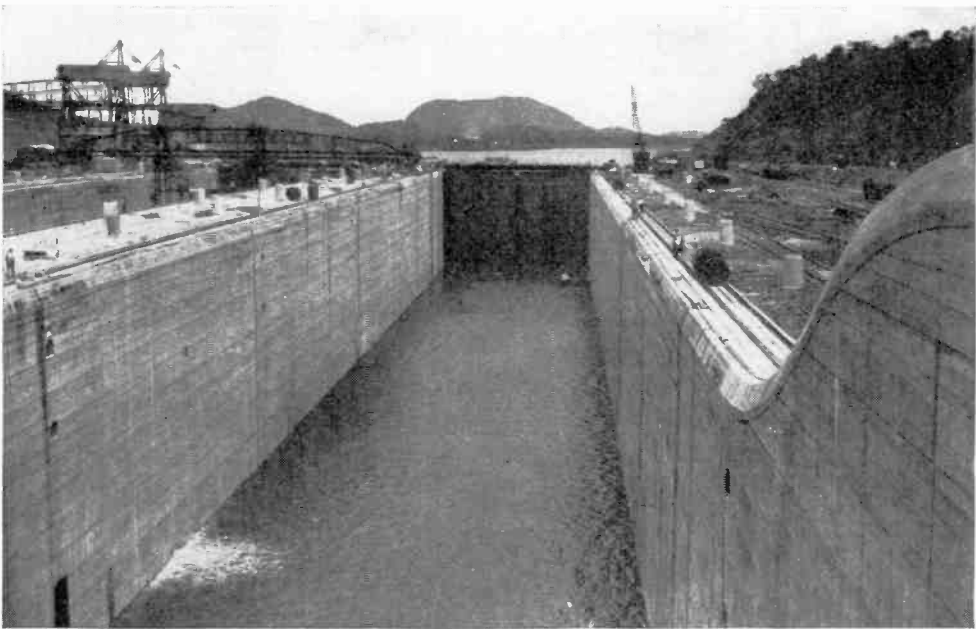
COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE, N. Y.

This remarkable photograph shows the explosion of 20 tons of dynamite used in blowing up the last barrier between the Pacific Ocean and Miraflores Locks of the Panama Canal.



COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE, N. Y.

View from the trestle at the south end of Miraflores Locks showing the Canal after the water had been let in.



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Following the explosion something unexpected happened. The gate valve which was supposed to keep water out of the lock leaked badly and permitted water to enter at the rate of three inches per hour. In the picture it had leaked in to a depth of twelve feet.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

The Peace Palace at The Hague, which was built by Andrew Carnegie and recently donated to the Peace Cause in the presence of the Queen of the Netherlands.



PHOTO BY E. I. HERRINGTON

Outdoor household duties in Salvador—Women grinding Corn.



PHOTO BY GUY E. MITCHELL, WASHINGTON, D. C.

An irrigated onion field in Montana—Growing the onions for seed.

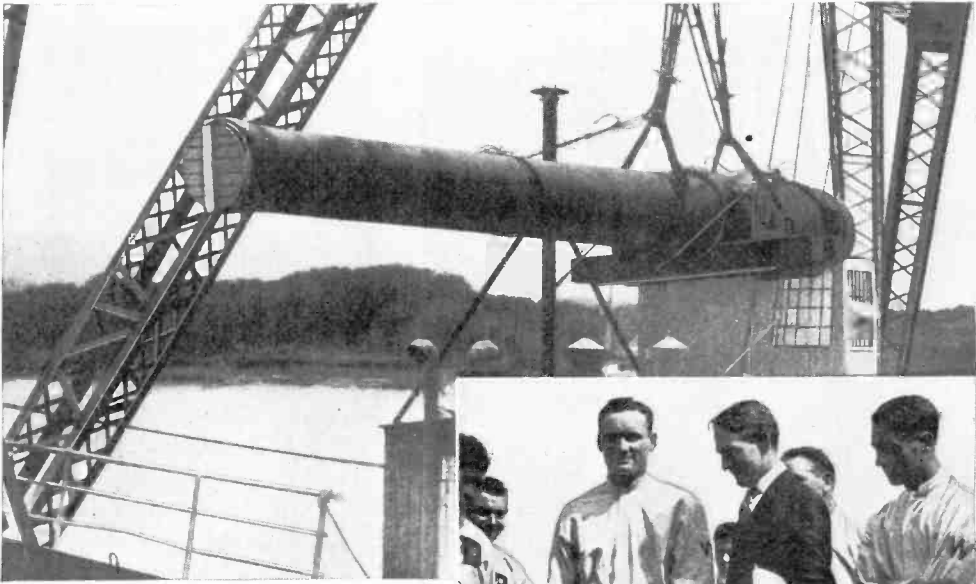
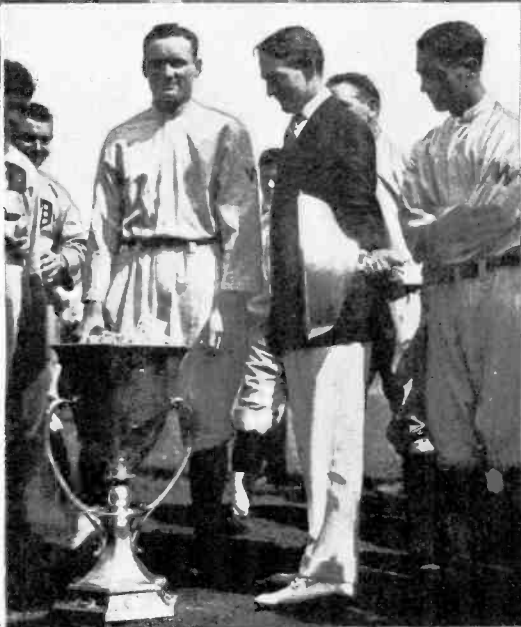


PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.

Landing a 58 ton gun at Pearl Harbor, Hawaii, where the work of strengthening fortifications is being rushed.



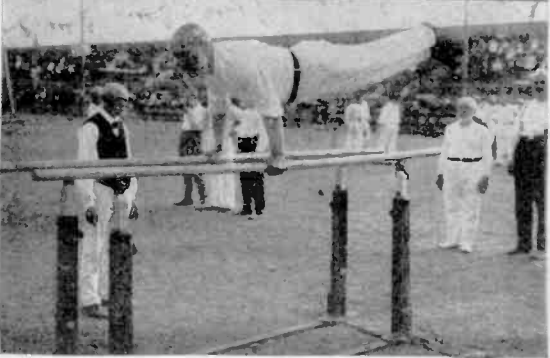
Walter Johnson, American League pitcher, and silver loving cup full of money presented to him by the fans of the City of Washington.

PHOTO FROM PAUL THOMPSON, COPYRIGHT BY HARRIS AND EWING, WASHINGTON D. C.



The artist Jose Marino won a bet of 10,000 marks in Germany, by letting an automobile run over him. He was not injured by the experiment.





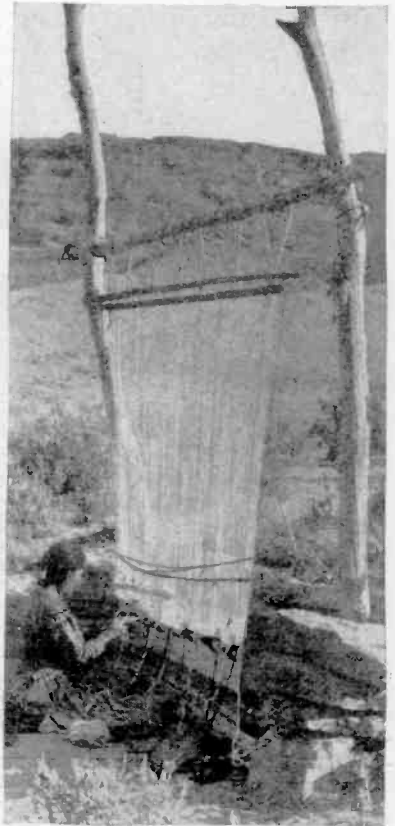
PHOTOS BY PAUL THOMPSON, N. Y.

Scenes at the Leipsic Turnfest. The lower picture shows that old men can keep themselves in remarkably good physical condition.

Siamese priest as a teacher. The books are made of ordinary palm leaves scratched upon by means of a needle.



PHOTO BY FRANZ OTTO KOCH



COPYRIGHT BY GEO. R. KING, PASADENA, CAL.

Navajo Indian woman making a blanket. The best wool, only, is used, produced by the flock of the tribe.

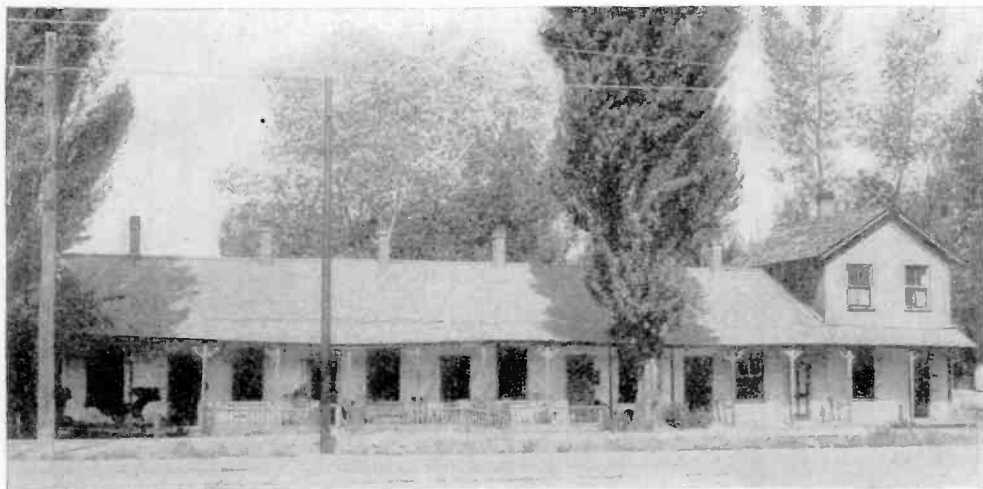
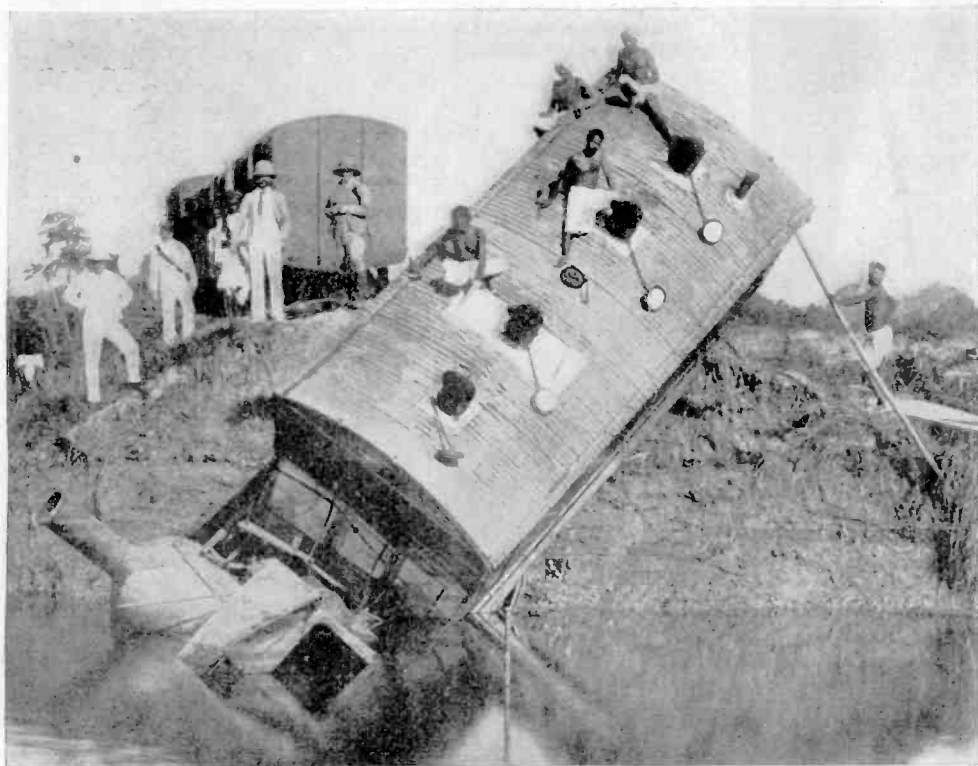


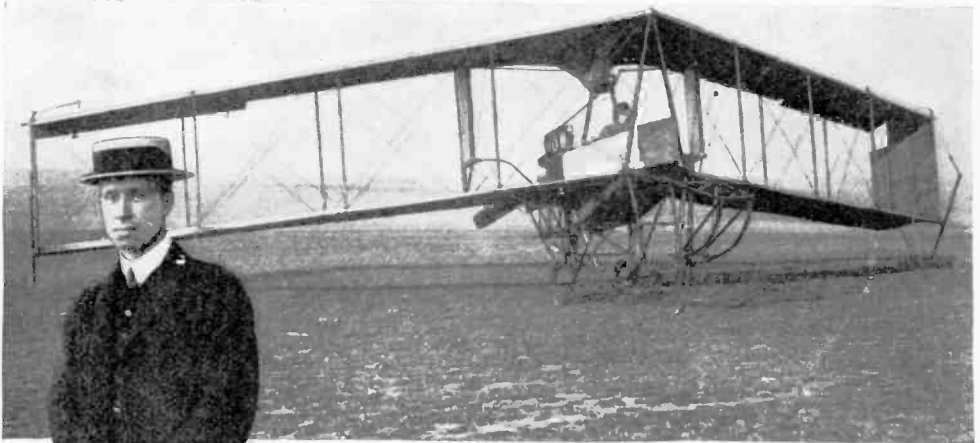
PHOTO BY GEO. F. STRATTON, SALT LAKE CITY

Type of old Mormon dwelling. By counting the number of doors it is possible to tell how many wives the owner had. Now used as a tenement house.



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Railroad wreck in India caused by a flood.



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Lieut. J. W. Dunne and his non-capsizable, tailless aeroplane. The wings coming together at an angle are designed to give stability.

Raised Eskimo graves made of driftwood are frequently to be seen on the bleak Arctic coast.

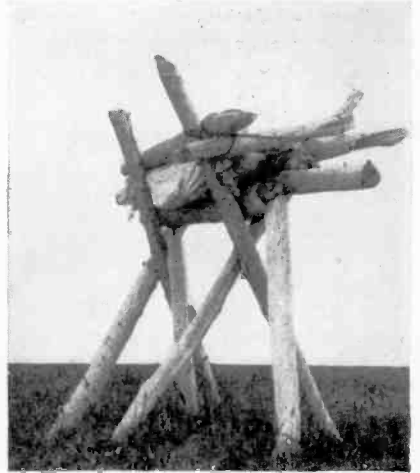
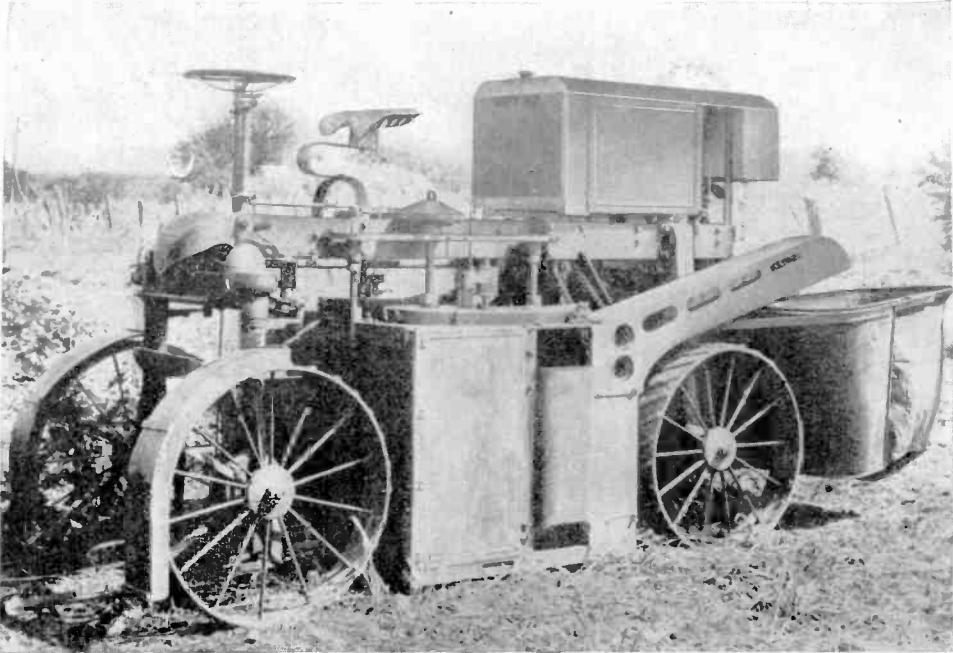


PHOTO BY LUY E. MITCHELL, WASHINGTON, D. C.





A Modern Cotton Picking Machine. After years of study a practical machine has been evolved which means much to the South.

PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

This building of brick, weighing 8,000 tons, was moved a distance of three city blocks on 2,000 small steel rollers.



PHOTO BY L. R. PERRY, BERKELEY, CAL.



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Quaint narrow streets of the residence section of Constantinople, Turkey. There is not a water plug, fire hydrant, lamp post or mail box in the whole length of the street. The laticed bay windows are where the women of the harems stand and gaze out at passersby.





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"Shiver and Shake for Suffrage Sake." Suffrage followers camping in a barn on Hampstead Plain Aviation Field, Long Island.



PHOTO FROM PAUL THOMPSON, COPYRIGHT BY HARRIS & EWING, WASHINGTON, D. C.

Secretary Lane when on his recent trip to Glacier National Park was attended by several Blackfoot Indians.

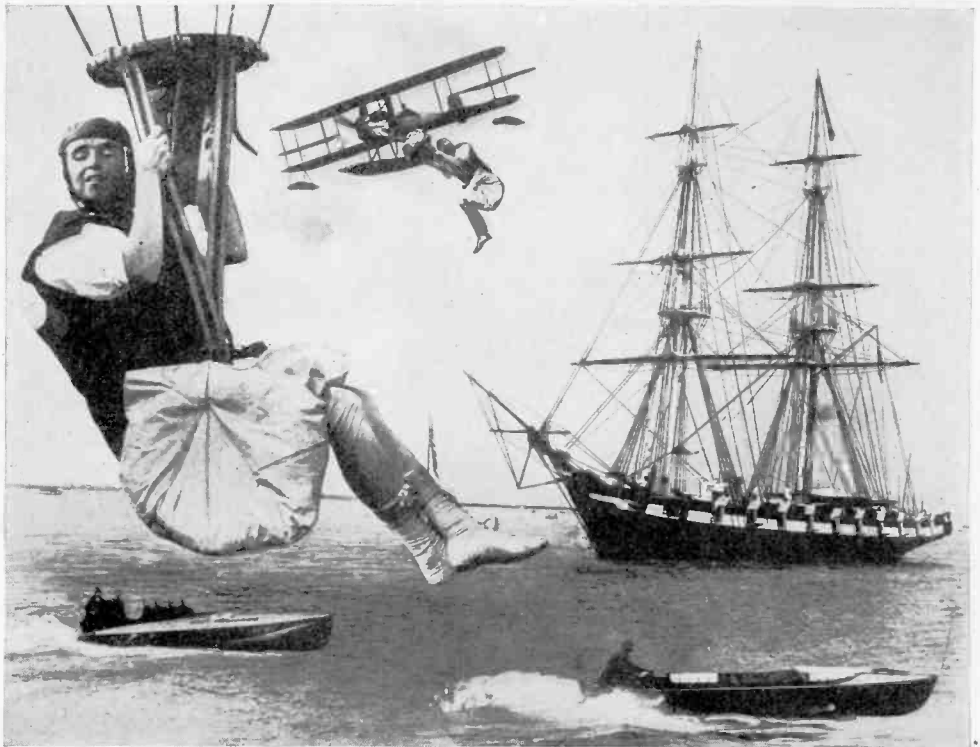
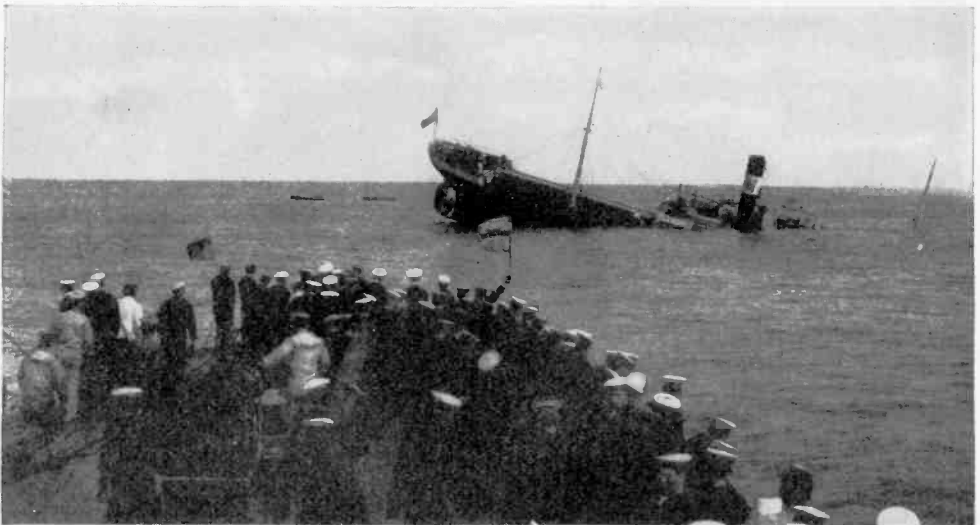


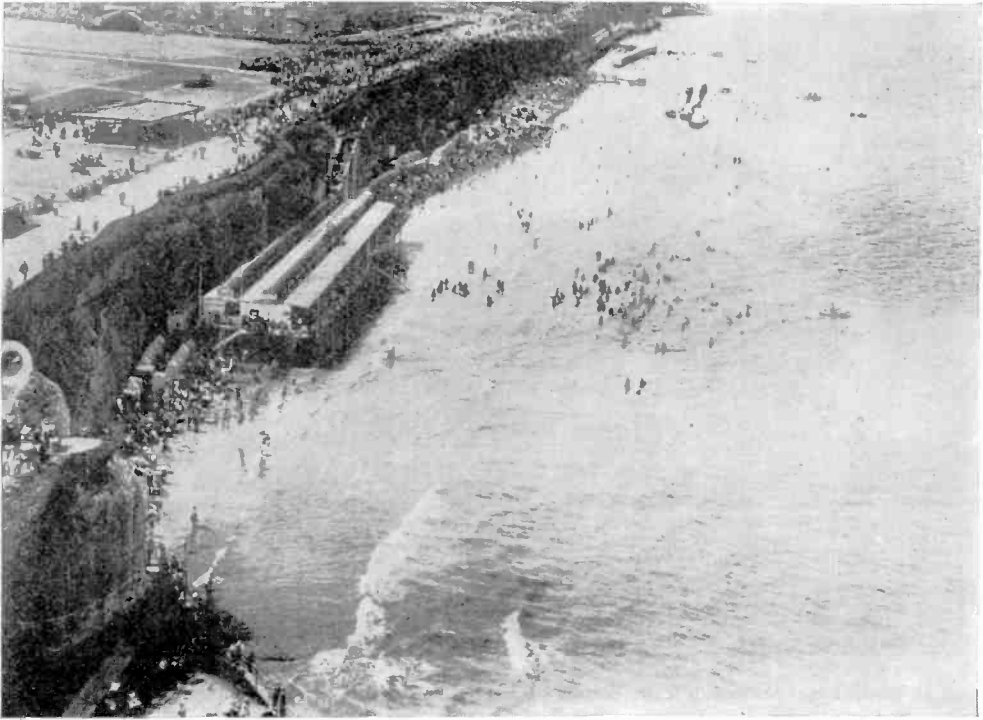
PHOTO BY BURKE & ATWELL, CHICAGO

Combination photo made at the Perry celebration in Chicago during which Miss Tiny Broadwick made parachute descents from a hydro-aeroplane.



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After a steamship collision—H. M. S. King Alfred slowly sinking by the head.



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Remarkable view of Margate Beach, England, taken from an aeroplane.

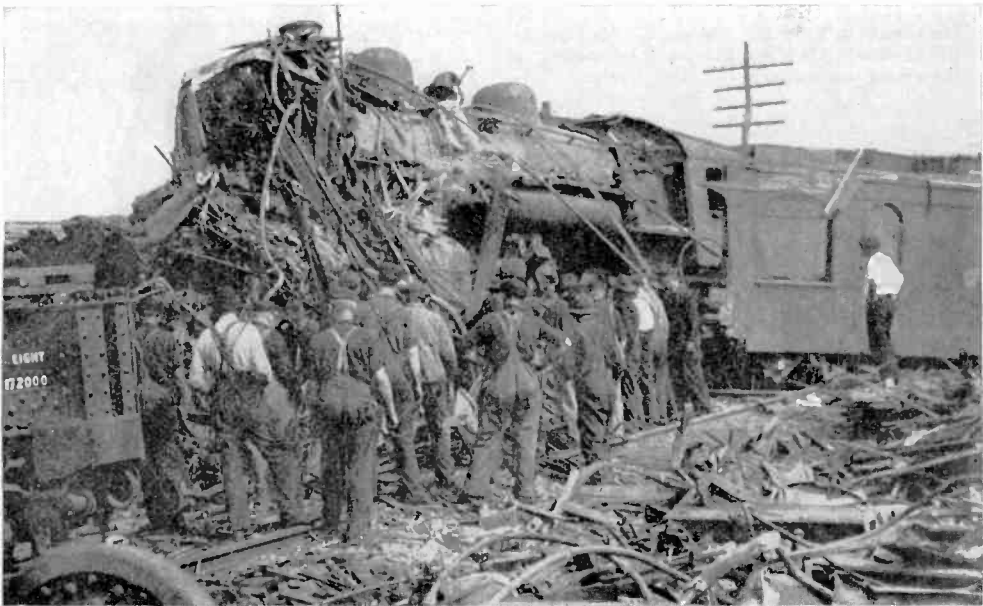


PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.

A great Mogul utterly demolished—wreck of the Bar Harbor Express near New Haven, Conn.



PHOTO BY PAUL THOMPSON, N. Y.

Machine used successfully in Berlin to deliver excavated material directly to wagons on the street level.

San Marino, capital of the smallest republic (of the same name) in the world. The republic has a population of 10,791; it is within Italy but is independent of the laws of that country.

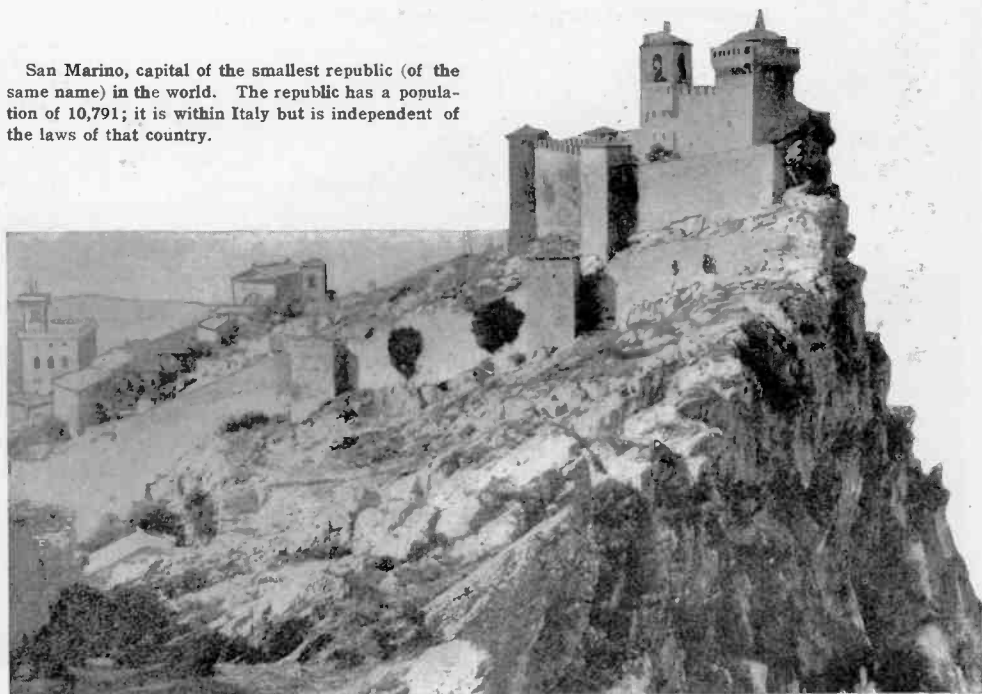


PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

# The Individuality of Gary

BY GEORGE F. WORTS

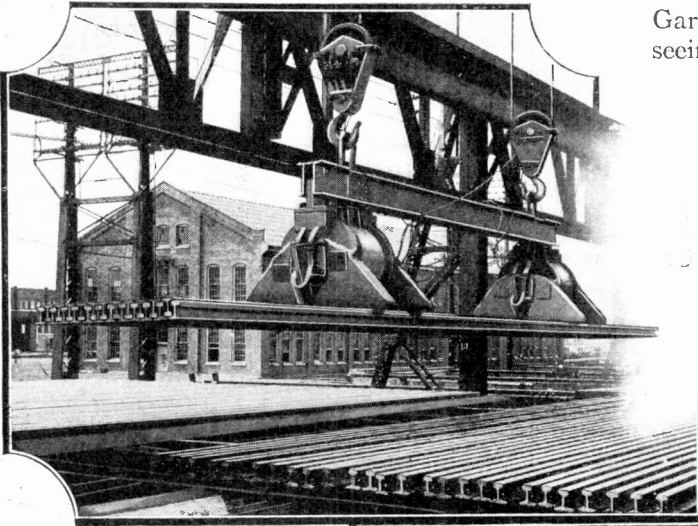
Individuality has been defined as the result of the judicious combination of seemingly ordinary things.

Strictly under that definition, Gary, Ind., is individual; for, although more than a hundred million dollars were spent there in a few brief years to create the world's greatest steel mill and a "rush order" city of utmost modernness, not a penny was used in experiment. Every device — whether in the abstract or concrete — before it was given a place had first conclusively proven its ability under the most severe working conditions. Too much was at stake to invite disaster by adopting untried ideas no matter how

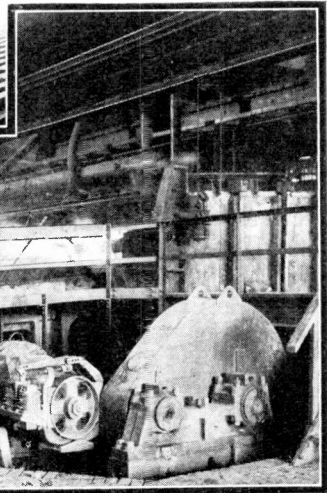
commendable they may have appeared on the surface. For this reason the choice of electricity as the sole motive power can be considered, to say the least, a flattering tribute to that form of energy.

I recall Gary, seven years ago, as an arid waste of sand. In fact, when a certain moving picture company wanted the precise "local color" for a caravan scene in the Sahara, they chose the sands from which Gary has since sprung. Gary and her steel mills were built because that location was nearer than any other to the sources of all necessary raw materials and a market for the finished product.

A short time ago, I visited Gary again for the purpose of seeing just what kind of a change a mere span of seven years and a hundred odd million dollars had made. It would be an easy matter to plunge into an ecstasy of contrasts of the "thens and nows" variety; but I will simply set down the things which appealed

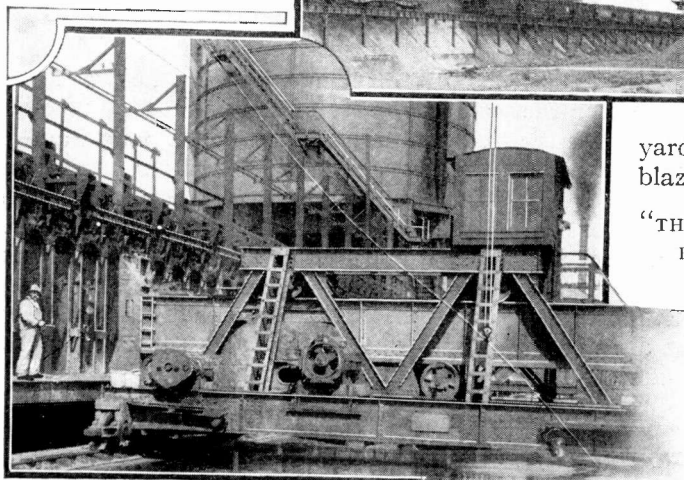
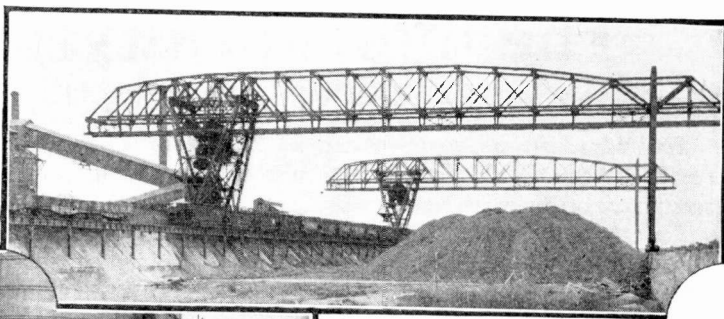


More than 30,000 Pounds in a Load.  
Steel Rails Handled Expeditiously  
by Electro-magnets



Feeding Slabs of Steel into the Re-  
heating Furnace in the Sheet  
Bar Mill

Coal Storage Yards which have Ample Capacity to Supply the Furnaces for a Year if Running at Full Blast



A Machine which Feeds Coal to the Coke Ovens

yards. Over the bridge is enblazoned this promising legend:

“THE CAREFUL MAN IS USUALLY  
EFFICIENT THE CARELESS  
MAN IS NOT”

Throughout the entire works are similar signs with meanings poignantly clear and frank. And so satisfactory have been the results that industries large and small — even cities — are now practicing Judge Gary's slogan

to me as the most striking and interesting.

When the wheels of the electric express, which brings Chicago and Gary together at a mile-a-minute clip, grated to a stop, (there is still plenty of sand there), I stepped out on a broad concrete avenue, lined on either side with attractive office buildings and stores. The vista extends as far as the eye can reach. There are street cars, an artistically designed “cluster” lighting system — in fact, every improvement and convenience one would expect to find in any modern city. A “University Club” is one of the latest institutions, not to mention spacious parks, well appointed hotels and good theaters.

Turning your back upon the city you glimpse the grim, formidable, but everlastingly smokeless towers of the greatest steel mill on earth behind which sparkle the blue waters of the lake. A brisk five minutes walk takes you to a railroad bridge under which you proceed into the

of “Safety First!”

The Gary steel plant was built on the same monstrous scale that has become symbolic of all things American. Four railroads were bodily taken up and moved; a river's course was changed a mile; dunes and gullies were leveled and a deep sea harbor was dredged. All this before 60,000,000 bricks, 722,000 yards of concrete and 80,000 tons of machinery were very scientifically assembled.

There is something wonderfully fascinating in the making of steel rail — from the crude red ore in the hold of a monster ship until it stretches a gleaming ribbon of silver before you on a fast train.

Alongside the wharf in the mile artificial harbor is a giant ore steamer — longer by far than the world's greatest dreadnaughts. Beside it on the wharf are the fastest unloading machines made. They *have* to be fast because each minute that a freighter lies idle costs the better part of a dollar. Mountainous heaps of the precious red dirt lie in the storage

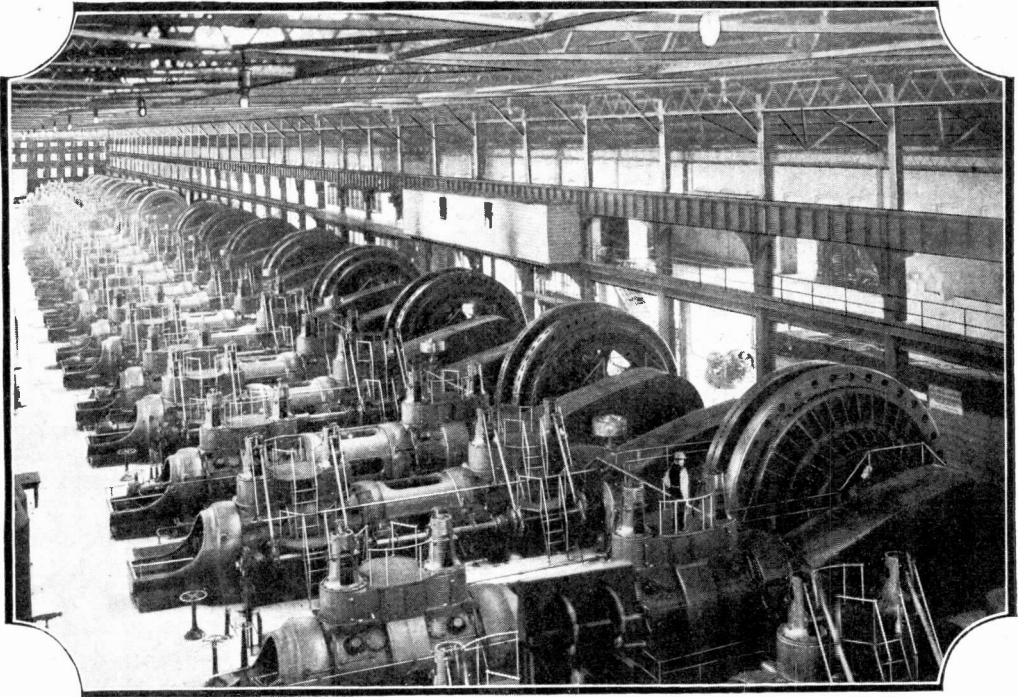


yards behind the unloaders — yards that have capacity more than ample to supply the furnaces, running at full blast, an unbroken year.

Two hundred and twenty-five miles of railroad trackage now enters vitally into one of the fastest games of modern industry — making steel rails from pig

hearths. Here with an inspiring accompaniment of roaring gas, intense heat and brilliant light, impurities are rent from metal and — magic transformation to which the industrial success of the very world is due — steel is made.

Through a blue cobalt glass and a little aperture in the furnace wall, you can



The Vibrant Electric Core of Gary. A Quarter Mile Row of Gas Engines Manufactures the Electric Energy to Operate the Greatest Steel Mill on Earth

iron, losing the least heat possible; for every degree of heat that steel loses in the handling means dollars lost. In this vast system of trackage there is no curve greater than 22 degrees simply because it is somewhat difficult for a switch engine to round a curve sharper than 22 degrees. Further, it is a literal truth that at Gary steel gravitates towards the rail; because a gravity track system is employed between the consecutive steps in its manufacture. By this I mean that the rail pile is considerably lower than the ore pile.

Leaving the blast furnace, the gray iron is placed with the proper flux in the open

see steel actually boiling. Dante could profitably have peered into that inferno.

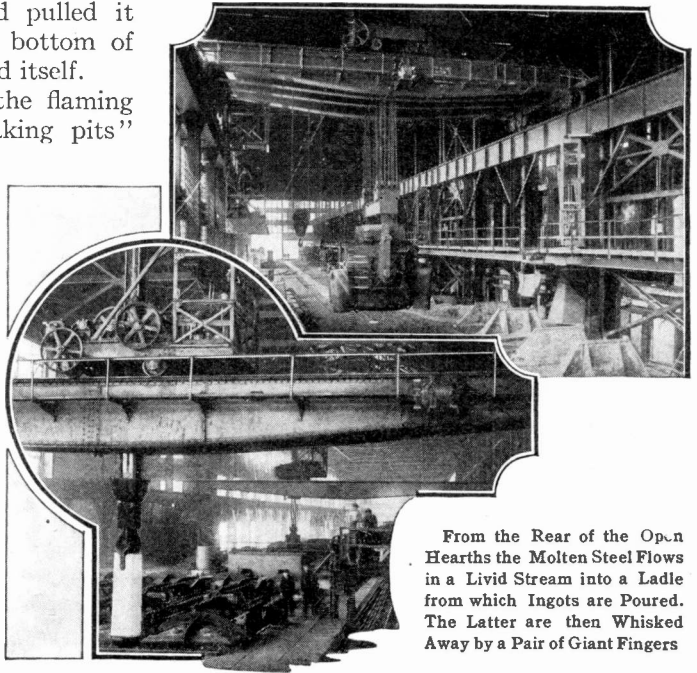
The furnaces are tapped, and the thick, lurid stream flows heavily into gigantic ladles from which, in turn, the ingots are poured. And the "lack of haste makes waste" process is speedily resumed.

A puffing switch engine hastily pushed the little ingot carriages down the track to the stripping house. Between them and the corrugated ceiling I could make out a strip of blue sky, wavering and quivering from the intense heat. Two giant fingers of steel, suspended from an overhead crane, dropped down, seized the

mold by the "cars," and pulled it gently off the ingot. The bottom of the mold is the carriage bed itself.

Soon again in motion, the flaming ingots arrive at the "soaking pits" where they are reheated for several hours, then put through several trains of rolls to become rails and beams for commerce. Beginning as bulky, four ton billets, they glide through one set of rolls after another, increasing in speed and length as they decrease in thickness. From between the finishing rolls, the rails shoot out with bullet like rapidity. There is a sharp clang as the "hot saw" plunges through the glowing steel; and it is pushed out of the way on to the cooling table.

It was thrilling a spectacle and became even more interesting when I learned that

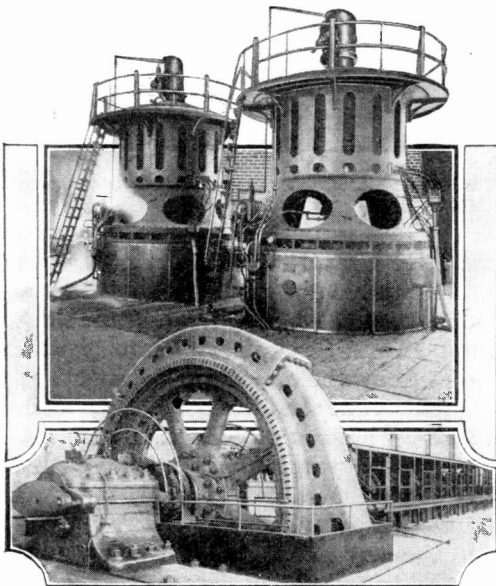


From the Rear of the Open Hearths the Molten Steel Flows in a Livid Stream into a Ladle from which Ingots are Poured. The Latter are then Whisked Away by a Pair of Giant Fingers

by a "remote control" electric system, just seven men direct the forty odd mill operations.

The rail mills are driven by induction motors which for size and strength have few equals. To give you some idea of their titanic size, let me mention that the cellar in each main bearing holds four barrels of oil, and that one hour and 37 minutes is the average length of time required for them to stop running after the power is shut off. They tower as much above what we ordinarily consider a large motor as the "Imperator" does over a harbor tug. Throughout the entire electrical system this same great proportion is always in evidence.

When I entered the generating station I instinctively realized that I was gazing upon a spectacle that was not duplicated anywhere else in the world. From the threshold of the door, I looked down a row of glittering, ponderous engines a quarter of a mile in length. Each unit had enough power to run a liner; and there were 17 of them! At the rear of each engine little colored lights were continually flashing —



Reserve Turbines, Tense and Vibrant, Ready to Jump into the Fray to Combat with Overloads. Below is a Mill Motor which would Tower above an Ordinary Motor as would the "Imperator" over a Harbor Tug

indicating the firing of the huge cylinders. It was difficult indeed to realize that they were really engines of the "exploding" or internal combustion type, so quiet and well oiled was their action. No Corliss ever ran smoother than they.

In an ordinary conversational tone, the foreman explained them to me.

"Just like an automobile engine," he said simply, "only a hundred times more powerful. Each engine has two cylinders and two engines comprise a unit — to turn an electric generator."

Perhaps the most striking feature of the generating system — at least the most interesting to me — is the scientific manner in which the gas is handled from the very moment it is given up by the decomposing coke in the blast furnaces until it explodes in the cylinder. Instead of turning tons of filthy smoke daily into the atmosphere they collect it, wash it in great revolving tanks, and use the purified gas that results.

At high tension, the current leaves the generating house and arrives at its many destinations by way of a steel tower transmission system — an imposing network of stout cables woven about every building in the place.

Two of these buildings are remarkable for their vital importance to the electrical life. One of them contains an enormous storage battery whose unique purpose — like Joseph and the corn of Balthazer — is to seize every superfluous volt and save it for pressing need. For 20 brief minutes — long enough to repair almost any break, so the engineer informed me — it will pour forth a current of 4,000 amperes.

The other structure — factory-like for size and industry — is the electrical repair shop. Here, injured armatures from the mills are repaired and commutators trued. And you should see some of the blackened, fused and scratched commutators that come in for repair.

"It is mighty good training for freshly graduated electrical engineers," laughed the superintendent, pointing to a clean-cut, young fellow, dressed in a shabby but

decidedly college cut suit of clothes, and wearing a huge brass watch fob. He was valiantly tugging at an obstinate spool of black wire in the corner. "It gives them that 'practical experience' they speak about so much."

In the neighborhood of 200 men are employed in the electrical repair shop alone. The working force of the entire plant averages 7,500 men.

Electrically speaking, Gary is epochal. Aside from the fact that it represents the largest application of electricity, it means that the shrewdest, the keenest minds in scientific industry — as the guiding geniuses of the Steel Corporation undoubtedly are — have decided electricity unqualifiedly superior to steam — one of the most vital decisions since the strife between these two great energy forms began years ago.

#### SCHOOL BUILDING HEATED BY ELECTRICITY

A new school building is being erected in Rupert, Idaho, which is to be heated as well as lighted by electricity.

Fresh air will be blown over electric heating units, and thus the heating and ventilating will be combined. In addition to the heating equipment, the school will have a household economics room equipped with a large electric range and twelve individual electric stoves. There will also be a large water heater for supplying hot water for all purposes in the building, including gymnasium baths.

#### "SOME" TALKING

Six hundred million conversations a year "made-in-Chicago." This is the enormous business handled by the Chicago Telephone Company. An average of 2,000,000 originating calls for each working day in the year is made over the lines of the telephone company, 600,000,000 being the grand total for 300 days. As the number 600,000,000 is incomprehensible, so would be the result to Chicago's business if her telephone service were shut off even for a brief period.

## "RODDING" THE U. S. CAPITOL DOME

The old time "lightning rod man" who scaled barns and farm houses to put in place his protective shafts was a mere novice compared to three or four men who have during the autumn of 1913 executed a somewhat similar job for Uncle Sam.

The task of this nervy quartette has been the daring and picturesque one of placing lightning arresters — they could hardly be called lightning rods—on the statue surmounting the dome of the U. S. Capitol at Washington, 287 feet above ground.

Moreover, the men who were entrusted with this unique chore were not "steeplejacks" but merely "riggers" experienced in the handling of swinging stages and other apparatus such as painters use.

The first arresters were put in place when the statue was erected during the Civil War and they soon proved their usefulness, for the big dome is struck by lightning many times a year. However, not only the statue and the huge ball which serves as its pedestal but the entire dome is of metal construction—the latter contains 9,000,000 pounds of cast and wrought iron—and thus serves as a gigantic lightning rod.

The lightning arresters are all uniform in size and form. Each consists of a spike perhaps five inches in length. The base or main portion of the spike is constructed of brass and gold plated, whereas the long tapering point

which forms the upper end is of aluminum with a tiny point of platinum, in which, he it explained, lies most of the virtue of the spike.

## CLEAN POWER MAKES CLEAN BUSINESS

The industrial plant operated by Elbert Hubbard, in East Aurora, N. Y., is of exceptional interest even to casual visitors. A sightseeing party recently went the rounds of printing presses, bookbinding, brass working plants and furniture making, with amazement on their faces.

"What I want to know," said a visitor turning to the guide, "is how with everything going on, things are so absolutely clean and orderly."

"Of course everybody keeps things picked up as they go along," replied the guide, "but since we have had electric power installed all over the plant it is a very easy habit to keep up."

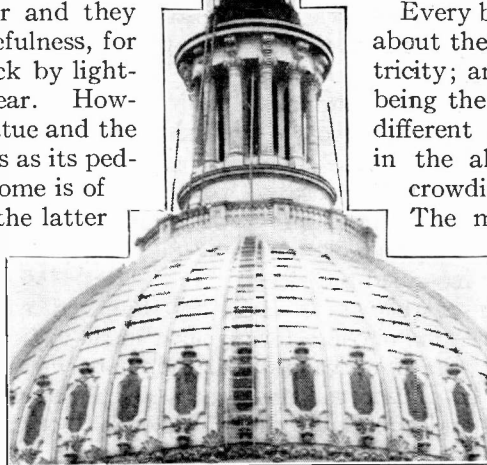
Every bit of power work done about the place is done by electricity; another surprising thing being the amount of work and different kinds of work, done in the allotted space without crowding.

The mailing machine, sealing and stamping envelopes, the folding machines and cutting machines, all working together with the utmost precision and all the other labor saving devices of the different departments

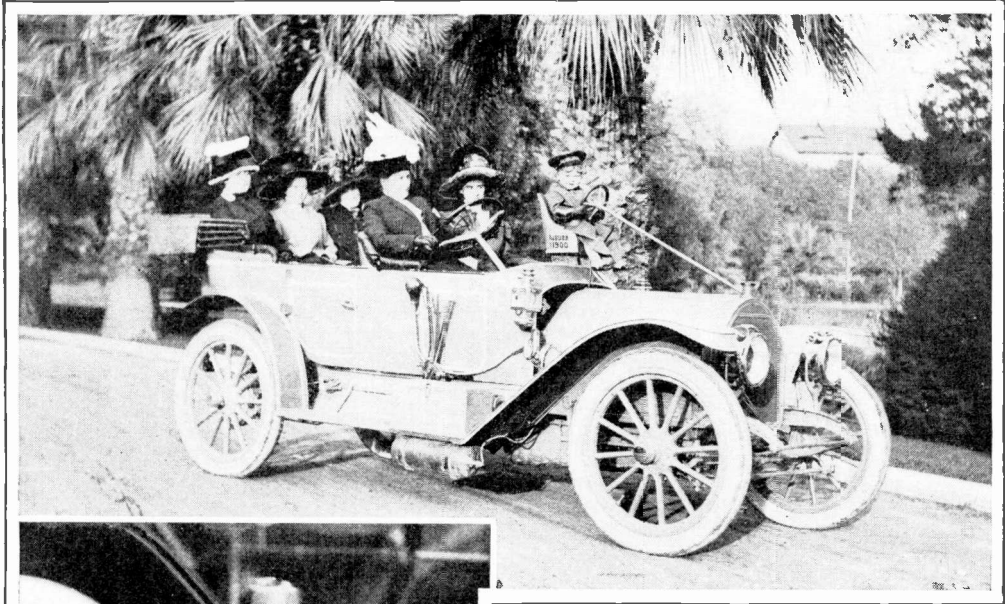
make business move along with the most placid aspect possible. The psychological effect of this cleanliness and precision upon the workmen makes for efficiency.



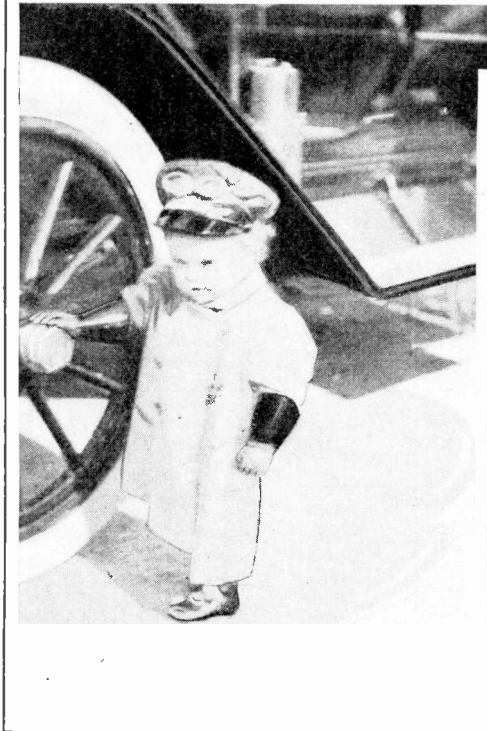
Head of the Goddess of Freedom Surmounting the Dome



A Special Staging was Erected



A Small Motor Traveler Who has Covered Thousands of Miles in California



### READY FOR THE ROAD

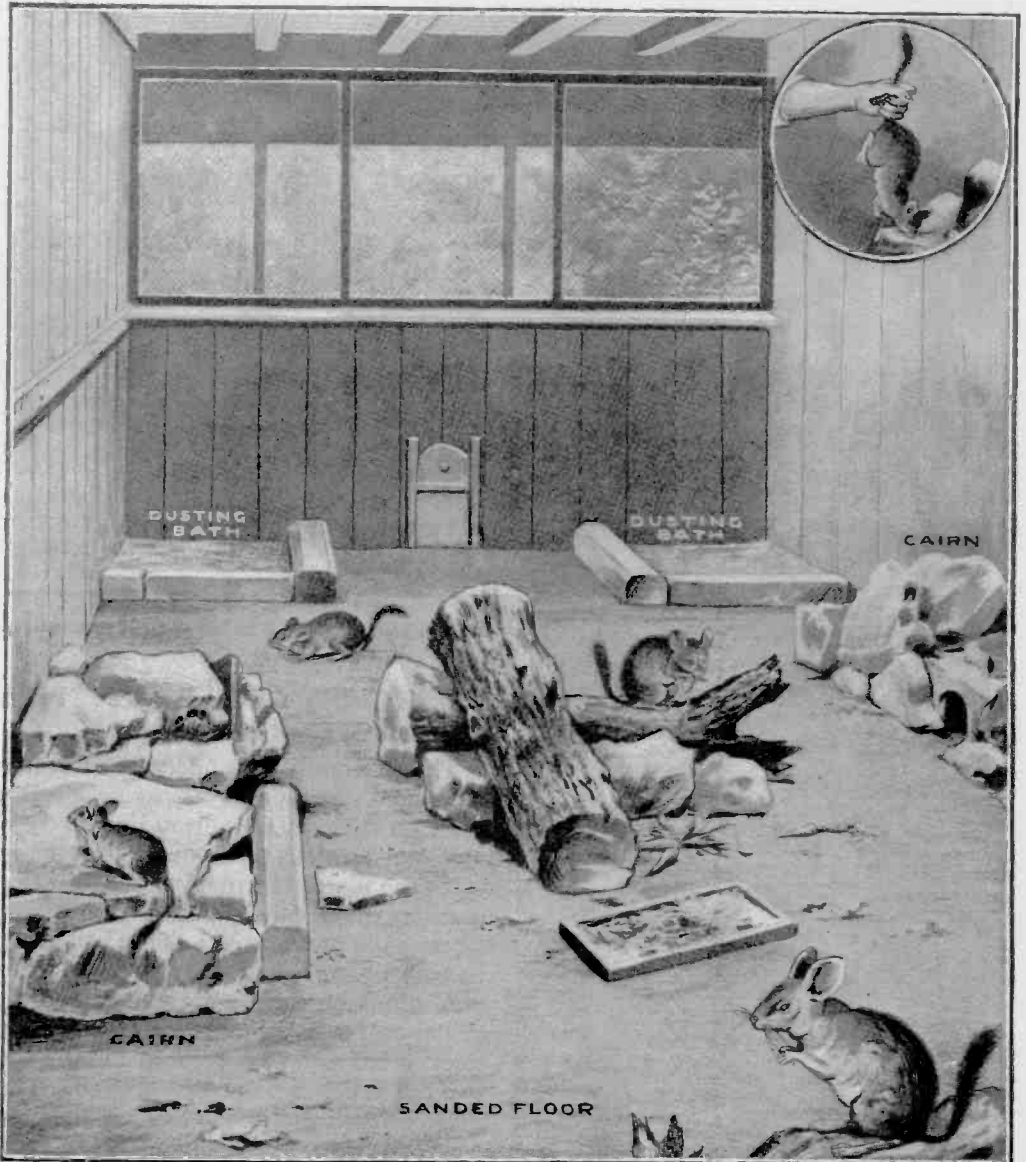
This small traveler is the three-year-old son of W. J. Burt of Los Angeles. His outfit for traveling by automobile is complete, and his father has built a special seat for the youngster over the dash, with a "dummy steering wheel."

### EFFECT OF CINDERS ON PIPE CORROSION

The corrosion of underground water pipes and gas pipes by straying electric currents from street railway lines is common and a serious problem. Yet in many cases the blame is wrongly placed in this quarter when careful investigation will disclose the presence of a cinder bed along the pipe.

A lump of carbon from any source, cinder coal or other material, can form an electric battery with an iron pipe if the two are in contact in moist ground. The iron becomes the anode against the carbon cathode. The iron dissolves with considerable rapidity until polarization checks the electrolytic action. If very near the surface so that air penetrates easily the polarizing film of hydrogen will be oxidized and the iron dissolve with increased rapidity.

Evidently filled ground is the worst place for iron pipes and care must be taken in such places to keep the iron from direct metallic contact with cinders or ash.



BY COURTESY ILLUSTRATED LONDON NEWS

## CHINCHILLA FARMING IN ENGLAND

The above drawing illustrates the first experiment in England at fur farming on a large scale. This experiment is being made by Mr. and Mrs. Johnstone of Burwood Park, Sussex. They recently sent a collector to Chile, who brought back over a dozen living specimens of chinchillas and other rare creatures. The chinchilla, which is valued for its pretty gray fur, is found in the high Andes, and there seems no reason why it should not be bred with success. It is used to great varieties of temperature and lives on coarse vegetable food. It is said not to drink at all.



## BOATS OF THE VICTORIA- NYANZA

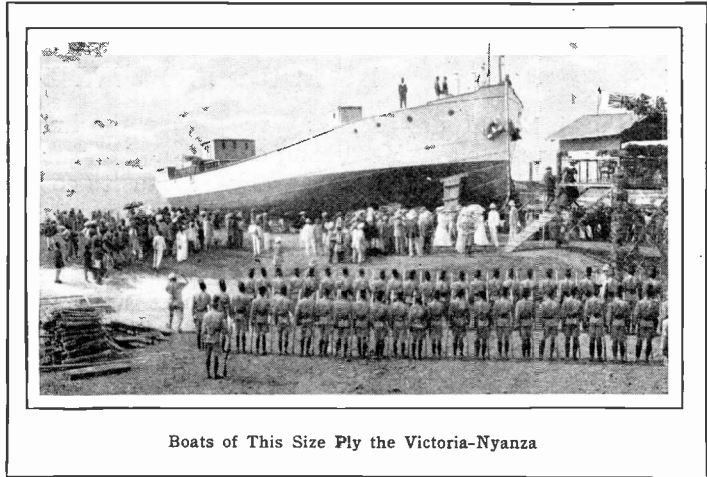
Port Florence on the Victoria-Nyanza boasts of the highest dry dock in the world, for it is situated at an altitude of 3,600 feet above sea level. Here all the steamers of the Uganda railway for the Victoria-Nyanza lake service are repaired. New ones are constructed adjacent to the dock itself, and the size of some of these African boats is surprising, as the picture indicates. At present there are four large steamers on the lake, two of 600 tons, one of 800 tons and a cargo boat of 1,000 tons. They are all fitted with electric lights, are comfortable and roomy and have more the appearance of miniature liners or pleasure yachts than anything else.

The steamers are built on the Clyde in Scotland, taken to pieces again, shipped out to Mombasa, carried up the railroad, and re-built on the shores of the Victoria-Nyanza by expert workmen and mechanics.

### PLATE STERILIZING MACHINE

Joubert Tiersot, a French inventor, has designed an automatic dish sterilizing machine, a sort of Ferris wheel arrangement on which hangers with trays of plates or other dishes are suspended in the position of the cars and plunged into the bath as the wheel is turned.

There are two trays of dishes on each hanger, and two of the latter are continually in the sterilizing bath. As the wheel moves every ten seconds each hanger with its two trays remains submerged 20 seconds. There are six hangers sterilized continually on the wheel, two sterilized trays being replaced by two other trays and submerged every ten seconds.



Boats of This Size Ply the Victoria-Nyanza

### THEY M. U. F. IN PITTSBURG

A number of the cars in Pittsburg display the letters "M. U. F." on one of the advertising cards at the front end of the car. The unsophisticated stranger is apt to ask the meaning of these letters, which stand for "Move Up Front."

### UNIQUE WISCONSIN LAW

On August 1st, Governor McGovern, of Wisconsin, signed a bill that is believed

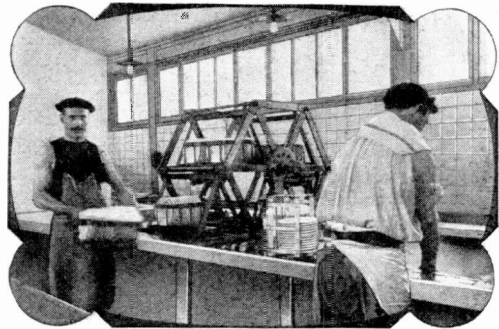


Plate Sterilizer

to be without a counterpart in any other state or country. The bill provides for the protection of frogs during their breeding season, March and April. The value of the Wisconsin frog crop is estimated at \$150,000 annually, and the law was thought necessary to protect the amphibians from marked decrease.

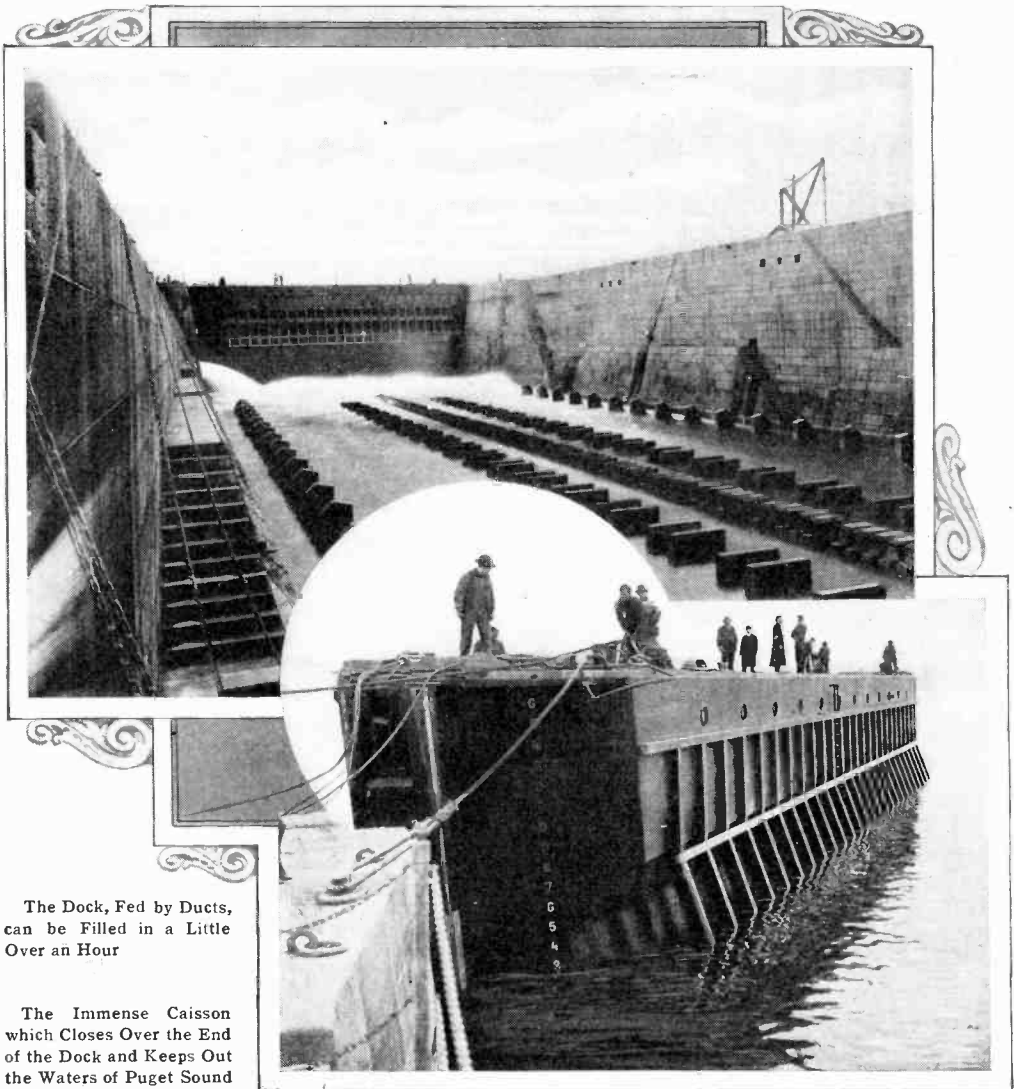
# Puget Sound Dry Docks

BY LOUIS E. BROWNE

The Puget Sound dry dock at the Bremerton, Wash., Navy Yard is an engineering marvel. It is the largest dry dock in the United States and was built by the Navy Department at a cost of \$2,300,000. Its clear dimensions for docking purposes are 800 feet of length, 110 feet of width and 40 feet of depth. In size, the dry dock is slightly smaller

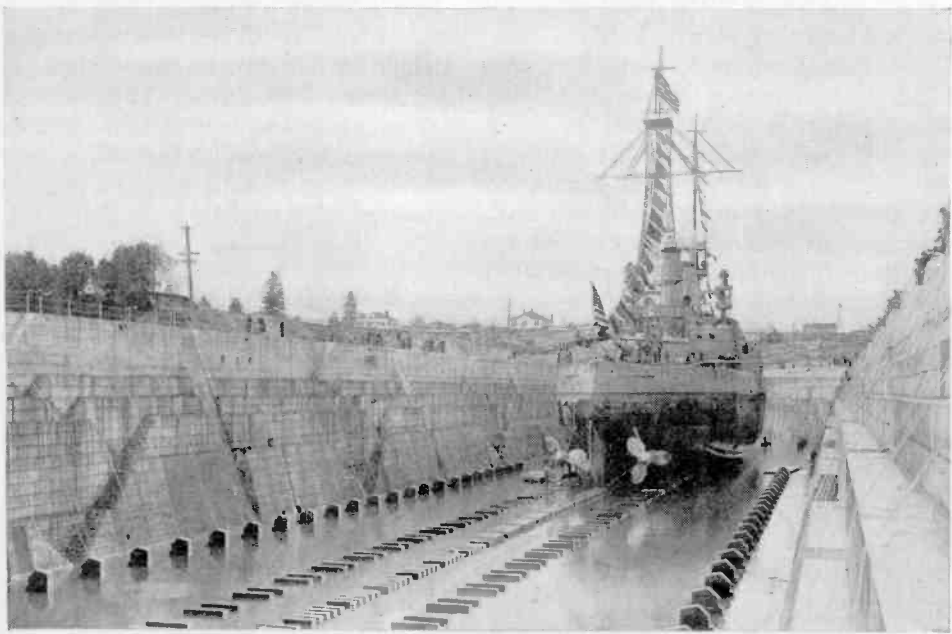
than the immense locks of the Panama Canal and to walk around it three times means to cover considerably over a mile.

With its economical and compact construction, the superb electrical machinery for pumping it dry and its accessibility it has no equal in all the world. It is the only dock on the Pacific which is at this time equipped to handle

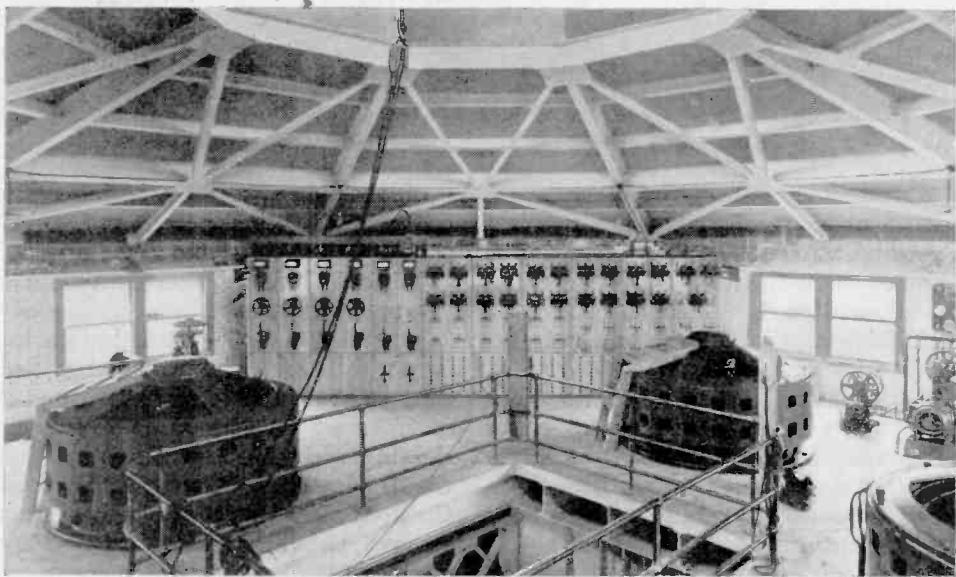


The Dock, Fed by Ducts, can be Filled in a Little Over an Hour

The Immense Caisson which Closes Over the End of the Dock and Keeps Out the Waters of Puget Sound



The Battleship Oregon, in Gala Dress, was First to Enter the Dry Dock



Pump House Interior Showing the Two Huge, Electrically Operated, Centrifugal Pumps. They will Empty the Dock of Its 28,000,000 Gallons of Water in One Hour and Forty-seven Minutes

any ship large enough to pass through the Panama Canal except as for length.

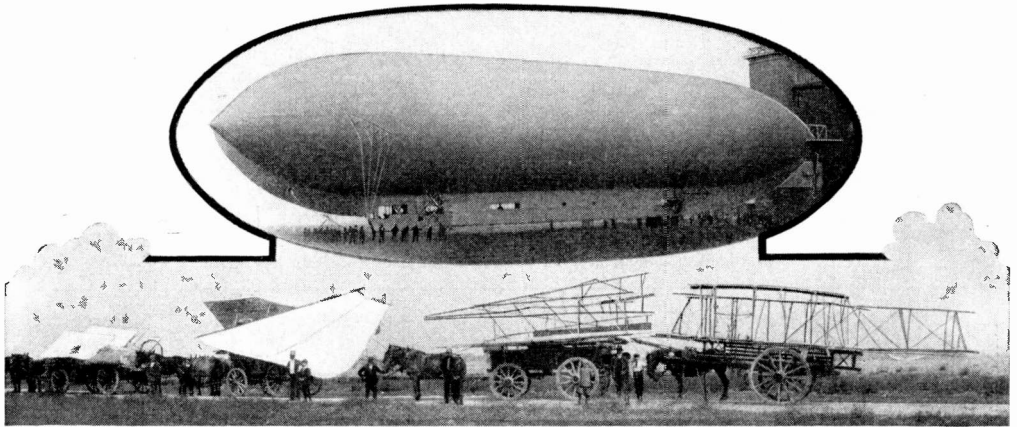
The real feature of the dry dock is the electrical pumping plant. It is the pride of the recent engineering achievement of the United States Navy. It is the largest pumping plant, and the most powerful, ever installed in this country. This equipment includes four pumps, 54 inch suction, 48 inch discharge with vertical shaft motors, and two pumps with 20 inch suction with vertical shaft motors.

This centrifugal pumping plant, while complete and efficient to a surprising degree, cost but \$120,000 and this includ-

It is extremely hard to realize just how large the Navy's prize dry dock really is. The amount of water the dry dock would hold would supply a town of 2,800 people for five days or one of 7,000 people for about two days. The amount of power needed to operate the centrifugal pumps would easily furnish a city of 10,000 people with electric light and power.

### A DEMOUNTABLE AIRSHIP

An interesting operation was performed recently, when the dirigible "V 1" of the Deutsche Luftschiffwerft Ltd., of Düssel-



A Balloon which can be Deflated and Knocked Down for Transportation in a Few Hours

ed a complete switchboard with rheostats, starting and indicating devices, connecting cables, a two inch motor operated centrifugal drainage pump, a motor operated ventilating system and electrical controls for the inlet and discharge ducts or flumes.

The combined capacity of the four main pumps is 263,000 gallons of water per minute. They will empty, absolutely dry, the dock which holds something more than 28,000,000 gallons, in one hour and 47 minutes.

The power plant equipment consists of one 500 kilowatt Curtis turbo-generator, one 500 kilowatt and one 1,000 kilowatt Westinghouse-Parsons turbo-generator.

dorf was taken to pieces in full military order, thus bearing out the airship's claims to perfect demountability.

The aerial cruiser, which in outside appearance resembles a rigid airship of the Zeppelin type, having landed in the vicinity of Jülich, her crew, assisted by twelve men of the Luftschiffwerft Company, commenced on the same evening the clearing of the keel and the evacuation of the gas envelope. On the following day, the keel, consisting of steel tubes, was unscrewed, the various sections being loaded on peasants' vans, which next noon reached without any hitch the Düsseldorf airship hangar, the distance covered being 21 miles. After a day's rest, the keel was fitted up again by the same crew.

This first dismantling and re-fitting is a remarkable success of the new military airship type.

### WHERE A MAN IS KNOWN BY HIS HAT

Hats are a passion with the native Mexican male. In Mexico a man may be known to a large extent by his hat. Big hats are the rage, wide of brim and high of crown. The rest of one's attire does not matter, but it must be admitted that the contrast between a mammoth straw hat on the head and sandals on the feet is a trifle amusing to strangers. Often the sandals are only pieces of leather held in place by cords.

Mexican dandies love to decorate their hats with silver ornaments. These hats are not what we commonly know as Panama hats. And Panamas are not made on the isthmus, as might be supposed from the name. They are really manufactured in South America from native material and are woven under



Hats are a Passion of the Mexican Male

water. Many of them are seen on the Isthmus of Panama and also in Mexico City. In the latter city, which is quite cosmopolitan, the business men dress practically like the business men of New York and wear the same kind of hats. You get little of the Mexican atmosphere in Mexico City.

### STRIKING FIGURES OF RAILWAY BUSINESS

Statistics are usually considered very dry and uninteresting, but the following are striking and simple enough to have the attention of any citizen proud of his country's progress. These figures are the latest available and may be depended on: During May of this year the railroads of the United States received for their services to the public an average of \$8,230,000 a day; it cost to run their trains and for other expenses of operation \$5,920,000 a day; their taxes were \$341,500 a day; their operating income \$1,972,322 a day for the 220,897 miles of line reporting, or at the rate of \$8.93 a day for each mile of line. Thus for every six dollars of their earnings which remained available for rentals, interest on bonds, appropriations for betterments, improvements and new construction and for dividends the railways had to pay more than one dollar in taxes.

All these amounts are quite substantially greater than the same returns for May of last year. They include over 95 per cent of the mileage and earnings of all the railways of the country.

England can not think of disarmament until sure that her daily bread will come to her as regularly without the world's greatest navy as with it. Through Liverpool alone comes 10,000,000 tons a year of cereal foodstuffs, with the greater shippers in this order: Argentina, Russia, India, United States, Canada. This huge quantity would fill more than 2,550 vessels of 4,000 tons burden.

# Invention of the Telegraph from the German Viewpoint

BY. DR. ROBERT GRIMSHAW

“Seventy-five years of Telephony.”

Under this title Herr Hans H. Giesecke of Merane has written an article which, while all Americans will not be pleased with the slight mention of Professor Morse, and few have heard that he was a German-American, is for all that of considerable interest, especially at this time. In this article he says that in 1913, seventy-five years have passed by since accident, which has played so important a rôle in the matter of invention, led to the electric telegraph. Further, this author says:

“The anatomist and physiologist Samuel Thomas von Sömmering had already made successful experiments in the use of the current from the Volta pile, made from Brabant thalers, felt saturated with a solution of common salt, and zinc disks, as a telegraph; so that on July 22, 1809, he could enter in his diary: ‘The telegraph at last finished.’ and on Monday, Aug. 28th, ‘I show my electric telegraph at the meeting of the Academy.’ He had been a member of the Academy of Science in München since 1804. But this apparatus was too cumbersome and complicated; Sömmering needed for each letter that was to be transmitted two wires, which terminated in a vessel full of sulphuric acid. The current dissociated the water of the solution, and the gas bubbles indicated which letter was intended.

“It is interesting in this connection to note that in the fall of 1809 Napoleon’s personal physician, Baron Larray (an admirer of Sömmering’s), came to München, saw his telegraph there and laid the invention before Napoleon on Nov. 5. But just as the latter’s far-seeing glance was blind to Fulton’s invention of the steam engine, so with the telegraph: ‘*Ah, bah! c’est une idée germanique*’—and that settled it.

“Sömmering himself did not overlook the real importance of the electric telegraph; although his invention was soon forgotten, he wrote ten years later to Sir Humphrey Davy in London: ‘You will perhaps live to see the telegraph carried across the Channel.’

“Despite the misfortune of the first electric Fernmelder (we have no word for this: ‘distant announcer’) Germany should still have the honor of the first practical application of the electric-magnetic telegraph. The Göttingen professors Gauss (mathematician and astronomer) and Weber (physicist) made in 1833 a so-called needle telegraph which, with a double-wire conductor, connected the physical cabinet of the university with the astronomical observatory outside of the city and was the first to be used practically for transmitting characters. With this, the telegraph finally emerged from the stage of a physical toy.

“But the discovery by the Dane Erstedt of the deviation of the magnetic needle by the electric current first gave the possibility of the really practical application of the electric current to telegraphy. Four years after the Gauss-Weber invention, Professor Steinheil connected the observatory in the same arched house in München in which Sömmering was incited to his discovery, with the same Academy building in which in 1809 the first telegraphic apparatus was shown publicly and made the first writing telegraph. Steinheil had two bar magnets which bore on their ends little colored pots and which made points or dots on a paper strip that was led across them, when the magnets came under the influence of the current. This was the first writing telegraph, which, however, certainly worked very slowly and awkwardly.



"But Steinheil made another still greater discovery:—that two wires were not necessary, only one for carrying the current in one direction, the return current being carried by the earth; a discovery that remarkably furthered the introduction of the telegraph.

"Fourteen years later, July 25, 1837, England celebrated the introduction of the first electro-magnetic telegraph by the experimental line of the London terminus of the Northwestern Railway with a line  $1\frac{1}{4}$  English miles long. William Fothergill Cooke, who made wax preparations for the university in Durham, had learned about Sömmering's telegraph through Prof. Munke in Heidelberg and the practical eye of the Englishman recognized at once the remarkable importance of this invention. He hastened to England and from then on strove only towards the one goal—to introduce the electric telegraph on an English railway. Not until 1837 did he succeed and then only through his connection with Wheatstone, professor of physics at King's College, London. In June, 1837, they took out their patent for the celebrated needle telegraph, which was not recording, but made it possible to work with unexampled rapidity. This apparatus had five vertical magnetic needles, each pivoted at its center and arranged beside one another; the current deviated two of them from their vertical position to left or to right, so that they showed the various letters on a scale back of them. This needle telegraph required, however, in order to move all five needles, five or six wires. But for all that, this construction was very simple and the mechanism very sensitive, even for weak currents; so that the Wheatstone principle was utilized later for cable telegraphy, which can use only weak currents. Here the needle was furnished with a mirror, which made a ray of light vibrate on a circular arc scale when actuated by the electric current.

"But 1837 was the date of still a third jubilee. Towards the end of the year the German-American Morse, during a voy-

age across the Atlantic, made the first real recording telegraph, which—naturally after many improvements, and especially after the invention of the Morse alphabet—was to conquer the world. Here an electric magnet acted on a lever pivoted in the center, and bearing on its other end a recording point, over which a paper strip was fed. According as the duration of the current was long or short, the lever was pressed for a long or a short time against the paper, and this made either a dash or a dot. The Morse alphabet is composed of dots and dashes. The Morse apparatus leads all in reliability and certainty, and for this reason even to-day is in use everywhere; it is only recently that type-printing apparatus have commenced to be a dangerous competitor.

"So the telegraph is a German invention starting from the work of Sömmering, Gauss, Weber and Steinheil. Although the services of Cook, Wheatstone and Morse in introducing the telegraph in the world's work are most willingly acknowledged, they are not the inventors of the telegraph."

All of which the translator respectfully submits without further comment.

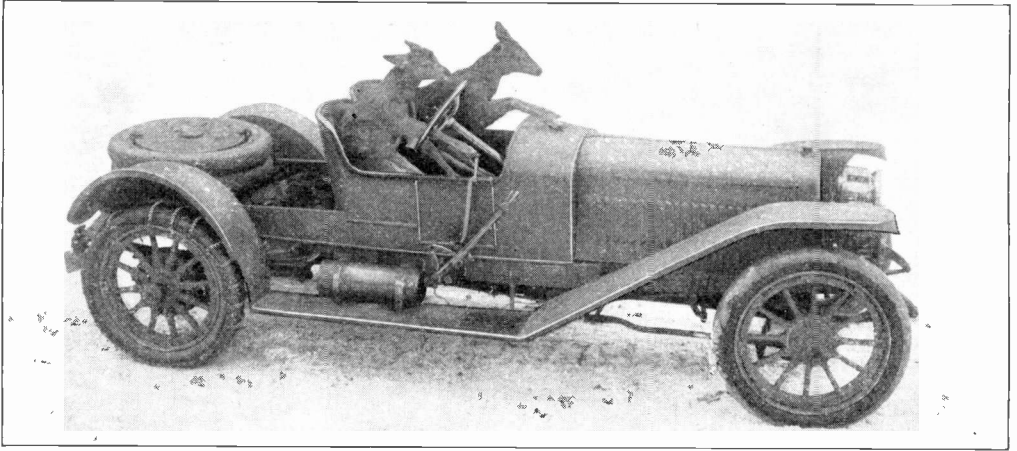
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#### HARDWARE'S DEBT TO THE FLY

The increased use of wire-cloth during recent years has been promoted by the public's attitude toward the fly. The campaign against the fly has also developed the flytrap and fly swatter. Millions of these are made and sold every year and nearly every home has one or more "swatters" at hand during the summer months. There are in Chicago about fifteen companies engaged in the manufacture of window and door screens, making all grades of screens and equipping houses and public buildings.

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No other form of service can equal electricity. Hence, no other plan of heat, light and power can be conscientiously compared in price with that of electricity.



Having Their Pictures Taken—Deer which were Run Down and Shot by Hunters in an Automobile

### HUNTING DEER BY AUTOMOBILE

Of course one cannot hunt deer with an automobile in every case; but where the country is open and even, and you are a good enough driver, it is possible.

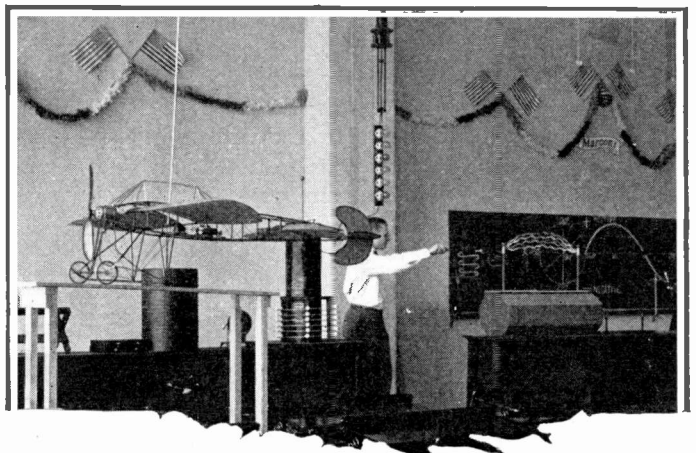
Two brothers, in their high powered roadster, sighted two deer a few miles from Duluth, Minn., and gave chase. It was a snapping winter morning, with the ground hard enough for speeding. Fleet as the deer were, they were no match for the racing automobile. After a short but hot pursuit, the game was bagged and brought to the city to have a "picture taken," as shown in the cut.

### AEROPLANE CONTROLLED BY WIRELESS

A wireless controlled monoplane is shown in the picture. It was designed and built at a considerable outlay of time and money by Mr. Edward Koepfel, a former student of the School of Engineering of Milwaukee. It is completely controlled by wireless—the key of the wireless set controlling the starting of the motor,

the rising, the turning and the returning to the ground of the aeroplane.

The horizontal, vertical and elevating rudders are separately controlled by a system of coherers, connected through coils tuned to different wave lengths. To start the aeroplane from rest the sending system is tuned to the wave length of the apparatus controlling the motor. A pressure on the key of the wireless set then starts the extra-high speed motor, (5,600 revolutions per minute) which operates the driving propeller. After some headway is gained the wave length is adjusted to correspond with the coherers controlling the elevating planes.



Wireless Controlled Aeroplane



## Mother Love

BY EDNA FRANCES



"As Bob Glanced into the Eyes of the Maid He Was Astonished to Find Her Exceedingly Beautiful" LUBIN

"Hello, mother mine," "Hello, dad," happily shouted Bob Wisner as he rushed into the house and seized both of his proud and happy parents in his arms, giving them a bearlike hug.

"And where's that kid brother of mine?" he demanded, as he swept the room with his eyes.

Bob was just home from college, and was naturally eager to see the whole family immediately upon his arrival. The "kid brother," referred to by Bob, was by all odds his favorite, and Bob looked eagerly forward to the time when he should grow up sufficiently to be interested in all of Bob's exploits at col-

lege, to hear tales of the gridiron and the diamond, the frat life and the college customs.

"Mary, bring Buddy in," called Mrs. Wisner, and a moment later the curtains parted and a trim, black gowned maid stepped into the room with little Buddy Wisner in her arms.

"Lo Bob," shouted the little fellow in high glee.

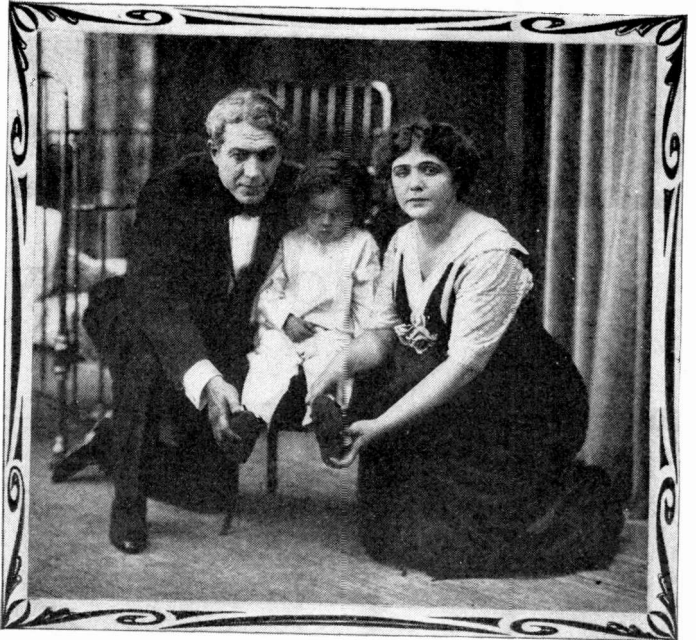
"Hello, Bud," responded Bob, as he swept his brother up in his arms and deposited him on the table. "Gee, but you've been growing," and he stepped off a few feet to take in at a glance the change in his brother since last he had seen him.

"Buddy and Mary are the best of friends," explained the mother as she introduced her son to the newly engaged maid. As Bob glanced into the eyes of the maid, he was astonished to find her exceedingly pretty. Her eyes were soft and brown, her hair fluffy and raven black in color, while her whole face possessed a most piquant charm. Bob almost instantly decided that he must know more of Mary.

"Lets go play horse," urged Buddy, who recalled some exciting rides on the back of his stalwart young brother, during the Christmas vacation, when Bob had made his last visit home.

"All right, Buddy, suppose we do," laughed Bob, as he picked the youngster up and, preceded by Mary, strolled off into the nursery.

The little romance which began that afternoon hurried along to a climax. Bob became a regular visitor at the nursery and as the days passed he spent more and more time amusing Mary and less and less in entertaining Bud.



"A Vision Appeared to the Grieving Parents in which They Seemed to See Enacted Again a Little Scene" LUBIN

The maid proved herself to be a girl as clever and capable as she was pretty, so that it was small wonder Bob fell in love with her. Though at first she discouraged his advances, arguing that she was far beneath his station in life and that only unhappiness could follow even the most innocent kind of a flirtation between them, Bob became so persistent that she was fairly swept off her feet by his courting and, at length, admitted that she loved him.

Though Mary and Bob made little attempt to conceal their steadily growing affection, neither Mr. nor Mrs. Wisner seemed aware of what was occurring in their home. The summer flew by on wings of love and the day on which he must return to college arrived for Bob ere he realized it.

He and Mary had been quietly married at a little country parsonage, following an auto trip taken by the entire family, but they decided to keep it secret until after Bob's graduation, for Bob expected to be taken into the firm by his father, and he feared lest he might be cast out

into the world should his parents learn he had been so hasty as to marry before completing his education. Bob was not in any sense ashamed of Mary, but he knew they had been impetuous and Mr. Wisner was a man who was set in his ideas and opinions, and certainly his plans for Bob included no such thing as a home and wife, until after he had safely established himself in business.

Though it was hard for Bob to leave his bride of but a few weeks, they both decided it was the best way, so Bob went back to complete his senior year in college, while Mary continued her care of Buddy and as she hugged him to her breast her mind was busy with a secret she feared it would be difficult to keep.

A few short weeks before Commencement Day, Bob received a brief message from Mary that upset all his plans for graduation. Though the note was but a few lines in length, it told Bob a lengthy story, that made him realize for the first time how unfair he had been to his little bride.

Mary was writing from her own home, and explained that her sudden illness and Mrs. Wisner's insisting upon calling a physician to attend her, had revealed the secret she had been trying so hard to keep. Though Mrs. Wisner was inclined to believe the worst of her, Mary still remained loyal to her promise and said nothing concerning Bob and the hasty marriage in the country parsonage. Shocked and scandalized as she had never been before, Mrs. Wisner had insisted upon Mary's going to her own home without delay, so all her little personal effects had been packed up and moved, and now Mary was writing Bob to know when he was coming to her.

To Bob's credit be it said, he responded instantly. Leaving college that same afternoon he boarded a train for home, and went, first of all, straight to his own people. Bob felt that once he had told them the whole truth and explained everything, assuming all the blame they might feel inclined to heap upon him,

that both he and Mary would find a refuge there. In this surmise he was disappointed, however, for after his parents had listened in horror to his story, they not only refused to consider his bringing his wife to their home, but even forbade him to go to her.

Bob's college airs fell away from him like a cloak in that hour, and he became a sturdy, self-reliant man, instead of a callow youth. Though they used every sort of argument to dissuade him, Bob was adamant in his resolve to go to Mary with the least possible delay and though his father told him that if he left the house he might expect to be entirely cut off from his own people, Bob marched grimly forth and set out for Mary's humble home.

It was there, weeks later, and fully a fortnight following the birth of his own little son, that news came to Bob of the death of his little brother. Following the departure of Mary the little chap had grown ill, and finally pined away. Though skilled physicians were summoned and everything known to medical science was done, Buddy continued to grow worse, until at last he was summoned by the Grim Reaper and his baby soul slipped silently out into the night.

Bob and Mary first learned of Buddy's death when they accidentally read the death notice in a newspaper, then over a week old. "Why the funeral is over by this time," gasped Bob, his body shaken with silent sobs, "and to think we never knew until now."

"Poor little Buddy," sighed Mary. "He was always a frail lad, and oh, how he longed for your return from college. Dear little chap, he could hardly wait for you to come home again."

"Oh, it must have nearly killed dad and mother," sobbed Bob. "Their whole life was wrapped up in Bud, and especially so since I disappointed them. Oh I'd have given anything to have had this news in time to go home, so as to be with them in their hours of grief and sorrow. I'm sure it wouldn't have mattered to



"A Look of Perfect Understanding in Their Eyes"

LOBBIN

his parents had in any measure recovered from the shock they received when the little life went out. In her boudoir the mother sat alone and grieved, a baby shoe clutched tightly in her hand; she glanced at the little boot, but her eyes so quickly filled with tears as to obscure it from her vision, and again she was shaken with sobs.

In his bedroom, just adjoining that of his wife, Mr. Wisner brooded over another baby shoe, the companion to the one his wife treasured. Though his eyes were not obscured with tears his grief was as great as that of his helpmate. Buddy had meant everything to him, especially after the last interview with Bob, and when the little chap slipped out upon that journey from

them, then, if I'd have come back. They'd surely have taken me in. Mary, dear, do you suppose it's too late yet?"

"Too late?" queried Mary.

"Yes. Suppose you and I were to go to them now—to go to them with our own little chap. Don't you suppose they'd welcome him, and eventually let him creep into Buddy's place in their hearts?"

"Oh, Bob, do you really think so?" cried Mary, now aglow with excitement.

"Do you really think they would?"

"It's worth trying anyway," answered Bob, as he hustled Mary into her wraps and telephoned for a taxicab.

Meanwhile all was gloom and sadness in the home of the Wisner's. Though several days had passed since little Buddy had been laid to rest, neither of

which no traveler has ever returned, it seemed as though the strong man's heart would break.

Shortly after the taxicab, containing Bob and Mary, drew up in front of the house and the two young people hastened within and up to the nursery, a vision appeared to the grieving parents, in which they seemed to see again enacted a little scene, which had occurred shortly after Bob had stormed out of the house. Together they had gone into Buddy's nursery and, father on one side, and mother on the other, had awakened the little chap to slip upon his feet the tiny pair of shoes that now they were treasuring as a last memento of their happiness.

Buddy had awakened, to yell with delight over the new shoes, and a smile of pleasure crossed the faces of his parents



as they witnessed his appreciation of the new footwear. Reverently they kissed the baby shoes and then stole away, leaving the little fellow to drift back into the land of dreams.

As the vision faded, each was actuated by the same impulse—a desire to glance as usual into the nursery as though to say “goodnight,” for the vision had been so real as to lead them almost to believe that Buddy was still with them.

Hearing them coming, Bob and Mary stole into the shadows, leaving their own little one snugly reposing in Buddy’s bed. Softly the parents entered, and presently first one and then the other started back, as the infant on the bed met their startled glances. Each was dazed at finding a real baby in the room and for a moment, could hardly believe it true. Pleasure undoubtedly mingled with the surprise on their faces, however, and seeing this, Bob and Mary stole silently forth from their hiding places.

“Bob! You here?” gasped Mr. Wisner in surprise.

“My boy,” cried Mrs. Wisner, as she burst into tears.

Almost unconscious of what she was doing, Mrs. Wisner held out her arms to Mary and when the girl had moved over to her, and nestled close beside her, the two turned their attention to the bed on which Mary’s child so peacefully slept.

Bob’s father slid an arm across the shoulders of his son and his eyes undoubtedly evidenced the fact that he was glad to have Bob back with him. Glancing across at his wife, Mr. Wisner beheld the baby shoe in her hand. Looking down, he became aware of the fact that Buddy’s other shoe was in his own hand.

Stepping softly up to the bedside, Bob’s father slipped the shoe he held onto the tiny foot of his little grandson. From the other side appeared Bob’s mother and the other shoe went on. Realizing what it meant, Bob and Mary

moved nearer, a look of perfect understanding in their eyes.

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### TROUPING WITH A CIRCUS

While producing the two part drama “The Clown’s Daughter,” Edgar Lewis and a company of Reliance players spent several days with Sig. Sautelle’s circus and all hands seem to have enjoyed the experience immensely. The circus performers were just as interested in acting before the camera as the Reliance players were in being temporary members of the big show.

Since Director Lewis is an old hand at anything connected with the canvas and the sawdust, some excellent results were obtained during the making of the picture the Reliance people came to take. Norma Phillips, leading woman, tried her luck as a circus rider as called for by her part, which was that of a clown’s wife. George Siegman, leading man, discovered that he was a good “spieler” and was given ample opportunity to practice spell-binding on a sure enough circus crowd.

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### MORE KEARTON PICTURES TO COME

James Barnes and Cherry Kearton, famed photographers of jungle scenes and out-of-the-way corners of the earth, are on their way to Africa where they plan to take moving pictures of rare beasts, especially of the water buffalo, the bonga, various species of the gorilla and the okapi, the latter of which no white man has ever seen alive. Much time will be devoted to the gorilla family and a search made for a species of monkey midway between the chimpanzee and the gorilla and they will also endeavor to secure pictures of the pigmy amphibious elephant, which was recently reported as having been seen in that country. Their equipment includes several phonographs and an attempt will be made to secure records of native songs and animal cries.

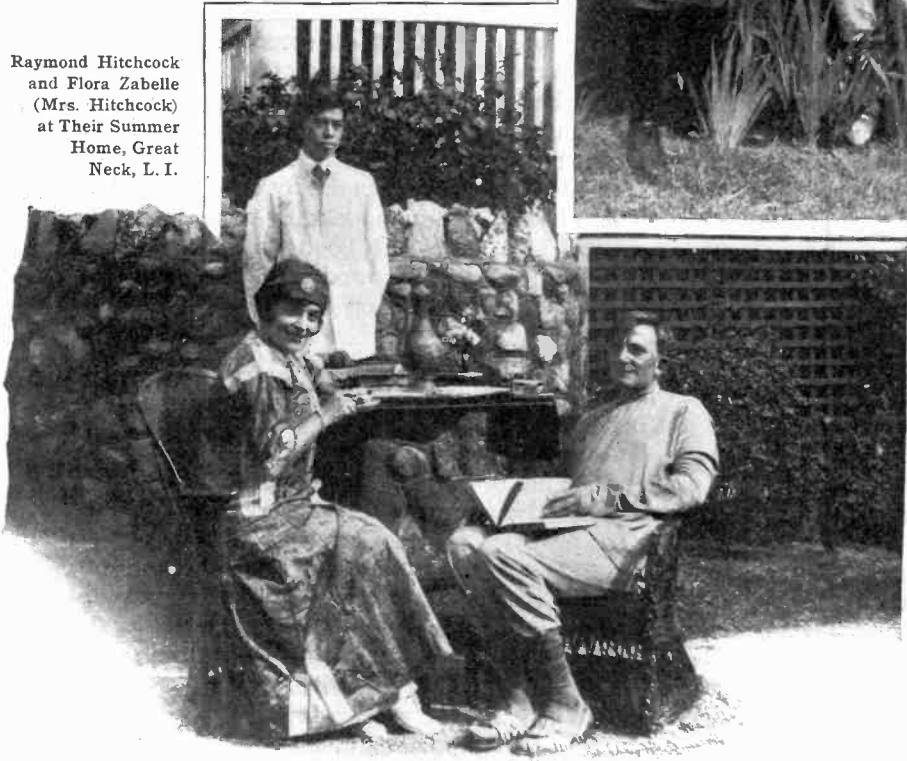
### POPULAR PLAYERS OFF THE STAGE

Kinemacolor has been quietly busy for some time in filming the celebrities of the legitimate theater in their hours of ease and recreation for a series of natural colored films to be known as "Popular Players Off the Stage." The actors are enthusiastic over the opportunity of having themselves photographed in all the colors of nature, exactly as their friends know them, while the ladies of the theater are equally keen over having their costumes, com-

Richard Harding Davis  
and Mrs. Davis (Bessie  
McCoy) at Their Summer  
Home, Mt. Kisco, N. Y.



Raymond Hitchcock  
and Flora Zabelle  
(Mrs. Hitchcock)  
at Their Summer  
Home, Great  
Neck, L. I.



plexions, colors of hair and eyes, etc., preserved for future generations in such an attractive form.

Among those already captured are Richard Harding Davis with his charming wife, Bessie McCoy, Raymond Hitchcock and Flora Zabelle (Mrs. Hitchcock), Weber and Fields, Eddie Foy and

the seven little Foys, Lillian Russell, and Blanche Ring. A representative of the Kinemacolor Company met Anna Held at the pier when she last arrived from Europe and promptly secured a contract to film her in the numerous new costumes she brought from Paris, including the diamond studded stockings.

which created such a sensation during her London appearances.

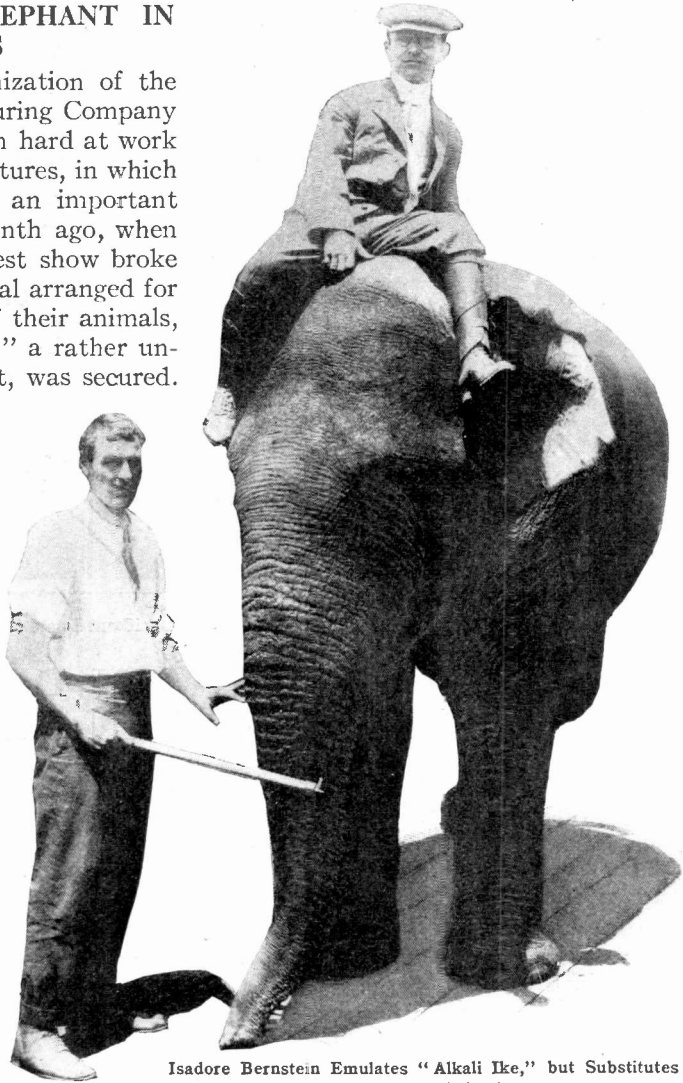
### BUFFALO BILL'S ELEPHANT IN PICTURES

The West Coast organization of the Universal Film Manufacturing Company has for several weeks been hard at work on a series of animal pictures, in which beasts of the jungle play an important part. A little over a month ago, when the Buffalo Bill Wild West show broke up in Denver, the Universal arranged for the purchase of several of their animals, and among others, "Bob," a rather uncertain tempered elephant, was secured.

Following his arrival at Universal City, California, "Bob" became even more sulky, and showed little inclination to cultivate the society of humans. Isadore Bernstein, a general manager of the western Universal Company, heard of "Bob's" distaste for company and went out to call upon him. Mr. Bernstein had, several times in the past, shown himself capable of making friends with the wild animals on the Universal ranch; nevertheless, much anxiety was expressed for his safety when he calmly walked into "Bob's" enclosure and began to talk to the huge pachyderm. Outside, a little crowd of curious folks waited, half expecting to hear cries for help, but, instead, they shortly heard playful trumpeting, and soon afterwards "Bob" came walking out with Mr. Bernstein astride his back, as shown in the accompanying cut.

Nobody knows exactly what Mr.

Bernstein said to "Bob," but since that day he has been a changed animal and now is one of the most patient and docile



Isadore Bernstein Emulates "Alkali Ike," but Substitutes a Different Animal

of all the beasts appearing in Universal films.

Miss Ruth Stonehouse, who for a long time has been the popular Essanay leading woman, announced recently that she will shortly retire from the pictures to marry and assume house-wifely activities.



Beautiful Exteriors Were Snapped on the Magnificent Estate of a Wealthy New Yorker

## GERTRUDE HOFFMAN DANCERS IN "THE GRECIAN VASE"

Several of Gertrude Hoffman's celebrated dancers were specially engaged to take part in the garden scenes of the Edison film entitled "The Grecian Vase," and the exquisite exteriors were snapped on the magnificent estate of a wealthy New Yorker, thereby lending their purely Grecian atmosphere to the irresistible enchantment of the fantasy. The beauty and grace of the experienced dancers still further enhances the effectiveness of the picture.

The story is that of a sculptor who falls in love with a beautiful woman on a Grecian vase. The vase is accidentally shattered, but the woman's head is preserved, and he dreams that the lady comes to life, transporting him to the days when the nymphs danced in exquisite fields and gardens to the intoxicating pipes of Pan. Through these fields

they wander together, the artist wooing the woman, who seems as obdurate as she did upon the vase — but far more enchanting.

At last she seems upon the point of yielding, when the dream fades and the sculptor awakens. His disappointment, however, is made less keen by the receipt of a note, stating that one of his statues has been accepted at a generous figure. Overjoyed at the news, and still under the influence of his dream, he carves a marvelous life size statue of the lady of his dreams, which brings him both fame and wealth.

### "NIGHTIE" BOOSTED HER INTO COMEDY

If you are in doubt as to whether or not peculiarly funny things happen around motion picture studios, just listen



When the Nymphs Danced in the Exquisite Fields to the Intoxicating Pipes of Pan

to what happened to Miss Annie Edney before she joined the Essanay comedy company. Miss Edney says: "I was a visitor at the Chicago studio one morning when a producer grabbed me by the arm and yelled something about my getting into a nightgown. I never was so dumfounded in my life, but full of excitement and wondering what might follow, I sought out one of the actresses and asked if I might borrow something that would do for a nightgown. This happened to be Miss Hennessy. (Miss Hennessy stands about four feet, four and one half inches. Miss Edney's height is five feet, nine and one half inches.) The nightie was a little short of what I had expected, but as the producer had almost demanded that I get into a nightgown I carried out instructions to the letter."

When Miss Edney finally arrived on the studio floor there was a riot. So funny did she look that she was immediately cast for a part in the comedy attraction being produced on the floor.

"So you see an accident sometimes helps one in landing in the moving picture game," concluded Miss Edney, with a smile.

As a matter of fact, the producer, who

asked Miss Edney to don a nightgown, mistook her for one of the actresses in his company, but he's awfully glad he made the mistake, now, because she is doing splendid work in the comedy company, as you will agree if you watch her work on the screen.

#### ALICE WASHBURN'S HATS

Thousands of people in all parts of the country have laughed with and at Alice Washburn, the Edison Company's character woman. It would be difficult to say just what constitutes the funniest part of Miss Washburn's make-ups and general behavior before the camera, but it is certain that her ridiculous hats are the cause of many a laugh. The clever Edison comedienne has made a study of hats, much to the disgust of many women of all shapes and ages, whom she has sometimes followed for blocks, in order to note the details of their picturesque headgear.

When a very young girl she became acquainted with a milliner, who catered to women of distinctly "newly rich" tastes, and it was this acquaintance which first awoke her to a realization of

the comedy possibilities in the feminine hat. Miss Washburn spends a great deal of her time, outside the studio, on the lower East side of New York, simply walking about with a notebook in her hand, sketching the marvelous creations which everywhere offend the eye. So it is that Miss Washburn is never at a loss for a hat to go with any of her ridiculous character make-ups.

### NOT ALL FUN

The life of the photo-player isn't all fun as the accompanying picture will clearly prove. This was only one of the trying incidents that Edwin August of the Universal Film Manufacturing Company and his associates encountered while on their way recently from Universal City to Auzusa, Calif. In fact they were a sorry looking lot when they reached their destination after a long but eventful tour. The players shown are Edwin August, Iva Shepard, Mollie Sherwood, Alice Rhodes, Chance and A. W. Caldwell, and they are located for a time at what is known as the Fallows Camp, which is in the heart of the beautiful foothills of California. There they will stage a number of photo-plays, the scenarios for which Mr. August took with him.

### SEEING THE ACTORS TALK

Did you ever stop to think what the pictures mean as an amusement for the deaf? Can you imagine what a vast field of entertainment the films offer those unfortunates who are deprived of their hearing, and so are unable to appreciate, in full, the average theatrical attraction or musical comedy that you so much enjoy?

Furthermore, do you know that the deaf mutes have the advantage of you at the picture show? That where you have to supply the dialogue from your own imagination, the deaf mute, if he is anything of a "lip reader," can actually see the actors talk. Conditions for lip reading at the picture theaters are well nigh perfect. The lighting of the scenes



One of the Trying Incidents Enroute to Auzusa

is of the best and the performers are trained to exaggerate the movements of the lips, so that one, with any experience, can read every word the players utter.

Some mighty funny incidents are noted, too. The lip readers "get" many things not intended for the audience. "Be careful, you idiot!" remarks the heroine of a picture drama, as she nestles confidently in her lover's arms, "or you'll have my hair down next." Another leading woman, resenting, it seems, the realism with which her fellow performer enacts his rôle, threatens to box his ears if he dares to kiss her again. That the threat is given with the coyest of upturned glances and the sweetest of smiles does not detract in the least from the force of the remark.

Celebrities, who have been filmed for some one of the several animated weeklies, often have had their passing remarks



preserved for all time, for those who have the eyes to see. That "Votes for Women" should be seen on Mrs. Pankhurst's lips, while she was being cinematographed, is perhaps not surprising, but some of the other notables more often than not pass remarks not exactly complimentary to the camera man.

"Bother these fellows!" said Winston Churchill as he was snapped, not long ago. Secretary of State Bryan quite plainly remarked the other day, "Hurry up, boys, I've got to catch my train." The bridegroom at a recent society wedding caused a decided smile to run over the faces of those who saw him in pictures, when he said to his bride, as they were leaving the church, "Best smile now. Here's where we've got to try and look pretty." And the bride did.

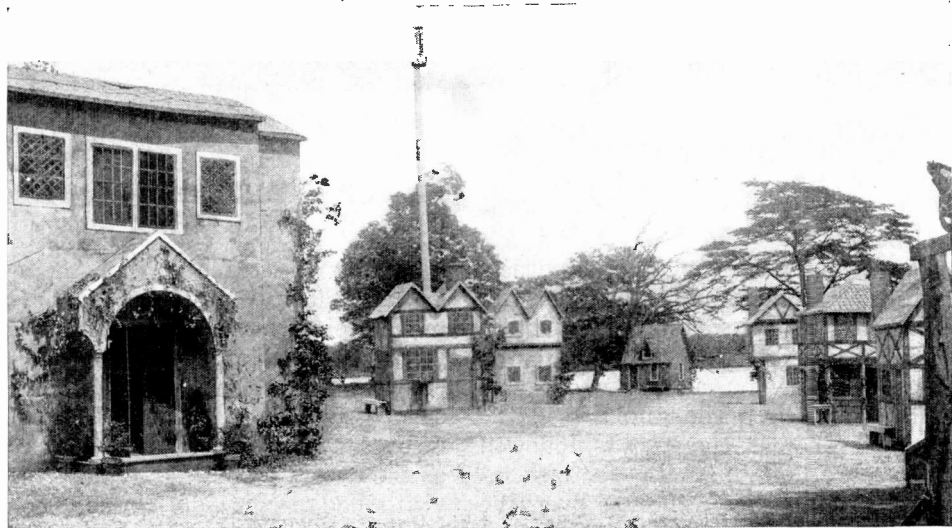
### YE ANCIENT VILLAGE OF HAMELIN

Some idea of the extent to which a film manufacturer will go in producing picture backgrounds can be obtained from a glance at the illustration shown below. The Edison Company in preparing to

film "The Pied Piper of Hamelin," which of course is a film version of the nursery story of the same name, which chronicles the adventures of the Pied Piper in freeing the ancient city of Hamelin of its rats, erected an entire village in a big meadow adjoining their studio, and in this village the players enacting the rôle of the village burgomaster, the Pied Piper and the score or more of citizens and residents of Hamelin made their quarters.

The day following the completion of the village by the stage carpenters and scene shifters, and after only one or two of the scenes had been taken, a storm came up which demolished the greater part of the little city and necessitated another day's work on the part of the stage crew.

J. Warren Kerrigan, leading man of the American Film Manufacturing Company, is shortly to appear in a series of costume pictures of the period of "The Three Guardsmen." Kerrigan will appear as a swashbuckling cavalier, similar to the famous D'Artagnon, in the entire series. The first picture will be called "The Adventures of Jacques."



Village of Hamelin Constructed at the Edison Plant for the Production of the "Pied Piper"

## MRS. FISKE APPEARS IN FILMS

The Famous Players Film Company, of New York City, headed by Adolph Zukor, and of which Daniel Frohman is managing director, did the world a great service when they presented in motion pictures such stars as Sarah Bernhardt as "Queen Elizabeth" and James K. Hackett in "The Prisoner of Zenda," as each of these productions is undoubtedly a masterpiece of its kind. But now they

been chosen with rare good judgment. Some of the scenes of rural life—of meadow, stream and hill—will linger long in the memory, even in the memory of those who see many pictures. The photography matches the locations. Not only was it exceptional in quality but by reason of the unusual skill displayed in the filming of sunsets and cloud effects, it will stand in a class by itself



"Crick's Stovr Pains Tess." Mrs. Fiske in "Tess of the D'Urbervilles"

have gone still farther and offer Mrs. Fiske in a film version of "Tess of the D'Urbervilles."

Those who were privileged to witness the initial production of this film will tell you that there was never a moment when the interest slackened, so great is the art of the famous actress who enacts the rôle of "Tess." The unfolding of the story of Thomas Hardy was followed by a silence that in itself is the best indication of the spell thrown over the entire house by the film drama.

The support given Mrs. Fiske is in all cases excellent and the backgrounds have

### PICTURES DISCLOSE LONG LOST BROTHER

During the exhibition of the "Quo Vadis?" film at the Whitstable, England, moving picture theater, a visitor became greatly agitated and was so overcome by emotion that he fainted, and had to be carried from the building. When he recovered it was ascertained that in one of the actors in the scenes depicted the visitor had recognized a brother who went to Italy twelve years ago, and had not since been heard of. A reunion between the brothers has been arranged.

## SEVERE TEST OF A PLAYER'S ABILITY

Not so very long ago, Irving Cummings, leading man of the Reliance Film Company, assumed a rôle, or rather a series of rôles, in a motion picture, which put his art to the severest test it has ever undergone. The story was called "Ashes," and Mr. Cummings is first seen as an old man of "four score years and ten" giving a dinner to the memories of the five sweethearts of his youth. At each cover of the banquet table has been placed a bouquet of his sweetheart's favorite flowers, and as in passing about

then as a soldier of 25 or thereabout, as a middle aged business man, and, last, as a man of 50, whose locks are beginning to be silvered with age. Five different leading women appeared opposite Mr. Cummings, each enacting the part of one of his former sweethearts. They were Bobbie Robbins, Norma Phillips, Edgena DeLespine, Rosemary Theby, and Irene Howley.

As the last love story fades from the screen and Cummings, as the old man, rises to toast his loves of days gone by,



Irving Cummings as Waverley Toasting the Shades of His Five Former Sweethearts

the table, he picks up each bunch of posies and gazes fondly at the delicate petals, the face of his long lost love appears in the center of the bouquet, followed by the story of his love affair with her, told in pictures.

In the stories of the five love affairs, Mr. Cummings had to appear first as a mere youth, next as a young college man,

each sweetheart appears in the form of a vision and answers his toast to her with upheld glass.

Startled by the realistic vision, the old man falls across the banquet table, dead. An overturned candle sets fire to the draperies and before many minutes each flower is reduced to a cold little heap of ashes.

## EXPERIENCES OF A PATHE CAMERA MAN

Blazing new trails in Glacier National Park with a motion picture camera was the recent experience of Ralph R. Earle, Pacific Coast representative of Pathe's Weekly. While in the vicinity of Glacier Park to secure a motion picture record of

fisherman of the Rockies of Montana, was secured as a guide for the expedition. He provided the party with horses familiar with mountain trails, and an early start was made from the Glacier Park Hotel, landing the party at Two Medicine camp the same day.

Although the present road to Two Medicine Lake has been in use the past



Packing a Motion Picture Camera into the Wilds



Tom Dawson Selected the Best Horses from His Big Ranch for the Trail Blazing Expedition



An Exciting Incident — Transporting the Camera by Rope Across the Entrance to the Ice Cave

In camp. Left to Right, Lloyd W. McDowell, Ralph R. Earle, Camera man, and Tom Dawson, Famous Guide and Hunter.



the arrival of Secretary of the Interior Franklin K. Lane, Mr. Earle was included in the party headed by Lloyd W. McDowell of the advertising department of the Great Northern Railway which was leaving for a trail blazing expedition into the unknown regions of the park.

Tom Dawson, for more than 40 years a famous guide, hunter, trapper and

two years, the guide took his party over Mt. Henry, more than 9,000 feet above sea level, and fully 5,000 feet above the elevation at the hotel. The trail was blazed through the timber, coming out on the side of Mt. Henry where, after two hours steady climbing, the Pathe camera was set in position on the summit of Mt. Henry for a panorama of the

surrounding country. The horses of the entire party were then led down the side of Mt. Henry for over 4,500 feet, over shale rock, landing at Two Medicine camp in time to make pictures of an approaching storm over Mt. Rockwell, one of the scenic wonders of the new park.

Preparation was made for the exploration of an ice cave on Rising Wolf Mountain, before the party encamped for the night. After a climb of several hours, on the following morning, the expedition found itself on a magnificent glacier, 4,000 feet above the shore line of Two Medicine Lake. The melting snows of early spring had formed a cascade of rare beauty and the rushing water had fairly plowed its way through the glacier, forming a great cave more than 1,000 feet in length and with an archway 20 feet

wide and ten feet high. At the upper end of the cave a beautiful waterfall, fully 50 feet high, was discovered. With the aid of ropes, the party came out at the farther end of the cave and slid over the glacier to the entrance of the cavern, the camera man recording the tour of the party in a series of unusual pictures.

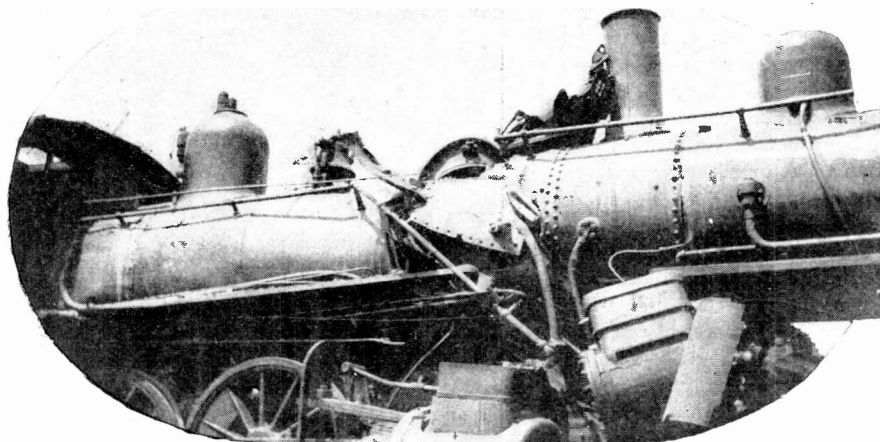
The tour of a week took the camera representative to new ice fields not yet visited by tourists, waterfalls of rare beauty, up mountain sides to points where excellent views of the surrounding country were secured and over virgin country to lakes and ice fields, where the government will no doubt build trails within the next few years, in order that sight-seers, visiting the newest of the national parks, may view its many wonders.

## STAGED A RAILROAD WRECK

A large company of Vitagraph players under the direction of Ralph Ince, assisted by A. V. Smith and Walter Ackerman, went over into New Jersey recently and

main line of the Raritan River Railroad the destruction was terrific, as is proven by the accompanying picture.

The work of rescuing the dummies,



The Effect of a Head-on Collision

astonished the natives by staging a real head-on collision between two locomotives, for picture purposes. To one engine was attached a train of three cars, well filled with realistic looking dummies. When the two engines collided on the

following the "catastrophe," was well carried out before the camera and a thrilling picture was obtained. Notice of the event was sent in advance to the New York papers and most of them gave it liberal space in their Sunday editions.



### G. M. ANDERSON

G. M. Anderson, director and leading man of the Essanay Western Stock Company, located at Niles, Calif., is known as "Broncho Billy" wherever motion pictures are shown. Having been identified with the film business since its very inception, and being able both to direct and play the leading roles in western dramas of a stirring character, it is not hard to see why his name has almost become a household word. Mr. Anderson writes many of his own scenarios and considers the three greatest essentials to the success of any player are personality, mentality and emotion, sympathy being the most effective emotion displayed.



### MARY FULLER

Mary Fuller, of the Edison Company, is known the world over as the star of the "What Happened to Mary" series of films, which were produced in conjunction with the Woman's World. Nowadays she is appearing in a similar series called "Who Will Marry Mary?" and incidentally still further increasing her popularity. Though Miss Fuller is a remarkably pretty girl, she does not depend on her good looks for her popularity, but combines with it a thorough knowledge of acting, multiplied by vivacity and charm. Add to all this a complete understanding of photoplay technique and you have the secret of Mary's success.

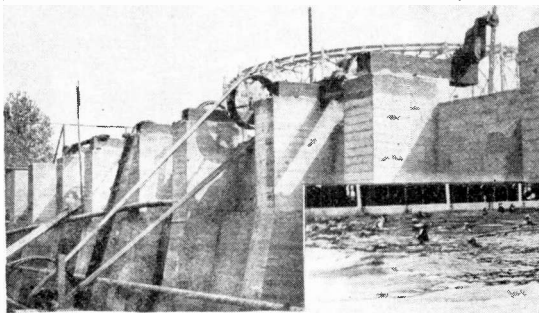




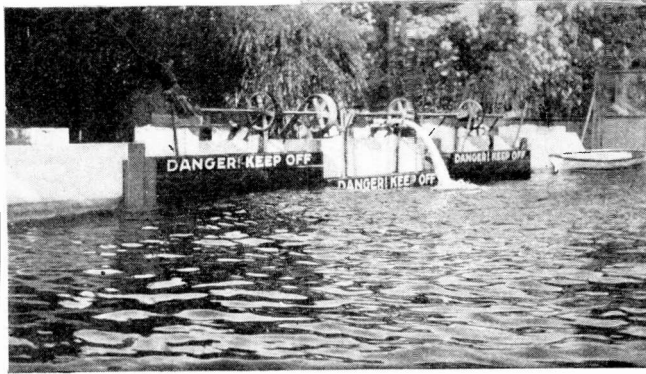
## ARTIFICIAL SURF IN A SWIMMING POOL

Mr. Schenck, the proprietor of a New Jersey amusement park, had been worrying himself sick in an effort to meet the demand for something new that the pleasure seeking New Yorker is always clamoring for. The quietly flowing Hud-

these boxes are pitman rods and the boxes slide in vertical grooves. The pitman rods are attached to wheels run by back gearing from a 20 horsepower electric motor, so that the boxes are pushed alternately in and out of the water. When the first box slides quickly into the water, the water displaced by it makes a wave, then the second box is shoved into the water and the first wave blends with the second moving across the pool in



Rear of the Wave Machine



Artificial Waves Produced

Front View of the Wave Making Machine

son gave him his cue—to give the public real surf bathing right there nearly 400 feet above the Hudson. The pool was easy enough, but the waves—that was the chief difficulty. However, a railroad mechanic devised a machine that would make real waves.

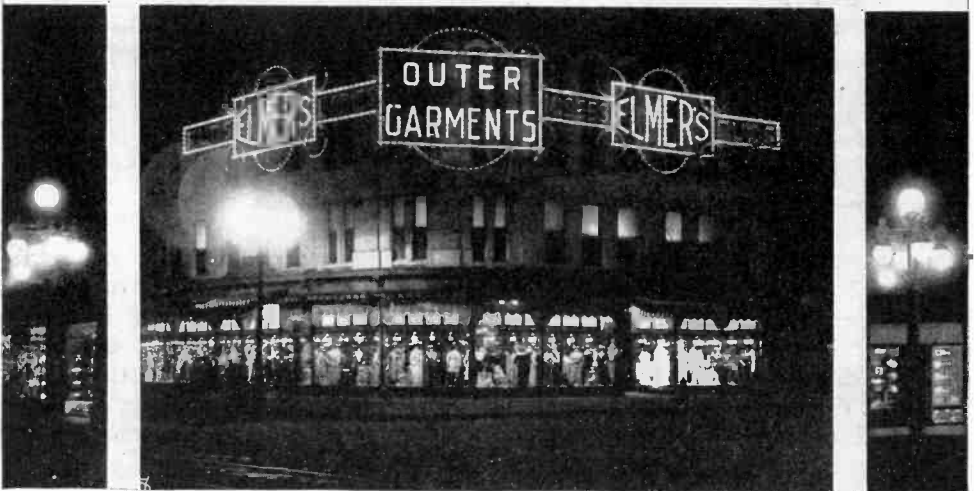
The pool itself is 150 feet wide and about 250 long, and the water varies in depth from almost nothing to fourteen feet. At the deep end of the pool is the wave making apparatus. It consists of three heavy wooden boxes, of considerable size ranged in a row. Attached to

a diagonal wave and, finally, the third box adds its wave to that of the other two.

The size of the waves may be varied by forcing the wooden boxes deeper, thus displacing more water, and the frequency may be varied by running the electric motor which controls the machine faster or slower.

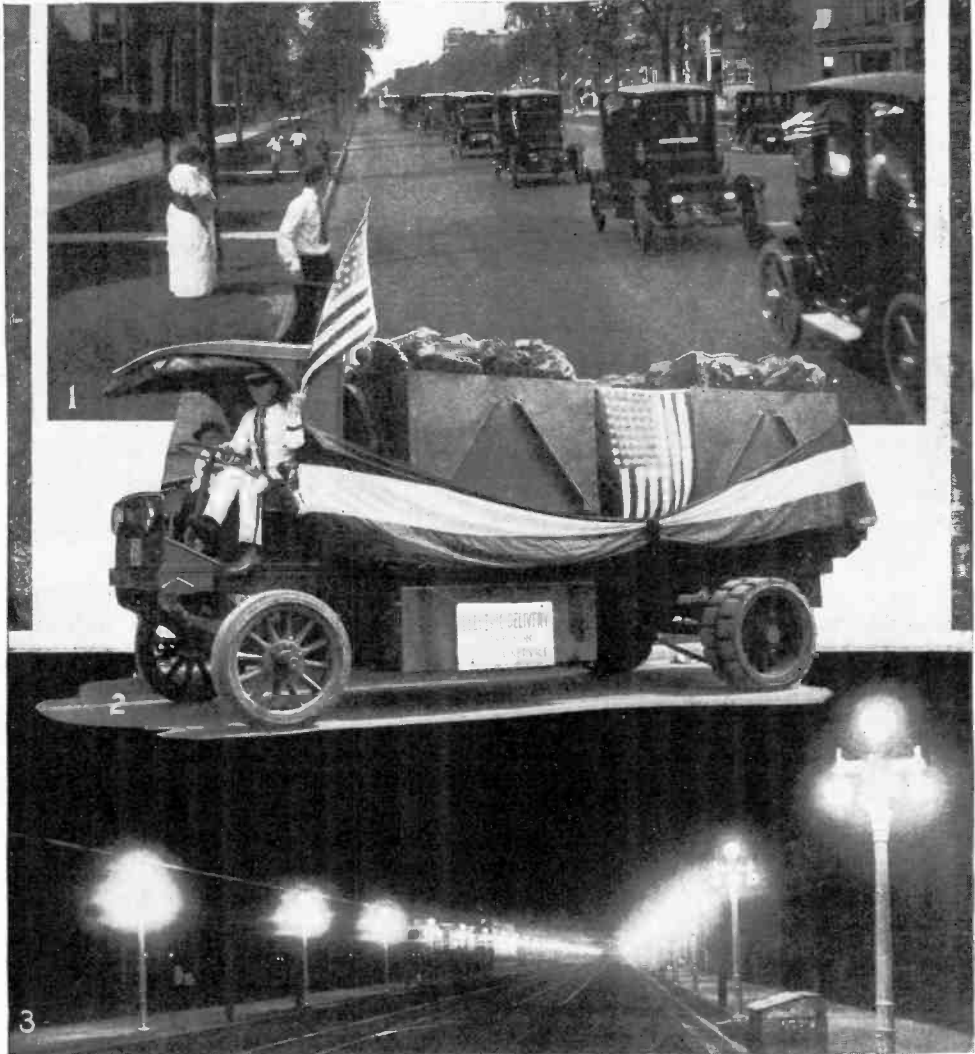
It is proposed to transmit electric energy to Paris from a hydroelectric generating station on the Rhone River at 120,000 volts. The distance is about 250 miles.

# THE PASSING



Shop Lighting Par Excellence. This Group Shows the Way Things are Done in the United States for Perfectly Appointed, Brilliantly Lighted Shops Situated, not in Any of the Great Cities, but in Smaller Towns at Widely Separated Points

# ELECTRICAL SHOW.



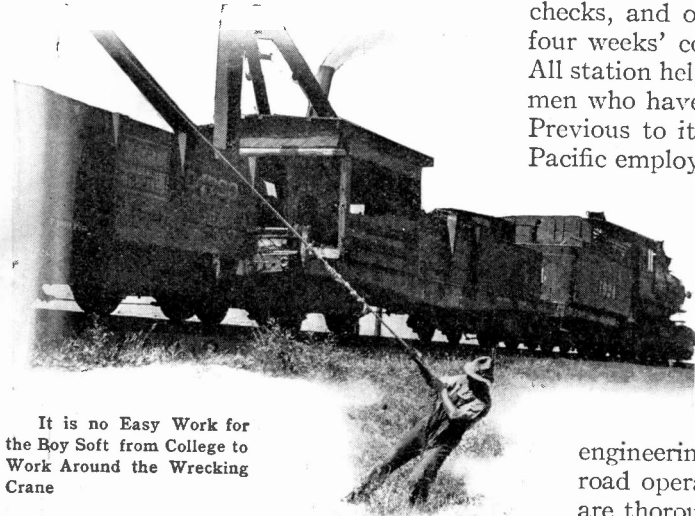
- (1) The Carriage of the Day. Procession of Electric Coupes and Broughams Passing Down Michigan Ave., Chicago.  
(2) The Very Latest in Electric Delivery Service—the Modern Coal Wagon with every Convenience.  
(3) A Street That is Not Only Lighted but Illuminated Every Night All the Year Around.



# Bachelor of Railroad

One railroad in the United States has established a "College in Railroad-ing." A college which offers not only the "regular" courses of four years or more but also summer courses as well. The great

agents are instructed in the "Station School." This school receives applicants for training who already have the ability to send and receive telegrams at a rate of eighteen to 20 words a minute. The school is equipped like the average railroad station and is in charge of one of the most efficient station agents on the road. All railroad wires are cut to the school. The standard forms of tickets, baggage checks, and other forms are used, and a four weeks' course of study is outlined. All station helpers are now supplied from men who have gone through this school. Previous to its establishment the Union Pacific employed 530 station helpers in a year, 60 per cent of whom left the service a few months after taking it up. Now not more than four per cent leave.



It is no Easy Work for the Boy Soft from College to Work Around the Wrecking Crane

Besides this work, courses are offered in every branch of work. Signal engineering, civil engineering, locomotive firing, railroad operation; all of these subjects are thoroughly and completely covered. The lectures in these subjects are covered by written discourses from

difference between these courses given by the Educational Bureau of the Union Pacific and those given in most of our universities is that work in the Union Pacific's "college" means usually an increase in pay and a better job, rather than a degree in "B. R."—Bachelor of Railroad-ing.

The Educational Bureau in Omaha provides not only practical work in all branches of railroad activity but also serves as a question box to the thousands of employees on the Union Pacific. It is a sort of correspondence school for those who wish to write and ask questions. Young men who wish to become station



Student Track Gang at Work



In Laborers "Togs" During  
the Hot Months

the various authorities in the different branches of the work. The instruction is all free not only to the employees but also to the members of their families. The Union Pacific is gaining through the work of this school, gaining not only in efficiency but in economy as well. In training its locomotive firemen it saves thousands of dollars, for every railroad man knows that millions in coal could be saved if every man who fired a locomotive knew how to get the greatest amount of steam from every shovelful of coal.

Every summer many students from the University of Cincinnati take work with the school students on the many School track gangs which do the actual work of section laborers. These gangs secure from actual experience at work upon the railroad the things they have been taught in theory in lectures.

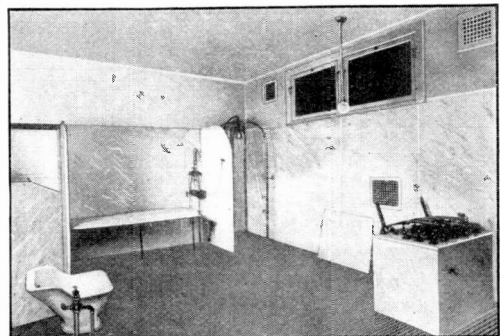
### ELECTRICITY IN THE TREAT- MENT OF MADNESS

Of all the singular and advanced methods for the treatment of mental abnormalities which are being tested in the new Phipps Psychiatric Clinic of the Johns Hopkins Hospital in Baltimore, none is proving more successful than

applications of electricity. Minds, strayed beyond the border, are being reclaimed to reason again as a result of treatment in the electrical room of the institution, and the permanency of the method as a weapon in the war on madness is assured.

That electricity would play no small part in the wonderful new clinic, the gift of the Pittsburg millionaire and philanthropist, Henry Phipps, was certain as soon as Dr. Adolf Meyer, recognized as America's foremost authority on psychiatry, was chosen to plan and later to direct it. Dr. Meyer has long been an ardent advocate of electricity as a therapeutic agent, and as he had the greatest voice in outlining the plans for the equipment and furnishing of the clinic, he saw to it that one large room, completely supplied with the most expensive batteries and accessories, was provided for.

The theory of electricity as an opposing element to insanity, though founded on some of the most fundamental truths



Electro-medical Treatment Room for Insane Patients

of biology, psychology and physiology, is yet quite simple. Body development—the upbuilding of the tissues, the enriching of the blood and, of far greater importance, the strengthening of the nervous system, is the surest method of attack against mental disease. Physical culture, says Dr. Meyer, is brain culture. The link between brain and brawn, mind and matter, is the nervous system. Electrical massage and baths, galvanic battery applications, etc., according to

Dr. Meyer, constitute the most effective treatment for the nerves. So, by a natural process, electricity takes its place as an enemy to mental weakness, the great majority of cases of which spring from wrecked nerves.

That his theory was right seems surely proven. Almost a year ago the clinic began receiving patients, and in that time scores have been treated in the electrical laboratory. Of these, so large a proportion have been discharged as permanently cured that Dr. Meyer and his associates feel justified in their belief that they have a new ally in their fight against dementia.

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### THE ANCIENT ART OF TREE SCULPTURE

Very many years ago it was the fashion in England and on the continent to have great gardens of evergreen trees trimmed and clipped into curious and fantastic shapes. To such an extent did the craze develop that these gardens were filled with crouching lions, pigs and even hens

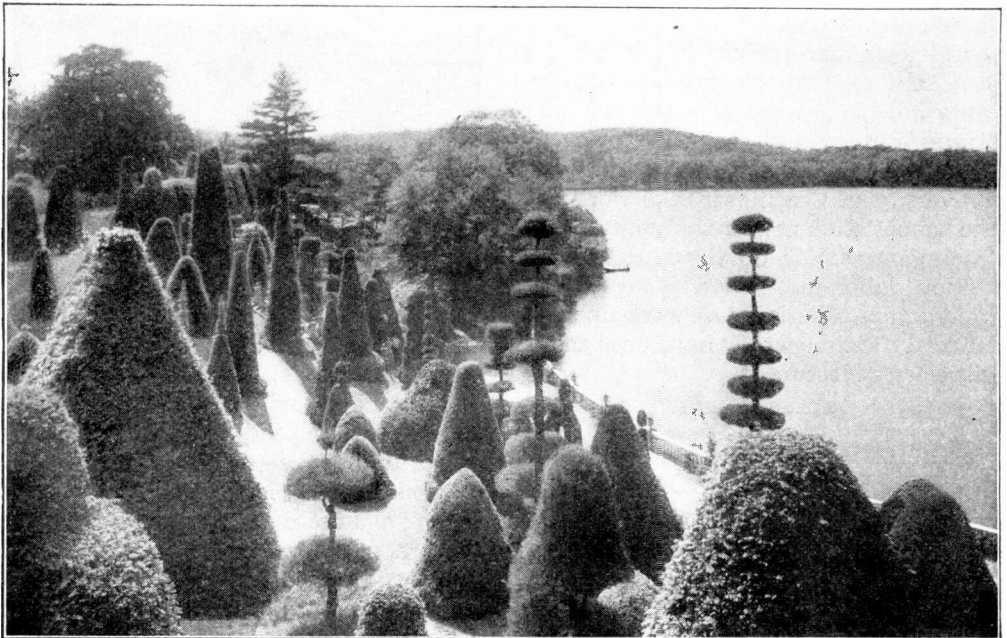
and chickens, all laboriously sculptured from living green and kept in trim by constant use of the knife and the shears.

A few of these gardens were established in this country and one still remains in perfect condition. It is located on the famous Hunnewell estate at Wellesley, Mass., and is visited by people from all over the world. The garden is on the side of a terraced hill dropping away to a beautiful little lake. Evergreens of many kinds are to be found there and each summer a force of workmen with long ladders carefully prune and trim the branches in order to preserve the strange shapes which have been developed with the utmost patience.

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### GREATER THAN PANAMA?

So much attention has been paid to Panama in the past several years that the vital importance of the locks at Sault Sainte Marie, Mich., has been largely overlooked. As a matter of fact, more tonnage passes annually through the "Soo" than any other port in the United



Sculptured Garden on the Hunnewell Estate, Wellesley, Mass.

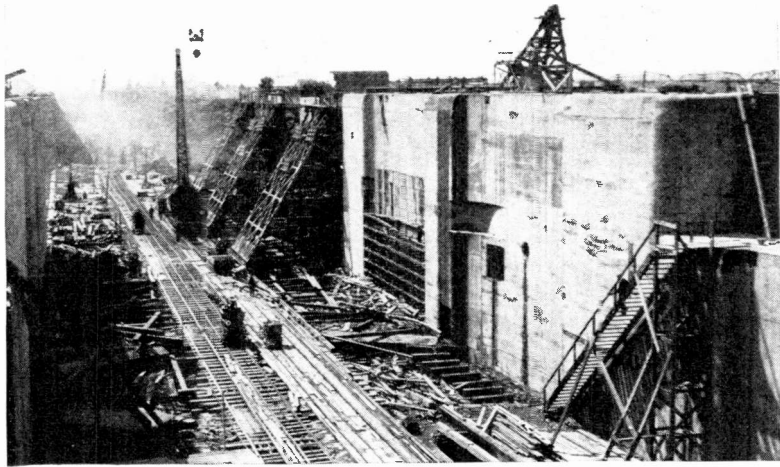


States: in 1912 more than 72 million tons. This represents an increase of 20 per cent each succeeding year ever since the opening of the first of the present locks in 1887.

It can safely be said that Panama will not — at least for some years — witness the passage of such tremendous tonnage through its locks as will the Soo. The remarkable showing of the Soo is simply explained in the fact that the Great Lakes are the logical outlet for grain and iron ore from the Northwest to the East and the inlet for coal from our eastern fields to the Northwest.

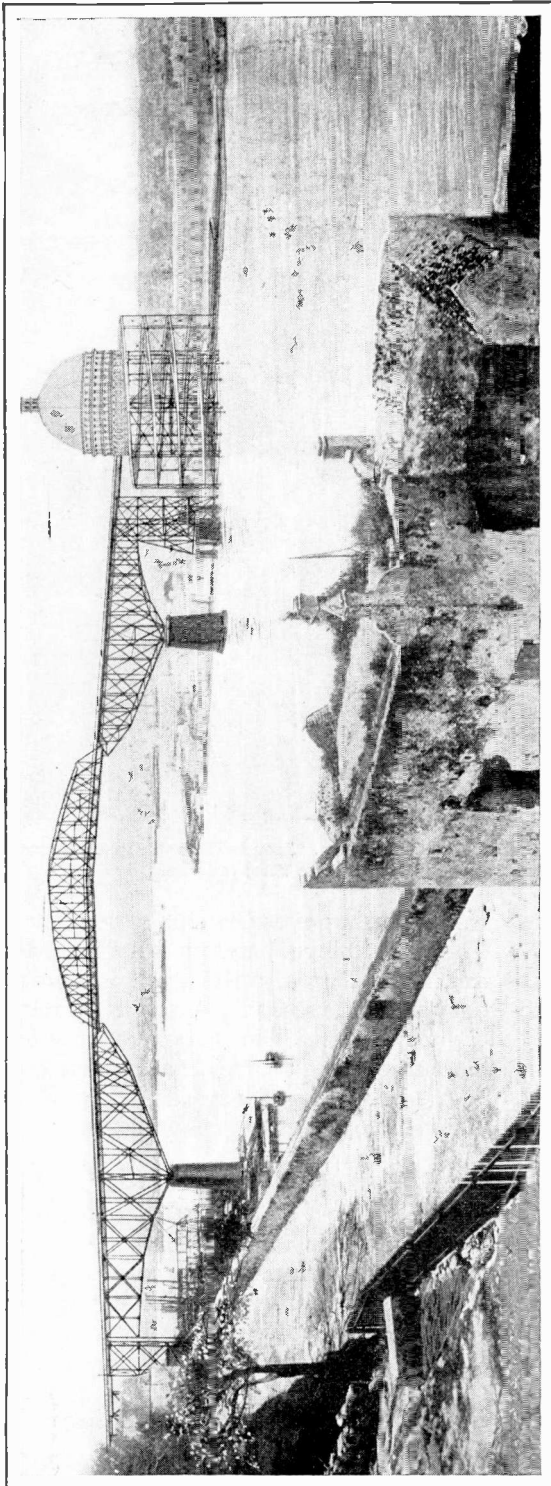
Although there are at present two locks on the American side and one on the Canadian side of the rapids, after foggy weather, when ships coming from both directions having anchored "outside" pending the lifting of the fog, sometimes they are delayed a large part of the day waiting their turn. When it is remembered that to delay a loaded ore boat costs about one dollar a minute, it can be readily appreciated that the utmost expediency in "locking" up or down is highly desirable.

To this end, two new locks — the longest in the world — are being constructed on the American side. They will each be 1,350 feet long, 80 feet wide and about 50 feet deep with 25 feet of



The Great Locks of the Soo Canal Under Construction. Through Them will Pass a Tonnage Likely to Exceed that of Panama for Some Years to Come

water flowing over the sills at low level. The drop in level between Lake Superior and Lake Huron, although it is said to vary with the seasons, is, on the average, eighteen feet. The same construction difficulties — of course on a smaller scale — are being experienced as in Panama. There have been some rather serious rock slides; but the greatest trouble is with water seeping in. Already, one contractor has lost \$200,000 through underestimating this factor. The new locks are entirely surrounded by water. They are being built of reinforced concrete and both cuts are through highly resistant Lake Superior red sandstone. One will be completed in 1915, if everything runs smoothly; the other in six or seven years. Approximately \$10,000,000 will have been expended according to present estimates.



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As the Great Havana Harbor Bridge will Appear When Completed

## IMMENSE BRIDGE ACROSS HAVANA HARBOR

The harbor of Havana, Cuba, long admitted to be one of the handsomest in the world, will shortly be spanned by a bridge unique in height, construction and approach.

For years it has been planned to erect a bridge from the Morro Castle side of the Havana harbor to the city side but this undertaking has always been postponed because of the large amount of heavy sea traffic which would, of necessity, have to pass beneath the bridge and because of the difference in levels between the two sides of the harbor. The former objection, engineers said, would necessitate a bridge over 250 feet in height and the latter would entail a long and very costly approach on the city side of the harbor.

Modern engineering methods, however, have provided solutions for both of these problems, and the bridge will be commenced within the year, the Cuban Congress having appropriated \$2,500,000 for the construction of the giant span.

The bridge itself will be nearly 300 feet above the surface of the harbor, thus allowing the largest vessels afloat to pass beneath without danger to their superstructure. There will be but a single span to the bridge, supported by massive masonry pillars at either side. The central portion of the bridge, as shown in the accompanying photograph, will be "raised" so as to offer additional protection to vessels passing under it.

But it is in the approach on the city side of the harbor that the bridge presents its most un-

usual feature. Instead of the usual straight inclined plane, the upper portion of the structure will be approached by means of a spiral of four tiers, making it easy for pedestrians or vehicles to attain the summit of the bridge with little effort. The erection of this spiral structure, unique on bridge building, was decided upon in order to save the long and expensive approach which the low level of the city side of the harbor would otherwise have made necessary.

### GIANT AEROPLANE PROPELLER AND ITS BUILDER

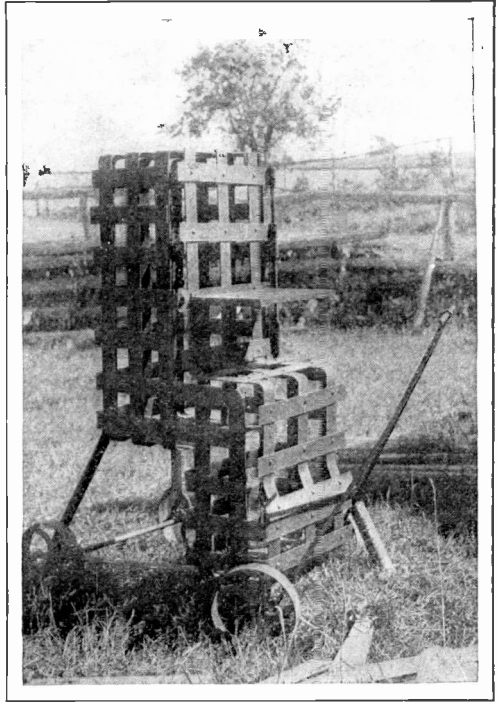


This is a picture of a giant propeller and its builder, Colonel S. F. Cody of England, who designed it for his big hydroplane and who with a passenger was killed August 7 by a 300 foot fall near Aldershot, England. Colonel Cody intended to prepare the day following his fatal flight for a hydroplane race round Great Britain, starting from Southampton. He was counted as one of Britain's most picturesque airmen—original and an inventor.

He began his career in this field twelve years ago by attempting to cross the English Channel in a boat drawn by two kites. He was laughed at then, but his successes since won for him world wide admiration which expressed itself in sorrow at his untimely death.

### RIDDING A TOWN OF TRAMPS

A town in Maine boasts of having rid itself almost completely of tramps. The town has a "tramp chair," so called. It is made in the form of a common upright



An Effective Tramp Chair

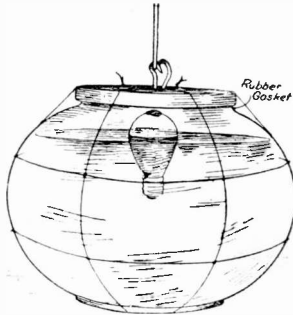
chair of strap iron material. It is on wheels and can be moved to any part of the town. Not a great while ago a tramp went to the village and there being no lockup he was put in the chair. This fellow when released evidently sent word to his brothers warning them to stay clear of this town for none of his ilk have been there since.

The first international exposition of safety will be held in New York City from December 11 to 20 next, under the direction of the American Museum of Safety. For the best safety, life saving and health promoting devices in each industry, prizes will be awarded of five grades—a grand prize, gold, silver and bronze medals, and honorable mention.

### DIVING LAMP GLOBE

From the ceiling of the window a fish bowl of ordinary size was suspended by a long copper wire apparently fastened to a hook in a wooden cover that tightly covered its mouth. The globe was nearly

filled with water and in it floated an electric light bulb also partly filled with water. The tip of the globe was broken but the hole was closed with sealing wax. The water in both the



Diving Lamp Globe

bowl and globe was colored, making the display more effective at night. At regular intervals of about 30 seconds the bulb slowly sank to the bottom of the globe and as quickly returned to the top.

The copper wire was hollow, being a tube such as is used in the numerous systems of gasoline lighting. One end of it was in communication with the air in the fish globe, while the other was connected with a simple rotary pump run by a motor. A safety valve placed in the pipe line completed the apparatus. The motor driving the pump compressed the air in the bowl and so increased the lifting power of the air imprisoned in the electric light globe. The globe, therefore, came to the top, the safety valve operated next and then the globe sank below the surface, the action being continuous.—R. SIMONTON.

### AUSTRALIAN WOOL WAGON

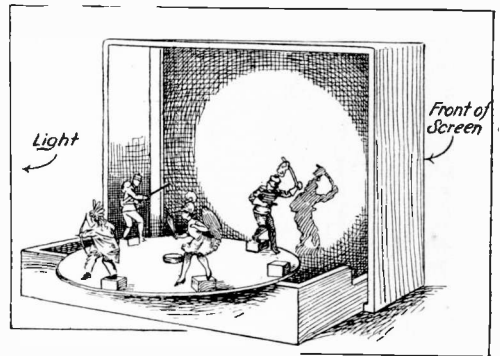
This autumn, there was held at "Olympia," London, an exposition known as the Commercial Motor Car Show. More important is the fact that there was on exhibition the largest motor vehicle in the world—the "Leviathan" of the carrying trade. It is one of a tribe of wool wagons designed to carry wool across the Aus-

tralian bush. Its build is known as the Halley. It may briefly be described by stating that a special dispensation had to be obtained from the Scotland yard authorities before it could be brought through the streets of London. To quote an enthusiast, "its vast six cylinder engine towers above the head of a tall man, while the driver's seat rivals that of the Lord Mayor of London's coachman from the point of loftiness." In point of fact it is a 25 ton truck with a driving seat ten feet up and a body length of 35 feet.

Two carburetors and three tanks are part of its equipment for its power of crossing deserts exceeds that of a camel and thus enables produce to be brought over many leagues of trackless and otherwise impassable sand.

### CHILDREN'S SHADOW THEATER

Quite a little amusement for children can be had with the miniature revolving shadow theatre, this being made up of a box cover having white cloth or the like stretched so as to form a screen, while the



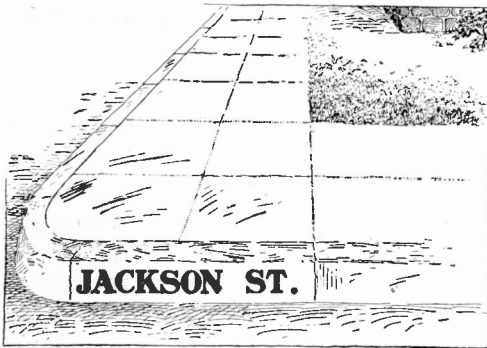
Shadow Theater

back part hinges down so as to lie flat and serve as a base for the revolving shadow part. This consists of a disk having a number of figures of any kind cut out of thin wood and set up around the circle. A suitable mechanism causes the disc to rotate and at the same time plays a music box. Placing a lamp about a yard back of the figures, the shadows are thrown on the screen and a curious effect is obtained,

for when looked at from the front side, the figures appear to pass from right to left and others from left to right according as they lie at the front or back of the revolving disk, meeting and crossing each other so as to give a series of amusing positions.

### A NEW CURB STREET SIGN

A useful idea in the way of a street indicator has been devised and adopted by the officials of Tropic, Calif., this being in the painting of the names of the



Curb Street Sign

various streets upon the concrete curbing at the corners instead of upon wooden sign posts. The unsightly wooden post is done away with and at the same time this modern street indicator costs only one-fourth as much as the old kind.

### ONE ARMED VIOLINIST

John R. B. Norfolk of Jersey City, N. J., lost his right arm in an accident and for some time grieved lest he should be unable to play the violin, his favorite instrument. His ingenuity, however, came to the rescue and in the accompanying picture is shown an artificial arm of spring steel which he designed and had made. The bow is held by a spring and the various joints are so arranged as to perform the motions of a human arm and wrist. Mr. Norfolk's playing with the use of this metal arm is so wonderful that he has accepted an offer to go on the stage.

### COLORED SHADOWS

Colored "shadows" are seen sometimes at banquets, carnivals, etc., where colored lights are used. Very pretty effects can also be obtained at parties by their intelligent use. The simplest way to get a colored shadow is to have an ordinary light and a colored light. If a screen is placed between and under the two it will throw two shadows — one on each side — of different shades and intensities.

To explain the phenomenon suppose we take two *colored* lamps — one green and one red — and place the screen as before. On the red lamp side we will have a red shadow, and on the green lamp side we will have a green shadow, thus being the reverse of the ordinary black shadows which are found on the other side from the light. Now the red lamp throws red rays and the green lamp throws green rays. Where the two kinds of rays are both found there is a mixture of the two which is near-yellow or white. But just beyond the screen from the green light no green light can fall — therefore in this spot only the red light falls — and that is all that is seen. This constitutes the red "shadow," though it is hardly right to call it a shadow. The green shadow is made in the same way of course. The different colored lights can



COURTESY THE MUSIC TRADES

Violinist Who Overcame Difficulties

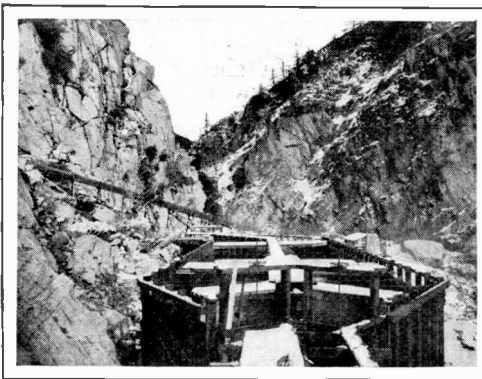
be made by placing thin colored paper over ordinary lights. The screen can be any opaque object. If more than two colors are used a great number of pretty effects can be produced.

### RIDDING FLUMES OF SAND AND LEAVES

One of the most annoying difficulties to be contended with in maintaining a flume carrying water to a hydro-electric plant, especially where it runs through



Automatic Device for Removing Leaves From a Flume



Type of Self Flushing Sand Box

wooded stretches of country, is the accumulation of leaves. Screens hold them back, of course, but, unless constantly attended to, they clog up and stop the water. The device shown in one of the accompanying pictures is in use in a number of the flumes of the Edison Elec-

tric Company in the San Bernardino Mountains, Calif. The leaves are caught upon an inclined screen which, through the operation of a chain and sprocket attachment to a water wheel, driven by the current of the flume, is automatically raised and dumped.

Sand, which is even more troublesome than leaves because of the manner in which it scours out pressure pipes and wheel cups, is also removed automatically in these flumes. Settling boxes are installed at intervals, the bottoms of which are balanced to open downward under a certain weight of sand and to close again as soon as the latter has flushed out.

### VIOLIN SIGNALS UNDER THE SEA

One of the most remarkable inventions ever evolved in the interest of safe navigation has recently been adopted by the United States Navy Department after thorough trial on several of the submarine torpedo boats of the American fleet.

This novelty is the invention of Mr. Christian Berger, an Austrian, who came to this country and interested Uncle Sam after his own government had failed to realize the importance of the invention. Mr. Berger refers to his invention as an apparatus for submarine telegraphy and signaling, but in American naval circles the innovation has been dubbed the "submarine signaling violin," and the appellation bids fair to stick because it is so appropriate.

Inventor Berger went to work on this invention some years ago with the object of improving upon bells (immersed and struck under the water) as the best underwater sound producers. He felt that the fact that a bell is in no sense a telegraphic transmitter, adapted to send messages in a practical way, left much to be desired. This gave him as a goal for his ingenuity a system by which ships and ships and the shore could actually intercommunicate.



The apparatus gives the Morse signals consisting of the usual long and short dots and dashes and with it a reasonable speed of telegraphic transmission may readily be attained. Moreover the signals sent and received are musical and of high pitch, a characteristic which has suggested the name "submarine violin." However, this tone quality has a practical value in that it enables the signals to be easily heard and readily distinguished from interfering sounds.

The new apparatus produces its signals by the vibration of a piano wire stretched taut between the steel sides of a vessel. The vibrations are induced by the revolu-

tions of a wheel in contact with the wire or wires. An electric motor controls the operations of the wheel and this motor in turn is controlled by a Morse key.

In the case of a submarine boat it is entirely feasible to stretch the wire, or "ribbon" as the inventor calls it, entirely across the interior of the hull but this is not necessary in a larger vessel. It is only essential that there be provided a wire ribbon some six or seven feet in length by six one-hundredths of an inch in thickness and this can be stretched from a frame at one side of the hull to a support in the interior.

### THE STATIC INTERROGATION

After "The Conundrum of the Work Shops," with apologies to Kipling.

When the flash from the string of Frank-  
lin's kite gave proof of the new-found  
Juice,  
He thrilled with the vision of mighty force  
he had placed at the whole world's use;  
And the reigning High-Brows hailed him  
Chief and pleasant he thought his lot—  
Till the Man-in-the-Street said "Fine! old  
top; but tell me, Ben, what's a watt?"

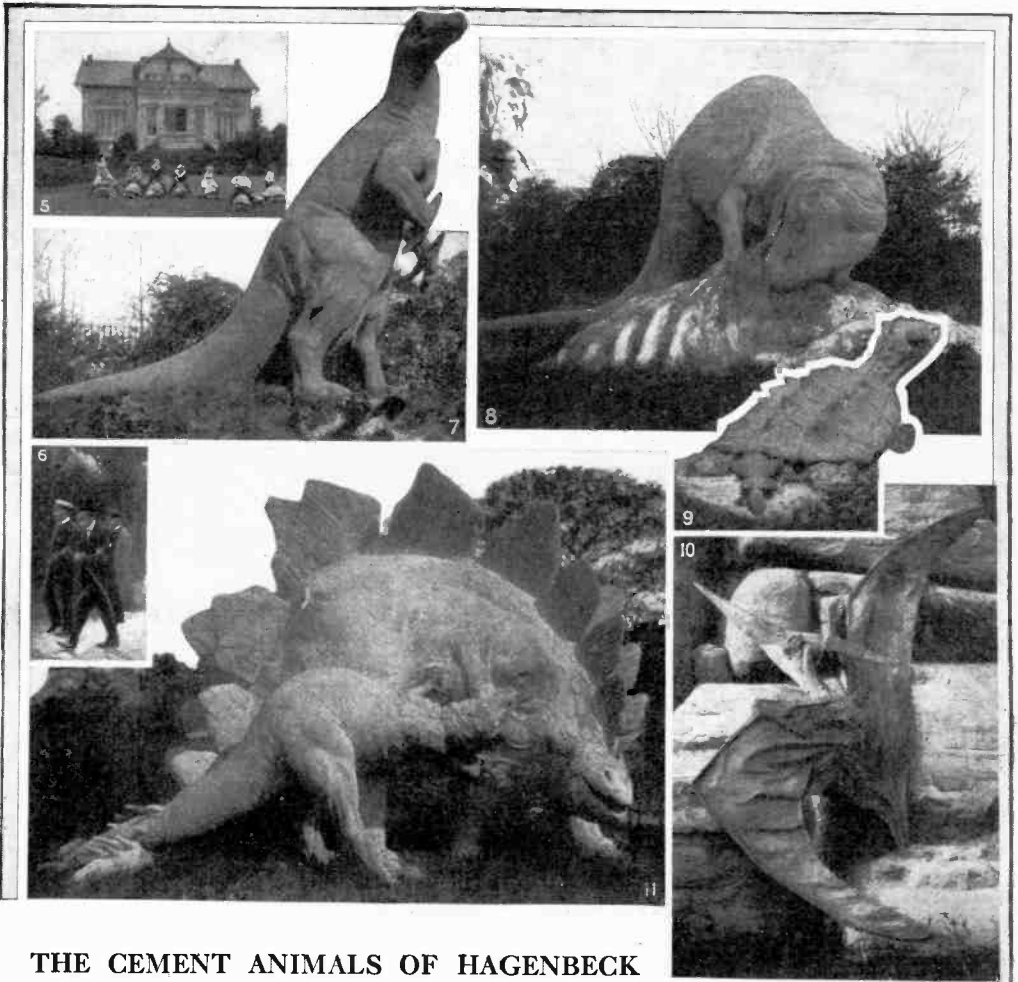
Wherefore, he muttered and passed the  
buck, till Morse, in his intellect's might,  
Imprisoned the Juice to race the wires  
and rival the speed of light;  
And the clicking keys told the world's  
tale in chattering dash and dot —  
When the Ham ticked off to his startled  
Chief — "Excuse me, but what's a  
watt?"

They tied a box to a bunch of wires  
and the thing transmitted speech,  
And talk with many a distant friend  
was placed within elbow reach;  
And great was the fame of Alex G,  
but his choler no man might tell,  
When the oft-phoned query, "What's a  
watt?" smote the ear of the angry  
Bell.

We have learned to bottle the sunshine up  
in the Tungsten's brilliant glow,  
And the work of the world is done to-day  
to the throb of the Dynamo;  
The X-ray penetrates things opaque  
and the Wireless sweeps the seas,  
But the Captains shudder, as "What's  
a watt?" is helixed across the breeze.

Now if we could get the N E L A  
to meet with the E D S  
And concentrate, with their gathered lore,  
to answer this ancient guess;  
And if they could counsel with Thomas A,  
(for the bunch of them know a lot)  
By the favor of Heaven they might reply  
to the why of this "what's a watt?"

—J. A. HARNEY.



### THE CEMENT ANIMALS OF HAGENBECK

The name of Karl Hagenbeck is known to every schoolboy the world over and probably no other man ever handled or owned more animals and birds than he. He was always in touch with trappers and hunters of every clime. "Just put 'Hagenbeck' on the envelope and the letter will reach him," said an associate when asked for his address.

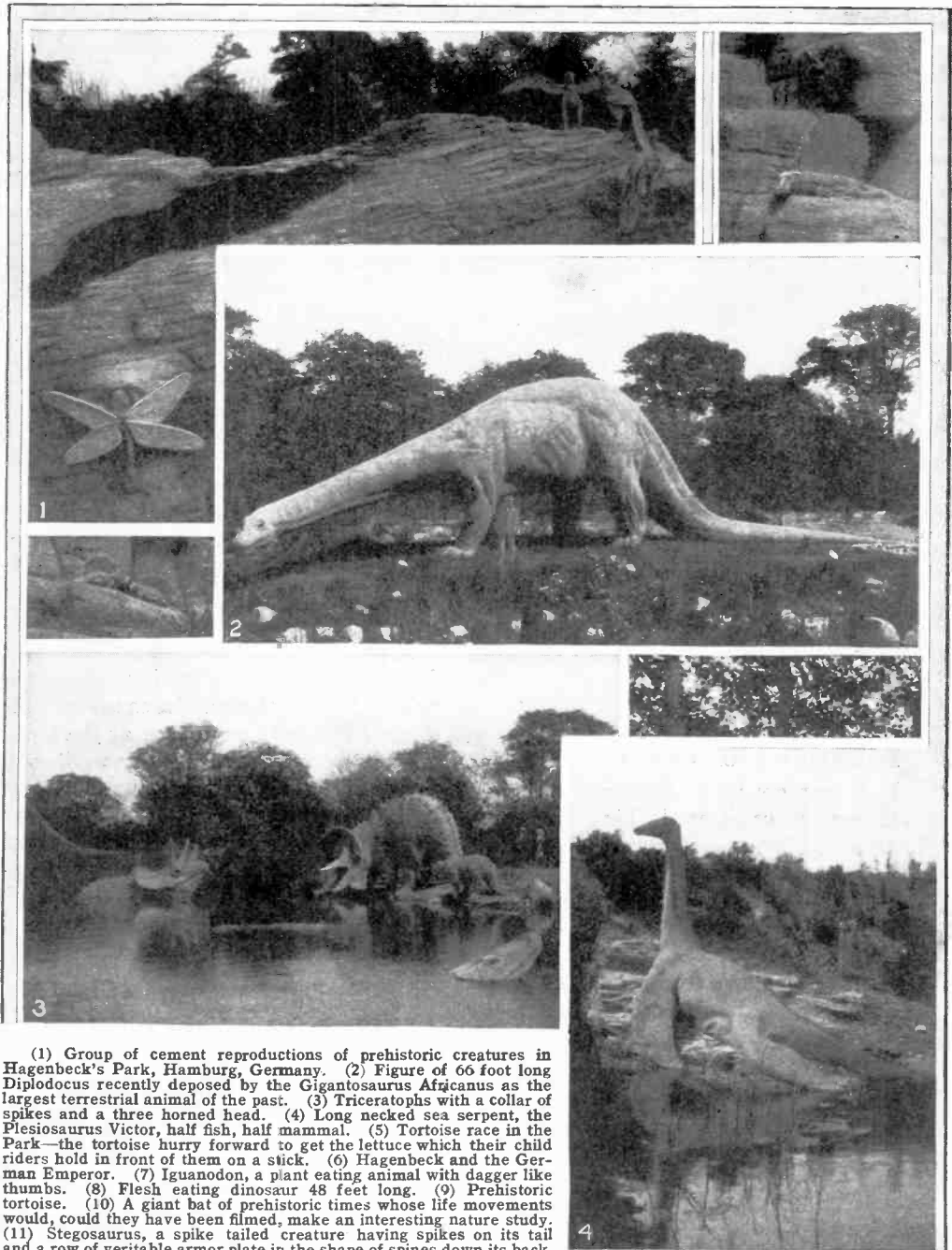
His recent death on his estate near Stillingen, Germany, brings before the public the immense animal traffic which he had developed since the age of 20 when the death of his father left a beginning in a unique business.

He was tall and thin and wore a beard that caused him to be likened to Lincoln in appearance. He was a lover of wild

animals and in his later life established Hagenbeck Park, where hundreds of his animals were kept for public observation and where, not satisfied with living creatures, he had made of cement the forms of prehistoric beasts, the pictures of some of which are here shown. Every year additions were made to the Park's attractions until its exhibit of birds and animals are among the most complete in existence.

### LONGEST SUBMARINE TELEPHONE CABLE

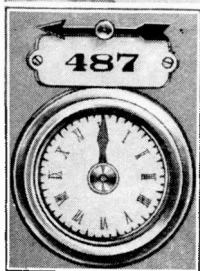
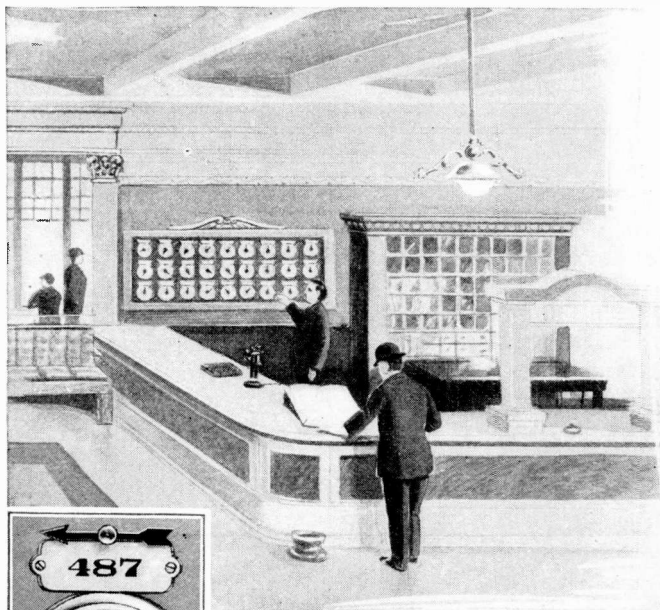
A submarine telephone cable 35 miles long is worth noting. Such a one—holding the record for length—has just been



(1) Group of cement reproductions of prehistoric creatures in Hagenbeck's Park, Hamburg, Germany. (2) Figure of 66 foot long *Diplodocus* recently deposited by the *Gigantosaurus Africanus* as the largest terrestrial animal of the past. (3) *Triceratops* with a collar of spikes and a three horned head. (4) Long necked sea serpent, the *Plesiosaurus Victor*, half fish, half mammal. (5) Tortoise race in the Park—the tortoise hurry forward to get the lettuce which their child riders hold in front of them on a stick. (6) Hagenbeck and the German Emperor. (7) *Iguanodon*, a plant eating animal with dagger like thumbs. (8) Flesh eating dinosaur 48 feet long. (9) Prehistoric tortoise. (10) A giant bat of prehistoric times whose life movements would, could they have been filmed, make an interesting nature study. (11) *Stegosaurus*, a spike tailed creature having spikes on its tail and a row of veritable armor plate in the shape of spines down its back. Its length is 25 feet.

laid between Vancouver and Vancouver Island in Canada. It cost \$100,000, weighs 280 tons and the expense of laying was \$20,000. This cable also holds the

record for depth, dropping down, at one place, to 1,356 feet below the surface of the water. The cable was imported from England.



The Board Contains an Indicating Dial for Each Room and Each Dial is an Individual Alarm

### PADEREWSKI AND RAGTIME

It is not generally known that when Paderewski celebrated his fifty-third birthday, a while ago, there was held at the Chalet de Riond Bosson, on Lake Geneva, a most wonderful ragtime party in honor of the event.

The opening piece was a ragtime version of Strauss's celebrated Blue Danube waltz with the following five famous artists all playing ragtime at once on the same piano: Paderewski, Olga Samaroff, Josef Hoffman, Scheeling and Rudolph Ganz. Stokowski conducted. There were various comic numbers on the program, the last being a tableau vivant which ended in Mme. Samaroff being carried off the stage disguised as a Steinway piano, the piano movers being Schelling and Hoffman.

It was figured out that at their usual scale of payment the charge per minute when the celebrities were playing Strauss in ragtime would amount to \$750.

### CALL SYSTEM FOR HOTELS

A new device of practical use to hotels (as well as an adjunct to the electric utilities of the home) has appeared in the form of a call or alarm system. Through the agency of the mechanism, a guest or sleeper may be awakened at any hour he desires, the dial being in full view as he registers upon entering the hotel, where he may watch the clerk set the hand and know for a certainty at what moment he will be

aroused from his slumbers.

A particular feature of the device is the feeling of absolute security from fire it affords hotel sleepers. In case of fire, the clerk, by pressing a button at the side of the dial-board automatically notifies the fire department; at the same time a red light appears and a bell rings in every room, thus arousing all simultaneously. The ringing of the bell cannot be stopped except at the office. Each room is also put in direct telephone connection for information.

### FIRST OIL DRIVEN DREAD-NAUGHT

The Queen Elizabeth, now approaching the launching stage at Portsmouth, England, will be the first Dreadnaught in the world to be exclusively propelled by the agency of liquid fuel. She will have practically no coal bunker accommodation and all her furnaces will be designed for the use of oil only, which will be stored in a specially strengthened and sealed double bottom. The absence of bunkers will give much additional space on board.

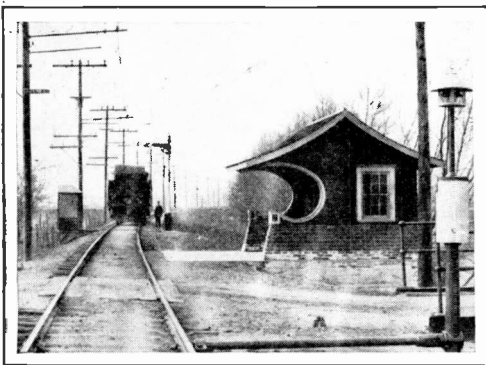


### INCREASING FREIGHT TRAFFIC ON INTERURBANS

The illustration, taken at a small town in central Illinois, shows the increasing popularity of electrical freight traffic, this particular case being the delivery of corn to an elevator on the Illinois Traction System's right of way from which it is freighted by trolley to the nearest transfer point on a steam railroad, thus saving the farmers a lot of time and wear and tear on their horses and wagons.

### ARTISTIC WAITING ROOMS

The rapid development of interurban passenger traffic has required the installation of numerous shelter sheds for the comfort of those who live at some distance from a main station. As the illustration shows, these need not be eye-



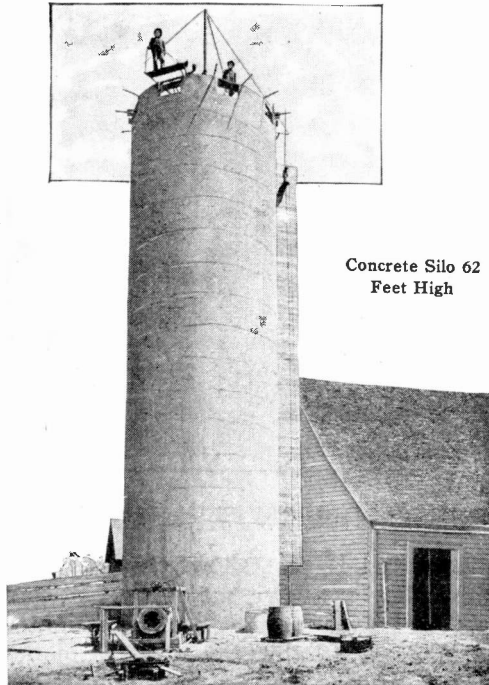
Artistic Interurban Station

sors of unpainted boards, but may be ornamental. The interior is divided by a pine partition so that shelter from cold

weather is obtained and electric radiators provide the necessary warmth. The bell mounted on top of the small post automatically gives timely warning of a train's approach.

### A GIANT SILO

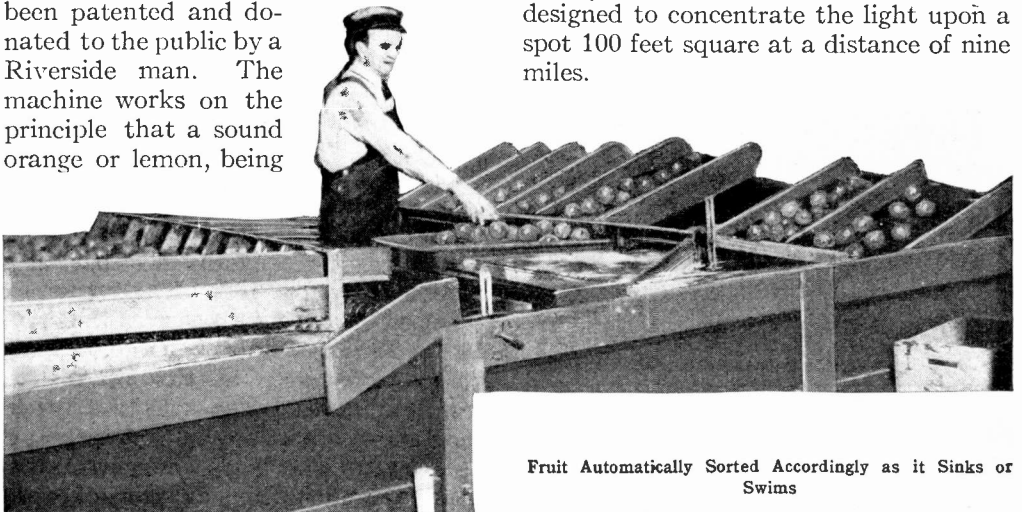
A prominent feature of the landscape near Homer, Ill., is an enormous silo on the L. V. Jurgensmeyer farm. It is 62 feet high, sixteen feet in diameter and has concrete walls eight inches thick. The walls are reinforced horizontally with seven-eighths inch twisted bar steel placed every eighteen inches, and vertically with three-eighths inch bar steel placed every four feet. The reinforcing members are tied with wire at the crossings. Entrance to the chute is made through oval openings two feet by two feet ten inches. The structure towers high above everything in that section of the country and holds enough silage at one time to fatten five car loads of cattle.



Concrete Silo 62  
Feet High

### CULLING OUT FROST BITTEN ORANGES

Very few people have sufficiently sensitive touch to detect a frosted orange by the "heft," while the alcohol method, sometimes used, is very expensive. The water type separating machine shown in the picture is the only satisfactory one of this nature, and it has been patented and donated to the public by a Riverside man. The machine works on the principle that a sound orange or lemon, being



heavier, will sink in a stream of running water more quickly than a lighter, frost bitten piece of fruit.

An electric motor drives a steady stream of water through the separator and back again, below, at about four miles an hour. The oranges are fed into the stream of running water, one row at a time by a belt conveyor, run by the same motor that drives the water. The sound oranges sink below a screen, placed in the water at the proper depth. The frosted oranges, rising to the top, strike the screen and are carried by the running water into the middle chute, while the good ones pass into the outside chutes. This method seems to be the only cheap and certain one of eliminating the defective fruit, which formerly seriously injured the market, after a severe winter.

### SEARCHLIGHT BEAM NINE MILES LONG

The Mount Tamalpais Railroad is planning to install the largest searchlight in the world on the top of Mount Tamalpais at the time of the Panama-Pacific Exposition in San Francisco. It is expected that the light from this source will illuminate the exposition grounds to an appreciable extent. A mirror and lens will be used in connection with the lamp, designed to concentrate the light upon a spot 100 feet square at a distance of nine miles.

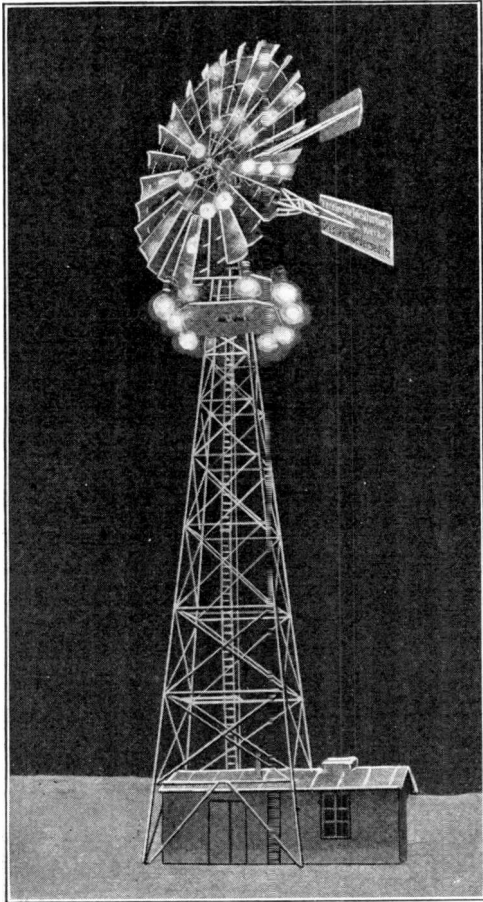
Fruit Automatically Sorted Accordingly as it Sinks or Swims



**GERMAN WIND POWER PLANT**

The Royal Technical Institute of Dresden, Germany, presents a concrete example of the use of wind power to generate electricity by the operation of a plant of this kind at the school. Pictures of both the exterior and interior are here shown.

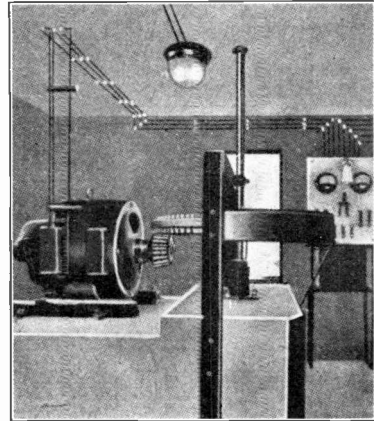
The equipment is the result of many experiments. The mill and platform are



Wind Power Plant of the Dresden Royal Technical Institute

fitted with lamps which are frequently lighted at night. The shaft from the mill connects through a bevel gear to the dynamo and a storage battery takes up the current made during such times as it is not needed for light or power.

From the tests upon this plant it is claimed that a German village of 100 persons may be supplied with water and



Wind Mill Shaft Geared to the Motor

light, using this wind power installation, for a total cost of \$125.00 per year.

### CONTROLLING THE FIRE OF FIELD GUNS

Probably the most minutely worked out science in the navy is the fire control system. Into this wonderful compilation of formulæ and rules enter the problems of the wireless, the strength of the powder, the weight of the projectile and the individual characteristics of each gun.

For field work the navy has a portable fire control outfit, used by the marine corps, which directs the fire of its field guns. The field gun is protected by two flanks of men who lie prone and use their rifles at long range. Folding wire towers are erected to one side of the field pieces and observations are taken. The electrical branch of the service moves far to one side where a view of the enemy's position may be had. By wireless the look-out keeps the men in the signal tower informed just as to where the shells are striking. With these and their own observations, the men in the signal tower telephone the proper ranges to the sighters of the field gun who wear a double set of receivers attached to their ears.



On the Firing Line

So accurate is this system of electric fire control that the navy's men on the field can, after three or four ranging shots, hit a target the size of a small barn at a distance of six miles.

A wireless outfit is carried by every platoon of two field pieces. When the field pieces go into action the wireless instrument is set up immediately.

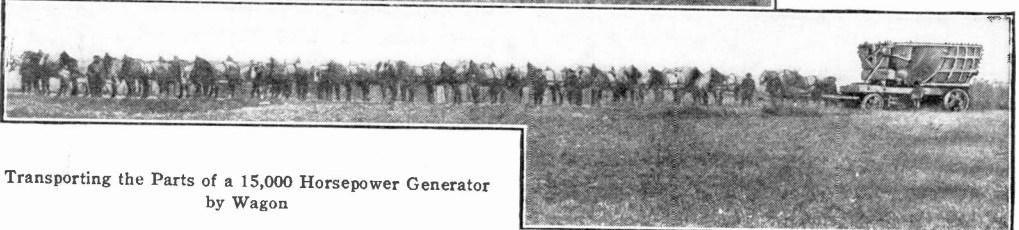
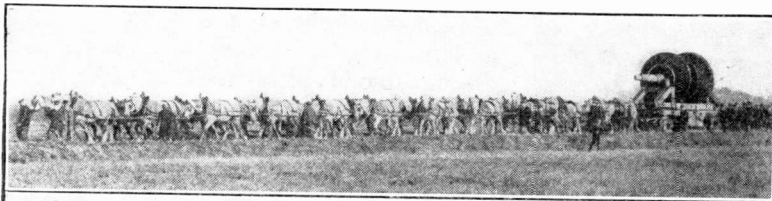
### THIRTY-FIVE HORSES DRAW 15,000 H. P. MACHINE

To put in the great steam turbine and electric groups of 15,000 horsepower size at the St. Denis electric plant near Paris was no small undertaking. Al-

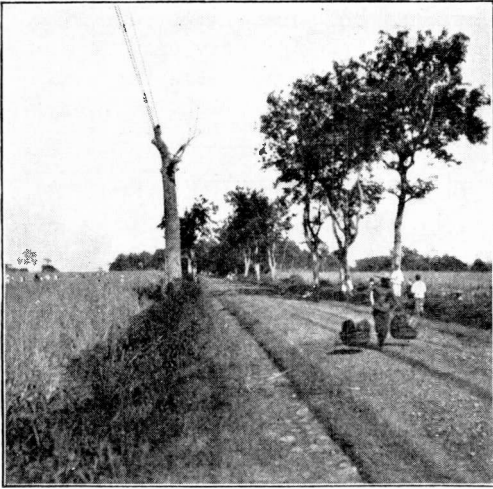
though the station lies on the Seine and can take in most of its supplies such as coal and small apparatus by water, the pieces of the large steam turbines were too heavy to be carried by boat and as the railroad tracks do not run to the station there was no other way to transport the heavy pieces of machinery weighing as high as 55 tons except to use teams of horses. One of the photographs shows the lower half of the steam turbine casing drawn by 35 horses, while the shaft and revolving part took 32 horses to bring it into the station.

### TELEPHONE LINE IN FAR-OFF JAVA

"There is no 'out of the world' today" exclaimed a business man who sought to get away from his cares and



Transporting the Parts of a 15,000 Horsepower Generator  
by Wagon



BY COURTESY OF THE WESTERN ELECTRIC NEWS

Telephone Line Beside the Rice Fields

worries for a few days by leaving the city. He found that the telephone at least could reach him and no better evidence of its great arm can be found than in the accompanying picture. We find the wires running along the roadway in far-off (Bintenzong) Java, where the coolie bears his burdens at the ends of a piece of wood resting on his shoulders. Rice fields full of workers spread out each way from the roadside while the native tendency to avoid work is manifest in the use of the trunk of a dead tree as a telephone pole.

### Vault for Three Billions

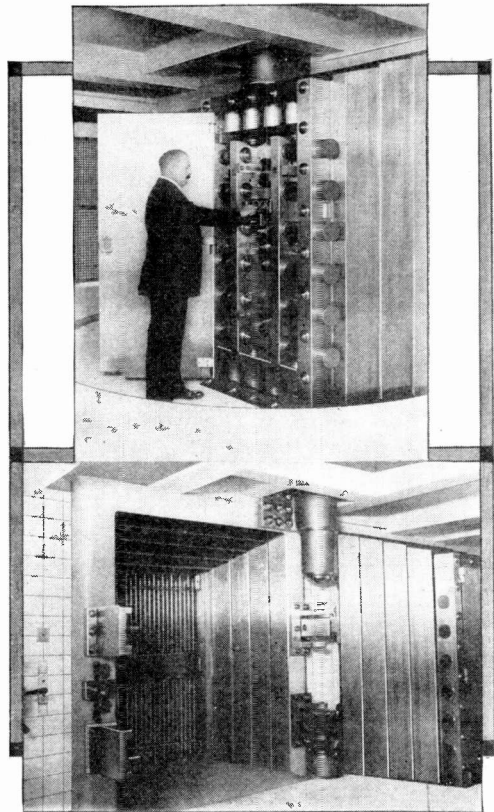
The new vaults of the Guaranty Trust Company, New York, are said to be the most complete in the world. Securities and cash to the amount of over \$3,000,000,000, assembled in a space approximately 35 feet wide, 24 feet deep and 20 feet high, constitute the all desirable bait for the burglar in this instance. Defenses, mechanical, electrical and human, of unique strength and complexity, keep the unparalleled prize completely out of reach.

There are two vaults, upper and lower, exact duplicates. Some 80 tons of steel are interposed between humanity and the billions within. Imagine a central

fortress, armored as heavily as big super-dreadnaughts; imagine it ringed around with sensitive tentacles of electricity ready to cry the alarm at the least disturbance of their normal position; then conceive of it as surrounded by a series of mines, counter mines, pits, chevaux-de-frises, and entanglements, in the form of doors, steel grills, observing mirrors and locks, more numerous than the defenses that wreath a modern city in state of siege, and you will have an idea of this remarkable vault.

The whole structure is erected on numerous narrow piers, and the spaces between them are shown by the mirrors set at an angle of 45 degrees.

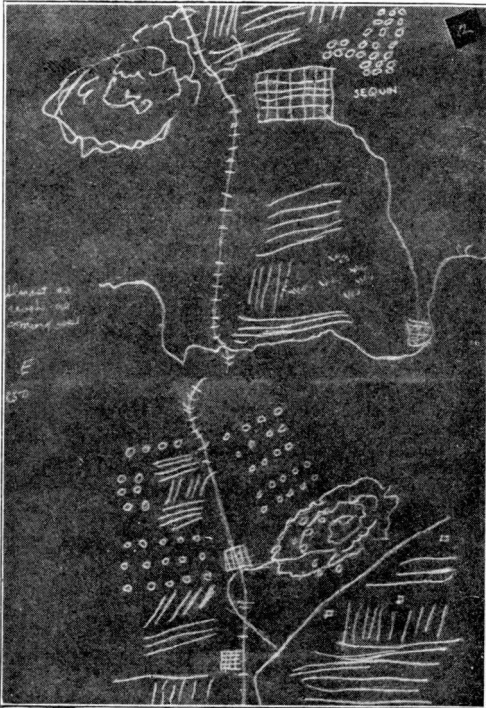
For the full length on each side of every rail in the double row of steel rails surrounding the structure is run a lead-covered burglar alarm cable.



Some 80 Tons of Steel are Interposed Between Humanity and the Billions Within

## MAP MADE FROM AEROPLANE

Lieutenant W. C. Sherman, an army aviator, has demonstrated to the War Department that it is possible for an aviator to make an accurate map of all of the country over which he may make a



Map Made by Lieut. Sherman in Texas

flight. His achievement has caused favorable comment the world over and brought him a letter of commendation from the Secretary of War.

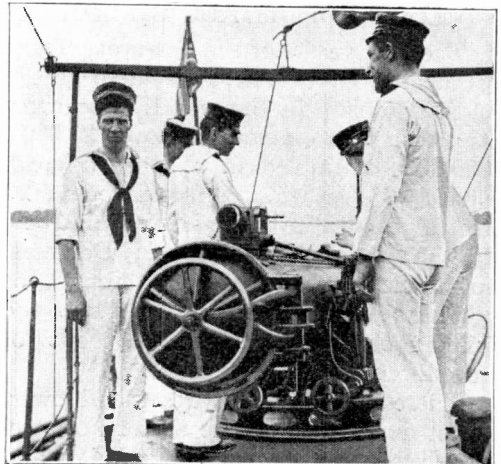
The diagram shows the second section of the map made by him while on a flight from Texas City, Tex., to San Antonio. The line with short cross marks indicates the railroad, the squares indicate towns, the small circles indicate cultivated tracts, the straight lines indicate forests and the curved lines forming circular tracts indicate marshes. The irregular lines indicate roads.

Distance was the hardest proposition. On the map he marked the hours and minutes according to his watch. Then

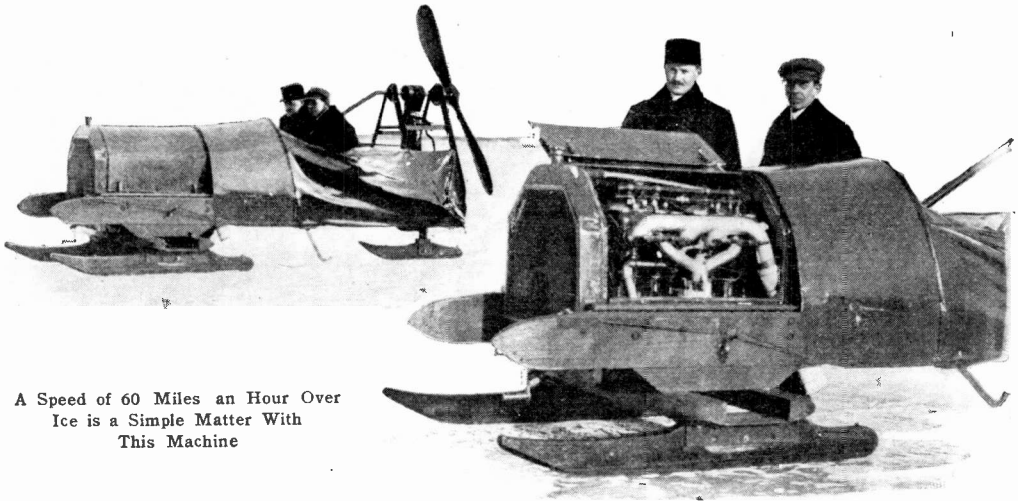
knowing how fast his aeroplane was speeding, he could very easily estimate the distance of any point on his map from Texas City.

## TEACHING FUTURE ADMIRALS TO FIRE A TORPEDO

Popular interest in American torpedos has been greatly stimulated by the extraordinary efforts which the United States government is now making to safeguard the secrets connected with this agent of destruction. At the behest of the Navy Department, Uncle Sam has even gone so far as to seek the aid of the courts to prevent a private manufacturing concern from supplying torpedos of the American design to foreign powers or from divulging any of the details of design of the torpedo or the tube from which it is fired. Another evidence of the new estimate of importance now placed upon torpedos is found in the circumstance that the midshipmen at the United States Naval Academy—the future officers of our navy—are now given very thorough instruction as to all the details of torpedo manufacture and are also required, in the course of their four year instruction course, to do considerable practical work in handling and firing torpedos.



Instruction in Torpedo Fire



A Speed of 60 Miles an Hour Over Ice is a Simple Matter With This Machine

### ICE MOTORING BY "AEROPLANE DRIVE"

Where the ice is thick enough to risk a heavy automobile chassis the accompanying photographs show one method of satisfying the seeker after thrills of the fast and exciting variety. The two gentlemen shown are of a mechanical bent and contrived the ingenious motor sled here illustrated. The chassis was placed upon stout runners and an aeroplane propeller rigged up on the "stern."

Inasmuch as the engine is very powerful it will drive the sled across the ice at an amazing rate. On account of weight the sled is slow in picking up speed but 60 miles an hour is a simple matter on the

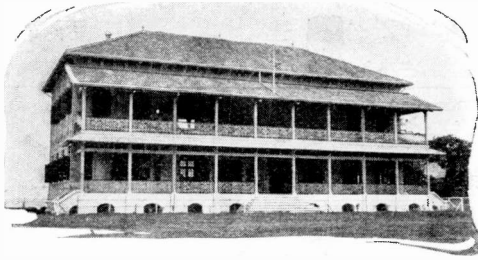
long, smooth stretches. An "L" shaped "foot" protrudes from the bottom and serves as an effective brake.

### 3,000 MILES BY AEROPLANE

The most popular aeroplane pilot in Europe is certainly Brindejone des Moulinais, who succeeded in making a most remarkable flight of 3,000 miles and over. Starting from Paris, he passed by a number of European capitals, Berlin, Warsaw, and St. Petersburg, then crossing the sea to Stockholm and returning by Copenhagen and The Hague, to Paris. The event attracted much attention and this view was taken when the air pilot was preparing to start off on his trip.



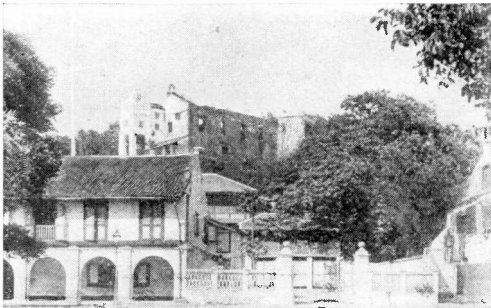
Preparing for the Start Near Paris



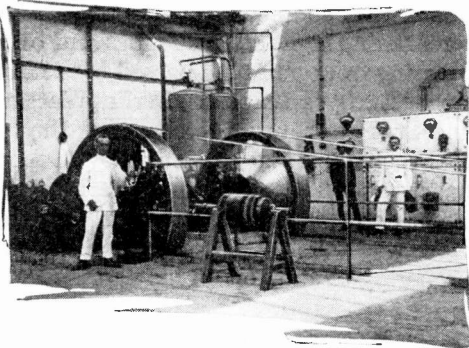
Malacca Club Building



Electric Plant of Malacca



Old Dutch Ruins



Engine Room



Malacca Business Street

### MALAYS ENJOY LIGHTS

We are indebted to Mr. P. M. Robinson, an electrical engineer in Singapore, for the description and pictures of the first electric light and power plant installed in Malay Peninsula. It serves the town of Malacca which though small is now growing rapidly on account of the rubber industry.

The site of the plant was originally a coconut plantation. One of the first precautions taken was to secure a substantial foundation and to do this it was necessary to use a good deal of piling on account of the nature of the soil.

The roofs of some of the buildings are of concrete and as a consequence their interior is quite cool even in the hottest weather. Metal filament lamps are used to light the plant which is capable of furnishing 87 horsepower and while this seems small by comparison with the larger city plants of this country it is ample at present for the needs of Malacca.

The current is distributed over a three wire system of bare copper wire carried on steel poles. There are no underground cables whatever even in the center of the town, for such an arrangement would cost too much. As Mr. Robinson states: "Not only is the cost of the insulated cables much higher than that of bare wire but the labor involved in breaking up streets and laying insulated cables would be very heavy and the cost of connecting consumers is also a heavy item, especially along the main street of the town, since



the shops are numerous and small. With underground cables it is necessary to break up the street for every consumer in order to run an underground cable into his house from the main and in addition, underground joint boxes have to be provided. In this part of the world where deep open drains run down each side of the road, the cost of getting a supply into a small consumer's premises is often out of all proportion to the value of his load.

"The price at which current is sold makes lighting by electricity much cheaper than by the various petrol and kerosene lamps with which most of the houses were previously illuminated and the Chinese and European residents are very quickly appreciating the advantages of the new illuminant."

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### AN AERIAL SEESAW

A working model of a device aiming to put into practical use latent amusement opportunities in the aerial cable conveyor was lately exhibited on the Pacific Coast. It consisted of two towers, set apart, with a cable stretched between them upon which a car or captive aeroplane traveled. The cable supports at each tower were movable and under the electrical control of an operator through an interesting system of pulleys.

The operator, by manipulating a keyboard with his fingers, could raise one end of the cable while allowing the distant end to remain or lower, or even rise, as he chose. Variation of the incline of the cable could thus be readily brought about, which, in turn, permitted the cage suspended thereon to travel under the force of gravity down the slope formed. A zig-zag course of varying length and speed could also be given to the car. A claim of 1,000 feet in length of cable for every 100 feet in height of towers was made. The only energy used was that of varying the incline of the cable or raising cable and car to desired heights.

The affair was called a "5 in 1 Opportunity," the opportunities being: an-



Model of the Aerial Car

chored aeroplane amusement device; aerial carrier for excavating purposes; aerial ferry system for crossing canyons and rivers; improved aerial ore carrier, and towers for wireless telegraphy use.

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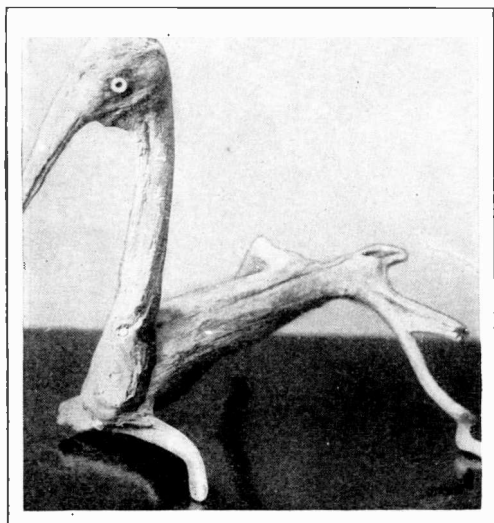
### CUTTING EXPENSE OF FIRE FIGHTING

In a recent discussion of the value of electrically operated fire fighting apparatus, Chief Clancy of the Fire Department of Milwaukee, Wis., is reported to have said, "Electricity is an essential factor in fire fighting. Without it in a city of any size the department would be almost useless. The great use of electricity in the department to-day is in its cutting down of expenses. Electric engines are now taking the place of the heavy steam engines whose cost of maintenance is enormous. The engines of the Milwaukee department, which are kept under steam the year around, consume two tons of coal every month while they are lying in the buildings."

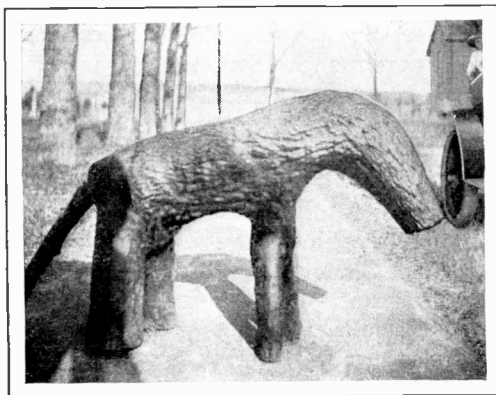
### NATURE TAKES UP ART

Occasionally Nature takes up art as a side issue as is well shown in the accompanying pictures.

The first is a piece of tree found by Hunter Thompson in the Maine woods



It Looks Like a Crane



The Elephant Limb

and in part resembles the neck and head of a crane. The only thing that has been added to it is an artificial eye. The body has four legs and a tail. This freak is now on exhibition in a private museum in Skowhegan, Me., as is also another, a part of a willow tree which has the form of an elephant, even to the tail. The four legs

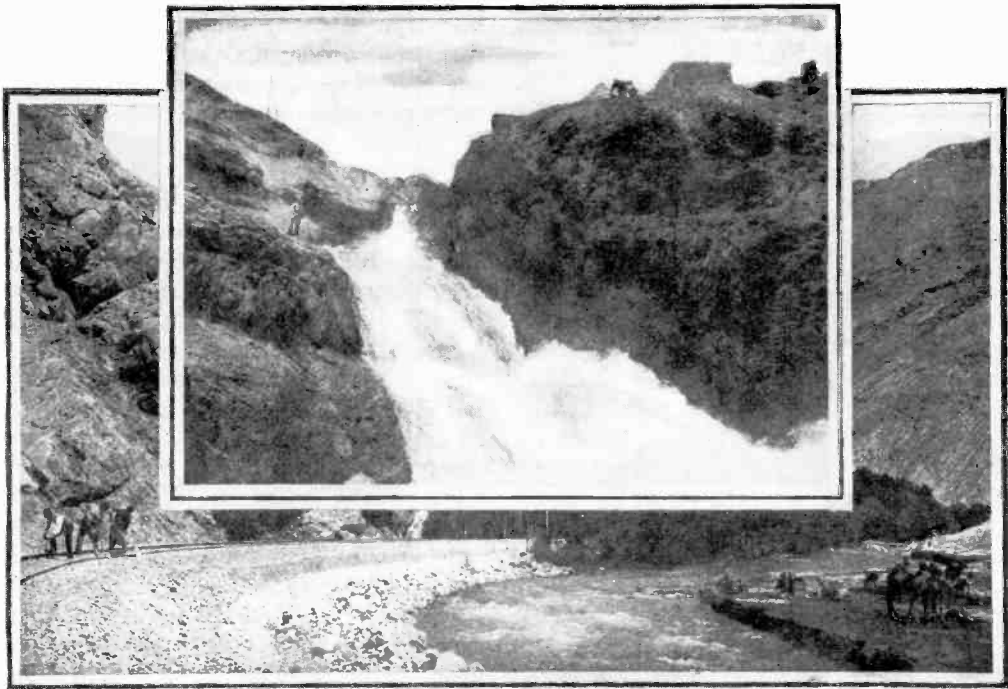
are nearly perfect and the whole make-up of the freak elephant attracts a great deal of attention. It is owned by Sewell W. Smith. The tree from which it was taken was nearly 100 years old and this was one of the main limbs, the tail having grown from another limb and being obstructed grew to the limb forming the elephant body when the tree was younger.

### WATERPOWER FROM THE FOOT-PRINT OF ABRAHAM

Few hydraulic plants draw water from a source comparable in origin to that of the spring from whose flow the installation which supplies Damascus with electricity derives its power. Four thousand years — or thereabouts — ago, so local tradition has it, the patriarch Abraham, the founder of Judaism, was wandering about the Syrian desert at the head of his tribe like any other nomad sheikh. Chancing to camp one night in a narrow, rock walled valley on the eastern slope of what are now called the Anti-Lebanon mountains, he was much chagrined one evening to find that the trickle of a stream which usually meandered down to the desert at that point had dried up in the summer heat. "I will pray for the Lord to give us a spring here that will never run dry," the patriarch exclaimed and after a few moments of silent supplication, he stamped violently upon the ground with his sandaled foot. Forthwith there sprang up a fountain of clear, cold water which, flowing a stream of the width of the height of ten men, has never flowed less from that day to this.

Though one may hesitate to believe all of the story of its divine origin, there is no doubt that the fact that this magnificent flow of water coming out of the earth at this point is directly responsible for there having been a city on the site of Damascus for a longer time than any other city in history.

This one spring has supplied all the water used by Damascus' two or three



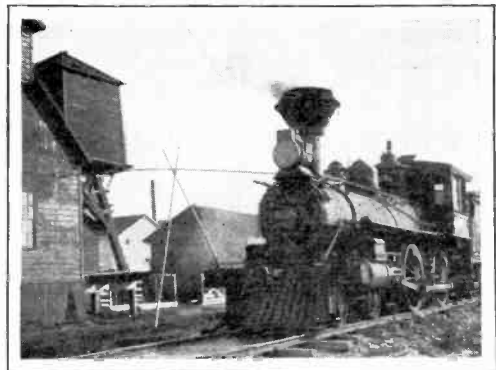
Fall near the Spring Which Arises from the Footprint of Abraham. The Power is Developed, Farther Down, to Furnish Damascus With Electricity

hundred thousand people for close to two score centuries, and for the last four years — through the installation of a hydraulic plant at a fall near its source — it has added electricity for light, manufacture and transportation to its gifts. On the completion of an extension of this hydraulic project, work on which is now in progress, sufficient power will be available not only to run a much extended trolley system, but to operate two lines of railway for 50 miles in each direction from Damascus as well.

### LOCOMOTIVE ASSISTS OVER- WORKED CANNERY

The present run of salmon in Puget Sound bids fair to break the record and the canneries are running night and day in their endeavors to take care of the fish daily brought in from the salmon traps. At the big Port Townsend cannery so much additional machinery has been added to take care of the catch that the

boilers of the plant have been unable to respond to the extra demands. In the dilemma an old locomotive of the Port Townsend Southern R. R. has been levied upon, and every minute she can spare from her run is spent in generating steam, which is piped into the cannery. With this timely aid, thousands of fish are being prepared which would otherwise go to waste through the inability of the canners to care for them.



Locomotive Supplying Steam

### PRIMITIVE FIJIAN "WIRELESS TELEGRAPH"



A Fijian "Wireless" Operator

The natives of the interior of two or three of the largest of the Fiji islands probably are able to do as much in the way of signaling as any primitive people, their messages being sent from village to village by means of blows struck upon hollow log drums. These drums are usually set over holes in the ground, half filled with water, and though their booming notes are rarely audible to an European at over three or four miles, the trained ear of a native will count them off readily at ten and more.

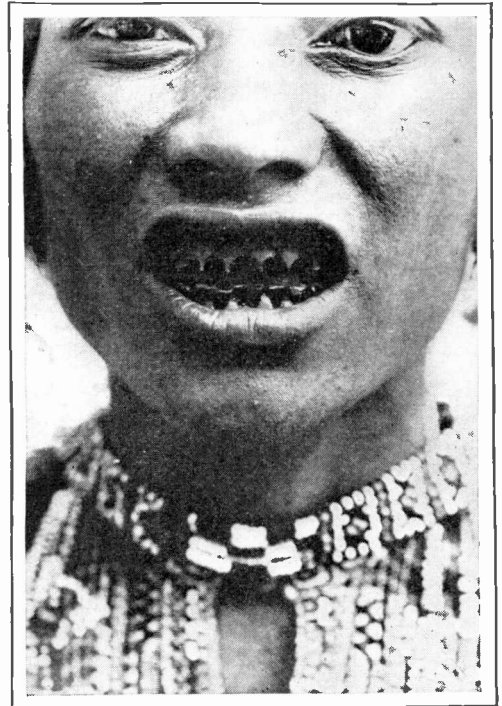
### SCHOOL OF PRACTICAL ARTS

The school department of Boston is to inaugurate a school of practical arts, in the Roxbury district in which electric apparatus and appliances will have a conspicuous part. A house which adjoins the new school building is being remodeled and made into an "all-electrical" school of home making. Basement,

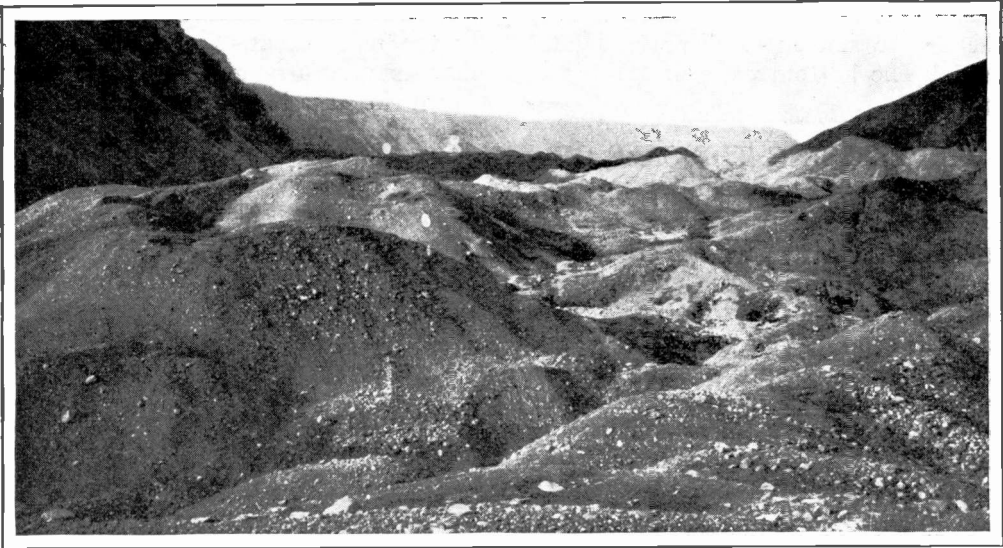
laundry, kitchen, dining room, living room, bath room and bed rooms will be equipped with the most improved electrical domestic apparatus.

### A PHILIPPINE BELLE

The lady in the photograph is a native Visayan belle of the Philippines. She is very proud of her necklace and shoulder covering of beads, but far more of her beautiful, filed teeth. This decoration of the teeth is a practice among a number of tribes of the Philippines and accounts for the teeth stumps which most of the women have later in life, after the sharp points have broken off. The young girl in the photograph is just at the marriageable age, in fact the teeth are filed in order to enhance the beauty and attractiveness of the girls so as to procure them excellent husbands. As it happens there are no future dentist bills to be contracted for the husbands to pay.



She is Proud of her Filed Teeth



Debris Left by the Kotsina Glacier in Alaska

### THE TRAIL OF A GLACIER

The millions of tons of sand, gravel and dirt filling the valley shown in the photograph to a depth of several hundred feet gives a graphic conception of the enormous scouring force of a glacier. All this vast volume of material has been ground off the mountain side and brought down the valley by the comparatively small Kotsina Glacier in Alaska. A glacier is not snow, but ice; it is snow which has been partially melted and then compacted under great pressure, so that as it moves slowly down the valley or mountain side it is a practically solid mass of ice from 50 to several hundred feet deep. It naturally tears loose and picks up anything which happens to be in its way. The present picture shows what has been brought down the valley and left by the glacier, which has retreated half a mile from this point.

### ILLUMINATED HOUSE NUMBER

This combined porch light and house number sign was devised by Charles M. Retts, a contractor at Tropic, Calif. This sign is shaped like a small shed or house, having slanting roof, overhanging

eaves, etc. It has a length of ten inches and a width of four and a half inches. At the front edge it is six inches in height and at the rear its height is eight inches. The framework is made of lacquered brass, while the frosted glass at the front, ends and bottom rest on the inside of this framework. The roof is of brass and extends at the front about an inch and a half over the framework and at the ends about an inch. The figures are five inches tall and can readily be distin-



Combined Porch Light and House Number

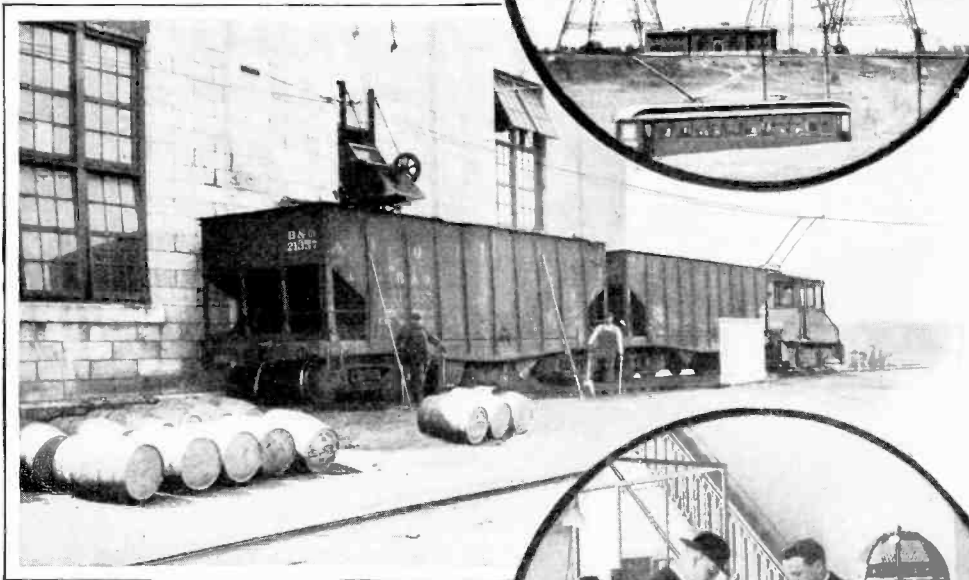
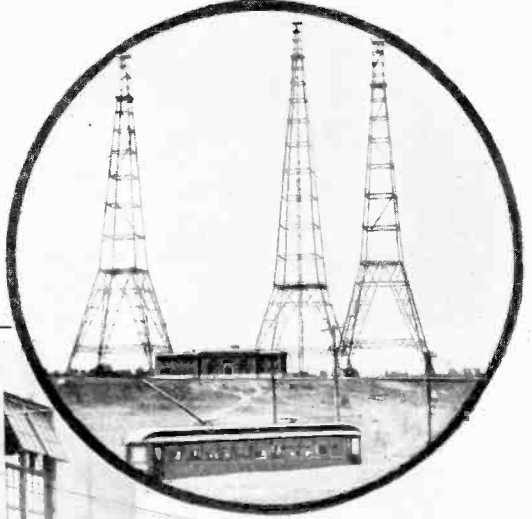
guished at a distance of 100 feet. In this sign a sixteen candlepower light is used. The bottom piece of glass is removable.

### ADVERTISING THE SALE OF CURRENT

The young men who are selling electricity in this strenuous age are not surpassed in resource and ingenuity by the business getters in any other field. Particularly are the "live wires" of the sales and promotion departments of our various American electric power companies to be given credit for the manner in which they are employing every known form of advertising to bring home to the

and reels furnished them, as is the custom, by the manufacturers of electrical appliances and arranging to have these shown in the regular motion picture theaters. However, the young men of

Most Powerful Wireless Station in the World



Electric Locomotive Switching Coal Cars

### EXAMPLES OF LANTERN SLIDES USED IN PUBLICITY WORK

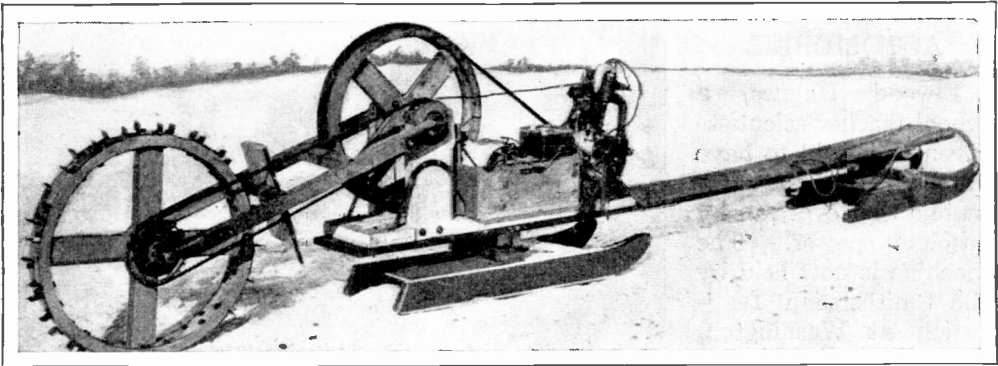
average householder the benefits and economies of electricity and the full meaning of the word "service" in an electrical sense.

Within the past few months electric power companies in any number of cities large and small have been using lantern slides and motion pictures in an advertising way — usually employing slides



Leads him Finally to Sign an Application for Electric Service





Auto-Sled

one power company — the Potomac Electric Power Company at Washington, D. C.— have gone one better and have worked up a full fledged illustrated lecture of their own which is being repeated nightly throughout the company's territory with most gratifying results in the matter of new business created.

The whole plan is a young men's proposition, and the beauty of the scheme is that it can be worked without any outside assistance. The advertising manager of the company delivers the lecture; an engineer, whose special hobby is motion pictures, operates the projection machine which the company bought for this purpose; and he has for assistant a solicitor from the regular outside staff who is repaid for an evening's work by the new customers or "prospects" he always gets through the interest aroused by the entertainment and the questions invariably asked at its close.

These volunteers in the free lecture field have a lecture that occupies about one hour and a half and in the course of which they display two full reels of motion pictures and 60 or more slides. Electrical manufacturers outfitted them with some of their lantern slides and the others they had specially made in order that they may illustrate electrical activities in the immediate territory where their operations are conducted. One reel of moving pictures is made up of comedy of travel subjects in order to put the audience in a good humor at the

outset but the other reel is given over to a very convincing presentation of how a young married couple solved the problems of housekeeping by the introduction of electric appliances.

Ultimately this lecture will be given in the city but thus far it has been given only in suburbs and small towns in Maryland, the Potomac Company supplying current to dozens of small communities in a radius of more than 25 miles. In these small places the delivery of the lecture in the local town hall has invariably been the local event of the period and sometimes has been followed by a demonstration of the various electric cooking, heating, cleaning and other devices which have been pictured and described in the lecture.

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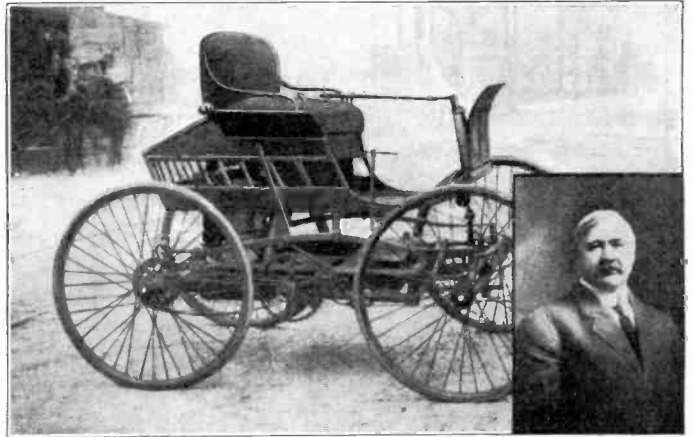
### AN AUTO-SLED

A. Arthur Jewett of Skowhegan, Me., has perfected a double runner motorcycle combination. He removed the engine from a regular motorcycle and mounted it on the rear end of the sled. The engine is belted to a large pulley on a countershaft and the latter is connected by a sprocket and chain to the driving wheel. The driving wheel is set in the rear end of a movable frame and pivoted so that it rises and falls readily to cover inequalities in the road. The rim of the driving wheel is studded with sharp steel calks to afford a grip upon the snow. Mr. Jewett gets a speed of 20 miles per hour.

### FIRST GASOLINE AUTOMOBILE

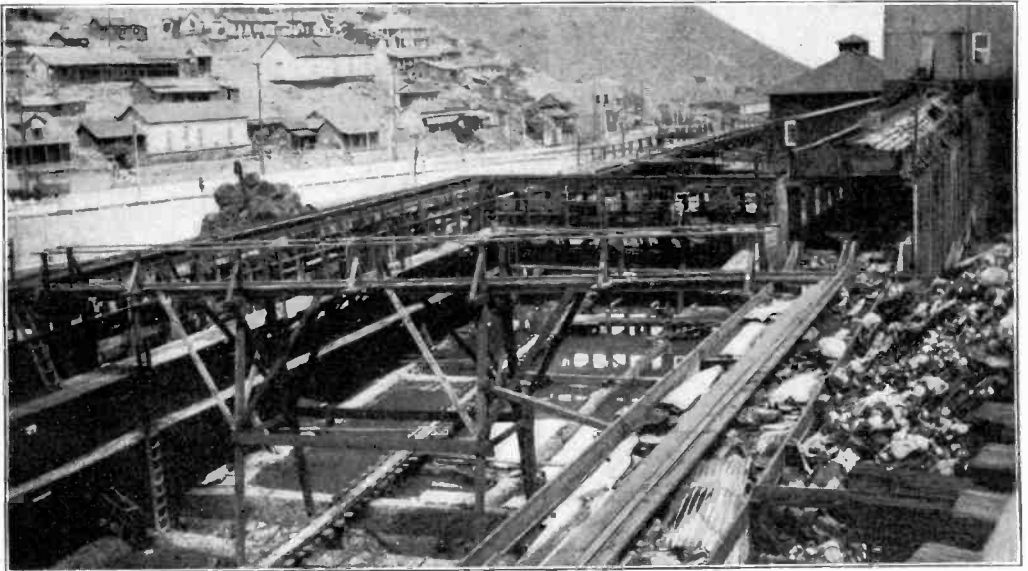
Elwood Haynes, a school-teacher-scientist-inventor is said to have hatched the first automobile that ever ran by gasoline power. The machine is now held by the Smithsonian Institution at Washington, D. C.

Haynes began in 1891 to prepare drawings for a "horseless carriage." Of course, he was laughed at and the project was voted by his friends as "only another of the vagaries of that teacher-scientist," but Haynes kept plugging away at his dream and in 1892 got his batch of plans so worked out that they seemed to dovetail. He moved over to Kokomo and went at the building.



First Gasoline Automobile and Its Builder—Mr. Elwood Haynes

On July 4, 1894, to the inspiring ejaculations of a mob of boys, loafers and unidentified bipeds, the first gasoline automobile was made to go. It was stylish, compact and light appearing—they thought then—and in repeated trials would do its  $6\frac{1}{2}$  miles an hour.



### OLD CANS RECOVER COPPER

This view shows a plant in Bisbee, Ariz., where tin cans and other junk are made to recover the pure metal, worth about fifteen cents a pound. This is done without machinery or labor and by the simplest process; just by allowing water to flow over the old iron. But the water is heavily charged with copper, pumped from a near-by shaft, and the iron is gradually replaced by the red metal, through electrolytic action.

### PORCH SETTEE FROM AN OLD AUTO SEAT

By having your blacksmith secure four strong chains to the four corners of an old automobile seat, a very comfortable



A Comfortable Porch Settee

settee can be made. It is designed to swing from the roof of the porch or the beam of a pergola and forms a luxurious resting place.

### ELIANITE, A NEW ELECTRIC FURNACE PRODUCT

For a number of years experimenters have been busy trying to produce metallic alloys which will be resistant to the action of acids. The electro-chemical works at Rossi in Legnano have recently succeeded in producing such an alloy cheaply. They call their product, "elianite."

The alloy itself differs from similar alloys in that its resisting power is not

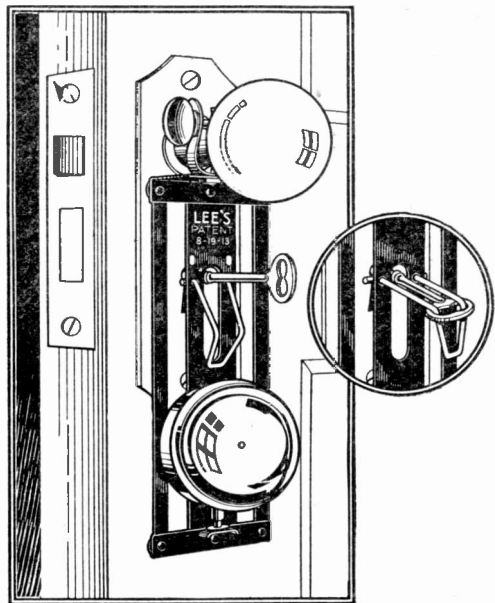
limited to certain acids, but is fairly resistant under ordinary conditions to all the common acids. It is a very good conductor of heat. This alloy will probably find a use in the manufacture of nitric acid from the air. The manufacturers have kept its composition secret.

### TURN OF KNOB SOUNDS ALARM

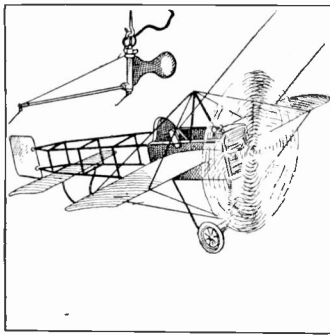
A burglar alarm which responds the moment the door knob is turned, and without waiting for the door to open, is here illustrated. The device is a rectangular steel frame attachable to the door knob by a collar and thumbscrew and carrying at its lower part a bell operated by a key-wound spring. With the device in place, the instant the knob is turned the loose jointed frame is by its own weight and that of the bell slightly twisted which releases the bell spring and rings the bell until the spring is unwound. The alarm is reset by winding.

Attached to the frame is also a key holder which prevents the key from turning or being pushed out from the outside.

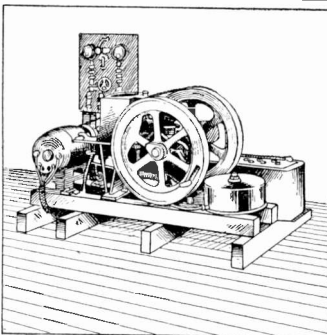
The device is patented by C. F. Lee of Chicago.



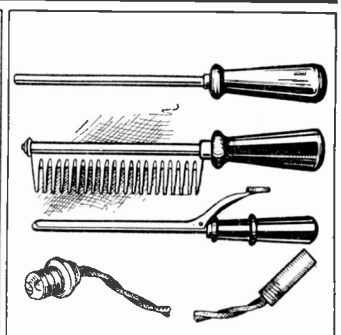
Door Knob Burglar Alarm



Miniature Electric Driven Aeroplane



Compact Farm Lighting Plant



Comb Hair Drier and Set

## NEW WAYS OF USING ELECTRICITY

### COMB HAIR DRIER AND SET

A combination of useful articles for caring for the hair is included in the home hair drier set, which consists of a hair waver, a comb and a curling iron.

After the shampoo one need not be made uncomfortable for any length of time by wet hair, for while combing the hair the electrically made heat from the comb dries the hair almost immediately, and there is not enough heat to scorch or cause the hair to stick to the comb. The hair waver can be used often without injury to the hair, while the curling iron is so regulated that an even temperature is maintained while it is in use.

A good length of silk covered wire, equipped with a plug at one end to attach to the electric light socket and with a similar device at the other for plugging into the handle of any of the devices, is provided.

### MINIATURE ELECTRIC AEROPLANE

Taking advantage of the universal interest in flying machines one manufacturer has placed upon the market a miniature electric aeroplane driven by electricity for use in show window advertising displays. Aside from its perfect construction as a small Bleriot model the aeroplane is equipped with a special small motor and an aluminum propeller.

The device is suspended from a swiveled counterbalance by means of two conducting wires which carry current to the motor. In operation the aeroplane gradually swings away from the center and soon travels in a circle which can be regulated by the length of the suspension wires and also by the speed of the motor. Placed on the floor it will make a very realistic flight and land when the current is turned off.

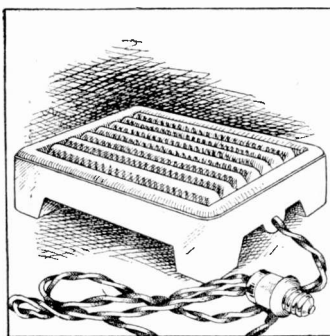
When used for window display, it can be run intermittently by means of a suitable flasher. The conducting wires are scarcely discernible when a dark background is used. It is practically noiseless and will run continuously with little or no attention. Conducting wires 30 feet in length are supplied with the device.

### FARM LIGHTING PLANT

Electric light in the farmhouse, in the barn, in the milk house and in other buildings on the farm saves steps and time; and besides this, power may be had for the shop, for churning, grinding feed and for doing a score of other things where power is needed.

A small, compact plant consisting of a gasoline engine, dynamo, battery and switchboard like the one shown will afford this luxury at moderate cost.

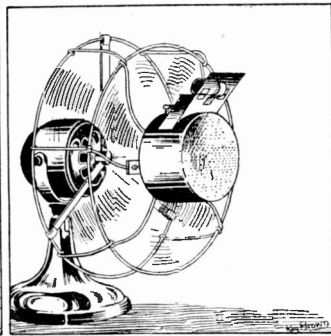
The Aplco house lighting equipment is compact and convenient. It is all mounted on one base, weighs 360 pounds and



Convenient Cooking Utensil



Blue Monday Killer



Disinfecting Attachment for Fan

occupies a floor space of 38 by 21 inches and is 30 inches high.

The engine develops  $1\frac{1}{2}$  horsepower, and has an extra pulley for driving other small machinery, such as a churn, cream separator or small water pump.

Sixteen eight candlepower carbon lamps or eight sixteen candlepower lamps can be lighted three hours, eight eight candlepower lamps or four sixteen candlepower lamps for seven hours, direct from the battery. Twenty to 25 sixteen candlepower lamps may be lighted continuously with the dynamo running, but as this number of lights is seldom if ever required at one time, the current for the average number of lights used may be taken from the battery alone.

It will be understood that only the lamps that are burning consume current so that the battery will have ample capacity to light the average of four or five lamps that will be in use in various parts of the premises during the evening or early morning for several hours.

### CONVENIENT COOKING UTENSIL

The sweetest, most palatable toast is that made upon an electric toaster. The National toaster stove here shown, however, is more than a delicious toast maker. It is a stove. It will fry, boil, stew and warm with ordinary cook stove utensils. It is made for convenient service on the dining table or sideboard. Besides its use for ordinary cooking, it is

an excellent device for preparing a late evening lunch in your room after the theater. It is also convenient for light housekeeping. When traveling it can, on account of its compactness, be stowed away in a corner of a suitcase and is ready for service by simply attaching to any light socket.

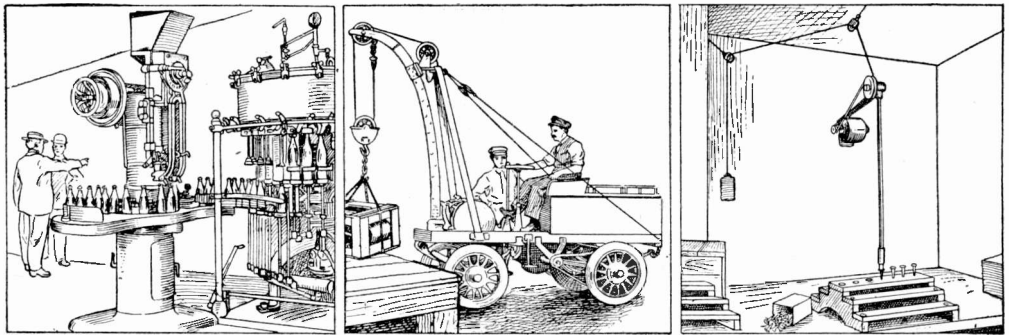
### AIR CURRENTS CARRY DISINFECTANT

Any ordinary electric fan may be converted into a disinfecting apparatus by the use of an attachment that may be readily mounted upon the guard wires in front of the fan.

The attachment consists of a container of brass holding a large wick which projects from a wide mouthed spout. Just as the oil creeps up into the wick of an oil lamp, so the liquid disinfectant follows the wick provided up to the open spout where the blast of the fan carries particles of it out into the air. The device is useful for hospitals, moving picture shows, railway cars and other public places.

### BLUE MONDAY KILLER

The Imperial electric washer makes wash day an easy one. The body is made of copper to a point above the water line and all parts above that may come in contact with the water are made of brass. The cylinder which is corrugated on the inside reverses every revolution, thus



Bottle Capping Machine

Battery Truck Freight Handler

Electric Driven Screw Driver

continually lifting the clothes and letting them slide down over the washboard surface, taking out the dirt and allowing it to settle to the bottom of the tub. The wringer is of the reversing type and operates very quickly, and is also arranged to release the pressure upon the roll as a safety precaution. A lever controls these operations. Another feature that commends the machine is the covering that encloses all of the moving machinery. The motor on the base connects by a belt with a driving shaft one end of which is equipped with a pulley so that the motor may be used to drive a mangle, ice cream freezer or other small machinery.

#### ELECTRIC DRIVEN SCREW DRIVER

An electrically driven screw driver which will be appreciated by boat builders, etc., is so arranged that pressure operates the driver by friction, and when the screw has been turned entirely in, the friction is relieved. The moment the pressure is released, also, the driver stops. This quick acting device saves an immense amount of time where a large number of screws have to be driven and the amount of current taken by the small motor, which operates the device, is insignificant. The equipment is also made up so that friction may be applied by means of a breastplate, just as one would operate a breast drill. The power is transmitted to the screw driver by a flexible shaft.

#### CAPS 100 BOTTLES A MINUTE

The great increase in the making and consumption of bottled beverages has resulted in the building of electrically driven machines for doing many of the operations in this field, among them being a machine here shown for attaching the crown caps upon bottles. This device caps 100 bottles a minute and does not require an operator as the bottles are fed directly from the filling machine to the capping device.

While this apparatus may be operated by any other power, nine out of every ten machines shipped from the factory are by order equipped with individual motor drive.

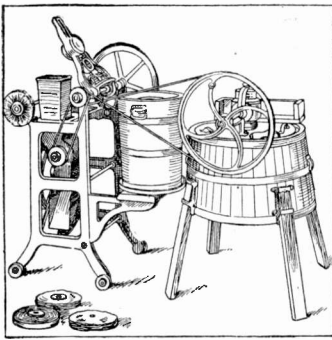
#### FREIGHT HANDLED BY BATTERY TRUCK

The modern freight handler is a four wheeled truck carrying a strong, iron arm and operated by electrical energy from a storage battery.

One man seated on the truck can pick up and transfer the heaviest kind of freight with no more expenditure of his own energy than is necessary to turn the steering wheel and operate a foot or hand lever.

Carefully kept records show a saving of from seven to ten cents per ton in freight handled this way over the man or man-and-horse method and when the end of the month comes there is no horse feed to pay for nor barn rent to consider.

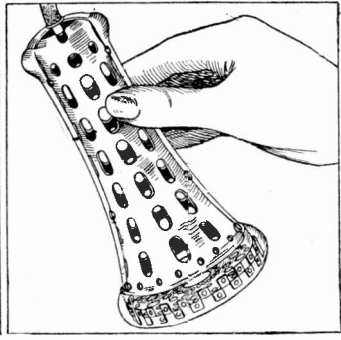




Household Power Plant



Minute Water Heater



Unbreakable Telephone Receiver

## HOUSEHOLD POWER PLANT

The use of electricity in the home makes possible a small power plant, so to speak, which may be moved about the house to perform various laborious tasks.

The Dana plant is built on a frame set upon rollers so that little effort is required to move it about. It will operate the ice cream freezer, crush ice, run an emery wheel, silver polisher, buffer and shoe cleaner and is arranged to belt to any washer that has a flywheel, though the equipment includes a washing machine if desired.

Ice is fed into the hopper at the top of the machine and as crushed ice is caught in a bucket at the spout on the side of the machine. Kitchen tools can be kept sharp on the emery wheel, and by substituting a buffer, knives, forks, spoons, trays, etc., may be polished.

## MINUTE WATER HEATER

The Minute water heater will heat enough water for a shave in 20 seconds.

A cup of water may be heated hot enough for most purposes in one minute. A cup of bouillon or beef tea can be prepared in less than two minutes, anywhere that current is available. The small cubes of extract which may be had from any grocer or druggist are recommended for this purpose.

The dentist finds this a handy device for sterilizing his instruments. It works

so rapidly that no time is lost, and the water may be changed frequently.

The doctor finds it convenient for sterilizing his instruments in homes without going to the kitchen, or trusting some one, inexperienced, to do it for him.

The heating element is perfectly insulated from the exterior parts so that there is absolutely no danger of receiving a shock.

In order to make it heat rapidly, heater is made in the form of a ring, to offer the largest heating surface to the liquid.

## UNBREAKABLE TELEPHONE RECEIVER

The ordinary desk telephone set is quite liable to injury should it fall to the floor or receive a hard blow, the receiver and mouthpiece, which are both of hard rubber, being the parts most readily broken.

This weakness has been remedied in the construction of the Kellogg steel reinforced receivers and mouthpieces.

The receiver shell for example in these instruments is built in size and shape exactly like the standard type but throughout in the rubber is a metal skeleton frame. The rubber insulation, by means of special machinery, is forced around this steel frame and between the ribbed openings. The receiver cap is reinforced in a similar manner with a metal perforated disk flanged at the circumference.

# Electrical Men of the Times

DR. EDWARD B. ROSA



His Reserve and Studious Instinct Suggest the College Professor

Several important developments, now impending in the electrical field, will combine to give especial prominence during the next few months to Dr. Edward B. Rosa, the chief physicist of the National Bureau of Standards. As chief of the electrical division of that governmental institution which has latterly done so much for electrical science, Dr. Rosa is already well known by repu-

tation to most persons in the electrical field, but Uncle Sam's program for the immediate future promises to give him a yet more conspicuous place in the public eye.

Mention may be made first of Dr. Rosa's new responsibilities as director of the new electrical laboratory of the National Bureau of Standards. The electrical work at the Bureau has grown

more rapidly in scope and volume than any other class of activities. The result has been that the activities connected with the accurate measurement of electrical quantities, the study of electrical resistance, the investigation of electric current and electromotive force, the testing of electric instruments, etc., have overtaxed the capacity of the quarters originally assigned for electrical work and consequently are now distributed among all the four buildings of the Bureau — an arrangement which is neither economical nor convenient.

Some months ago, Congress appropriated money for a fine new laboratory building to be devoted exclusively to electrical work and which would permit the concentration under one roof of all electrical interests. This structure — the fifth building in the notable group in the outskirts of the capital city — is now nearing completion and Dr. Rosa will soon soon be called upon personally to direct its occupancy and to map out electrical research on an enlarged scale.

Another turn of affairs that brings Dr. Rosa into the light of publicity is his selection to conduct the special investigation recently ordered by Congress on the subject of the dangers to life and property from electricity. The object of this probe of the electrical industry is to seek means of safeguarding the lives of electrical workers just as Uncle Sam has in recent years been devoting so much attention to the subject of lessening the number of accidents and reducing the death roll in our coal mines.

He proposes to go to the very bottom of the subject by studying the construction of electrical apparatus and approved practice in its installation, passing in due course to all phases of wiring operations and to the systems of inspection in vogue at various plants and in various cities, the object of the comparisons of methods in different quarters being to bring about standardization.

Like so many of the big men in the electrical world, Dr. Rosa is quiet and

unassuming in manner. His reserve and studious instinct suggest the college professor and the impression is amply justified by a review of Prof. Rosa's career. A native of New York State, his boyhood was spent in the vicinity of Wellsville, N. Y., where at a private school he prepared for college. In due course he graduated from the Wesleyan University at Middletown, Conn., and then took his Ph. D. course at Johns Hopkins University in Baltimore. Taking up his life work he was for a time an instructor at the University of Wisconsin and was then made professor of physics at Wesleyan University, in which position he continued for several years or until about the time he went to Washington to form that connection with the then newly established Bureau of Standards which has gradually brought him such prominence.

But for all the earlier influence of the college viewpoint there is naught of the impracticable in this energetic man of 50 who is in charge of Uncle Sam's special department of theoretical and applied electricity and electrical measurements. This has been conclusively proven to the satisfaction of the manufacturers and others who have come in contact with him through his responsibilities at the National Bureau of Standards and as secretary of the International Committee on Electrical Units and Standards. Particularly is it fortunate for the electrical industry that a man who thus combines the practical with the theoretical is to make whatever recommendations may be presented for remedying existing dangers in the electric field. Any ill-advised expedients for safeguarding the life and limb of the electrical worker would be liable to involve heavy expense with very doubtful benefit. But Dr. Rosa's verdict ought to have weight, not only with Congress but with the public service commissions in all parts of the country that have authority to promulgate electrical regulations.—WALDON FAWCETT.



# Electrical Interests of Women



EDITED BY GRACE T. HADLEY

## THANKSGIVING DINNER

"In these days of rapid transit by sea as well as by land, the markets of the world are brought almost to our very doors and we have a hundred combinations to our grandmothers' one. We therefore receive our guests more formally; we make preparations for their com-



ing and take pleasure in giving them a meal which shall vary from the humdrum order of culinary production."

### MENU

OYSTERS WITH SHERRY  
 THANKSGIVING SOUP      POPPED CORN  
 ROAST STUFFED TURKEY      BROWN GRAVY  
 SWEET POTATOES À LA BEMENT  
 BOILED ONIONS  
 TURNIP CROQUETTES      CRANBERRY CONSERVE  
 CHICKEN PIE  
 CHIFFONADE DRESSED LETTUCE  
 PURITAN PUDDING      FOAMY BRANDY SAUCE  
 MINCE PIE      PUMPKIN PIE  
 NUTS AND RAISINS      ASSORTED FRUIT  
 CAFÉ NOIR

—*Fannie Merritt Farmer.*

## MODERN HOSPITALITY

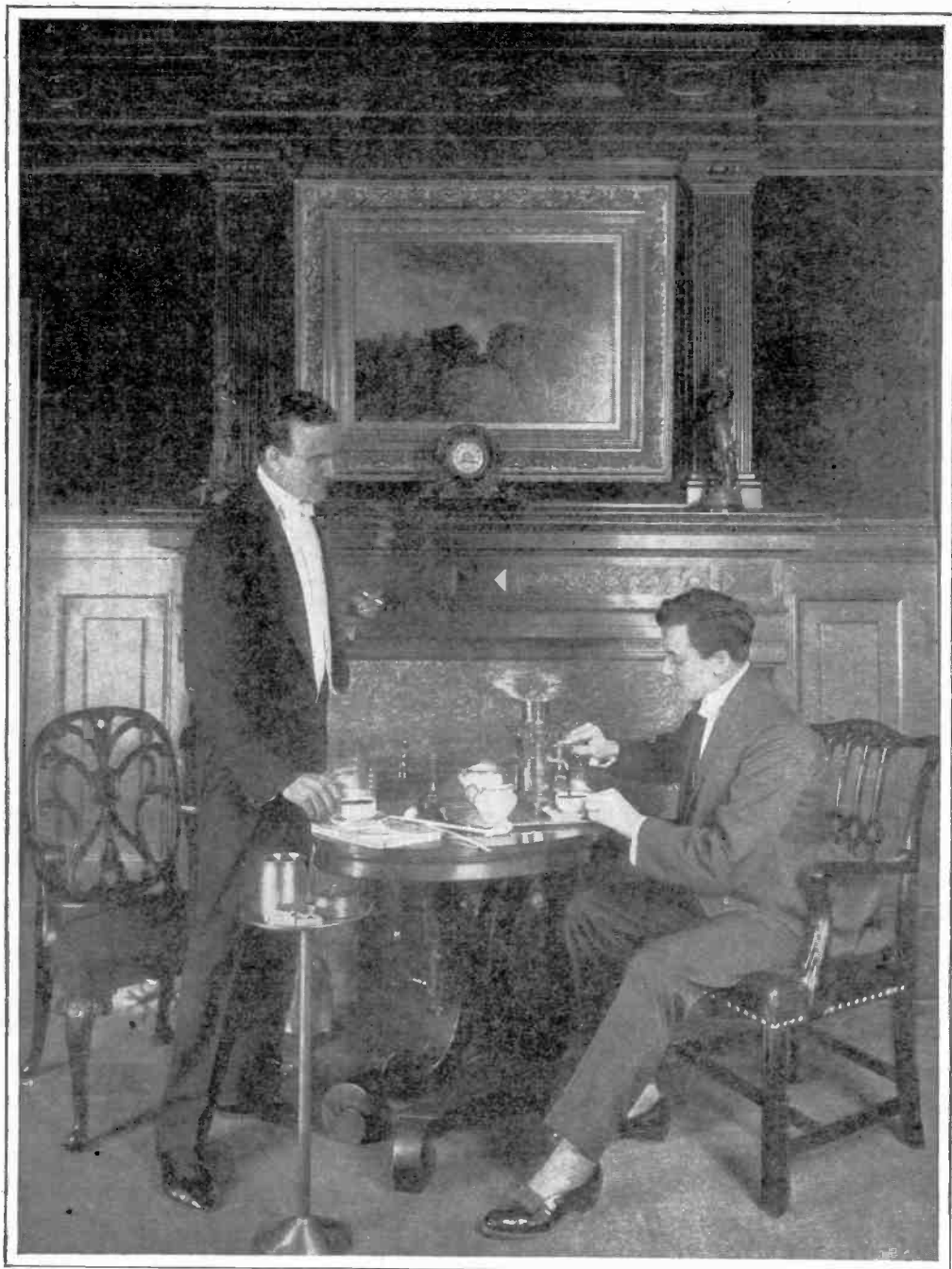
Since the cave man carpeted his cave with the boughs of trees and the skins of animals, man has sought home furnishings that would promote his comfort and please his esthetic tastes. Such furnishings have never been so plentiful or so beautiful as at the present time.

The many recent improvements in electrical appliances and repeated reductions in the cost of electricity have combined to put the use of electric current within the reach of thousands who appreciate the relief from drudgery. It is now possible to serve the after dinner coffee in the library with comfort.

Bachelors have found the electric current a positive boon in the entertainment of friends, or the husband of the house can dispense hospitality almost as gracefully as the wife, with the aid of electric appliances. The electric current eliminates the annoyance and danger of a flaming alcohol lamp.

Art in the home should be the expression of the owner's individuality. To say that every home should contain all the art which the means and taste of the owner can provide is to express a self evident truth, but art is by no means measured by money cost. Art is the human and super-useful quality of things. A savage is content to eat from a flat stone but civilized man uses a china plate and adds the higher pleasure of seeing its delicacy and decoration.

One of the many advantages of electricity is the ease with which it may be controlled; it is very desirable, therefore, to have the home equipped with a liberal supply of switches.



A Savage is Content to Eat from a Flat Stone, but Civilized Man Requires a China Plate — and Electrical Conveniences

**POT TYPE COFFEE PERCOLATOR**

"We never knew what good coffee was until we got a percolator" was the remark of a business man who depends upon his two cups of coffee as an important feature of his breakfast.

Coffee that is made in an electric percolator is as light and clear as wine and it has the pure, delicious flavor of the coffee berry. A new percolator which is simple, handy, convenient and less expensive than the more elaborate styles is just being introduced.

Water is put into the reservoir and coffee into the coffee retainer. The current is then turned on and in less than one and one-half minutes, hot water is forced up through the valve tube and sprayed over the coffee. The water trickles through the coffee, dissolves the extract and runs back through the strainer into the reservoir. This operation is kept up continuously until the coffee is of the desired strength. The current is then turned off. A pot of coffee can be made in



Pot Type Coffee Percolator

about fifteen minutes. A smaller quantity requires less time.

The heater is of a special design, projecting from the bottom of the vessel into the water. It is highly efficient, very durable and extremely simple. If always operated immersed in water, it should last a lifetime, but if for any reason, repairs are needed, new heaters can be easily installed. Connections from the heater are made to suitable terminals carried in the base of the percolator. This new utensil consumes 380 watts and has a capacity of two and a half pints of coffee.

**A PARABLE ON CLEANLINESS**

A certain lady had an electric toaster, and was more than pleased with it. She was also very careful with it and every morning after breakfast, she brushed it with a nice soft brush. This was her method, and it was perfectly satisfactory to herself. Now this lady had her mother-in-law dwelling with her, one who had been reared in the "cleanliness is next to godliness" atmosphere and who had dealt in her day with pots and pans that had to be scrubbed.

Now secretly she did not approve of her daughter-in-law's apparently lax method in cleaning the electric toaster, because she was positive in her own mind that cooking things should be plunged into boiling hot water and well scrubbed. One day, when the lady of the house was

out, she resolved to give the electric toaster the thoroughly good cleaning which she was sure it must need, so she filled the dishpan with hot water and soap suds plunged the

electric toaster into the hot suds and scrubbed it well. The next day when daughter-in-law tried to make the morning toast, the electric toaster would not toast. Daughter-in-law was in despair; finally the old lady confessed that she had given the toaster a good bath the day before but she didn't suppose that would hurt it any. In her day, cooking things always had to be scrubbed.

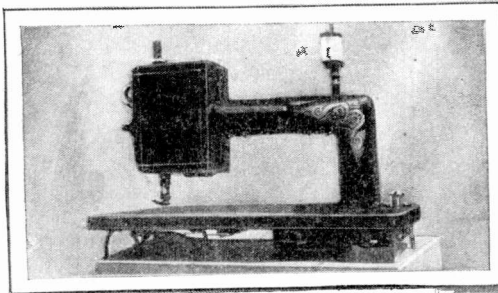
"Yes, but mother," protested the lady of the house, "don't you understand that electric utensils are different? They are not exposed to an open flame and they



do not accumulate carbon, soot, or similar deposits and they do not have to be scrubbed like the old time pots and pans; now my new electric toaster is ruined," and the lady of the house cried.

When the man of the house came home that night he endeavored to explain why the toaster was ruined:

"Energy is what makes things go; wherever a quantity of electricity exists, energy is present in the electrical form. When the electric current enters an electric cooking utensil, it encounters a resisting element, a 'resistor' that does not permit the easy passage of the current, so a powerful commotion is set up among the particles of the resistor and the utensil is made warmer because heat energy is energy in motion. Part of the resistor is placed in an insulating com-



Sewing Machine Run by Magnets

pound which is porous and absorbs water and if this is not thoroughly dry it may cause a short circuit between the two resistors, blowing out the fuse or burning off the resistor."

### MAGNETS RUN SEWING MACHINE

The accompanying pictures from photographs show the application of electricity in an unusual way to the operation of a sewing machine. The inventor's object is to substitute solenoids and magnets to operate the machine thus doing away with internal shafts and gearing. In one picture are shown

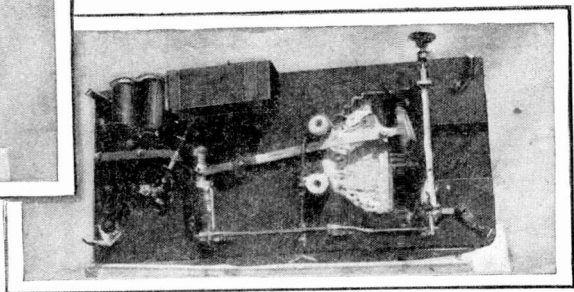
some of the magnets and bars on the base of the machine and in the other is seen the enclosure for the solenoids that operate the needle bar.

### NEW USES FOR THE ELECTRIC FAN

An electric fan in my house finds many uses other than the time honored one of cooling the air in summer.

I have an unventilated closet in which the air was always stale. Leaving the door open continually injured the clothes and occasional airings would not keep away the close smell. Now every few days I set my electric fan a-twirling in the closet and thus thoroughly air and sweeten everything at one time. I believe this has a tendency to keep moths from breeding, also.

The heat from our hot-air furnace seems loath to go into the living room.



Placing the buzzing electric fan on the register for only a few minutes will draw the heat nicely, and once the current is established the hot air continues to flow.

On the mornings when breakfast seems a bit chilly without a fire, we open the door into the warm kitchen and set the electric fan going on a high shelf in the kitchen. This blows the warm air into the breakfast room and it speedily becomes comfortable.

We achieved a beautiful effect one May-day at the crowning of our little queen. We placed a great tray of confetti in a convenient angle with the electric fan, suitably attached, behind it.

After the crowning, the current was turned on and the electric fan blew a most fairy-like shower of seeming rose-petals over the wee queen and her court.  
—MRS. H. G.

### HOME PORTRAITURE

The portable, mercury vapor lamp makes home portraiture an artistic possibility. Among many refined persons there is a very general feeling against the

ground for a portrait wherever it is personal and distinctive, and it is often desirable to embody these qualities in the portrait. Especially is this true in the case of family portraits. With the use of several portable lamps as illustrated, family groups can be successfully photographed. Wherever flash lights are objectionable, these portable outfits may be used to good advantage.

The outfit consists of two tubes within a reflector. These tubes contain vapor of



The Mercury Vapor Lamp Makes Home Portraiture an Artistic Possibility

“gallery expression” of the professional photographic portrait; a number of people object to “sitting” for their pictures in an unfamiliar photograph gallery, with its artificial properties and surroundings, and by the time they are properly posed their natural expression is entirely gone.

Now the home furnishes an ideal back-

ground for a portrait wherever it is personal and distinctive, and it is often desirable to embody these qualities in the portrait. Especially is this true in the case of family portraits. With the use of several portable lamps as illustrated, family groups can be successfully photographed. Wherever flash lights are objectionable, these portable outfits may be used to good advantage. The outfit consists of two tubes within a reflector. These tubes contain vapor of

lamp outfit includes lamp, reflector and certain electrical accessories which are compactly placed in a case; when in use the outfit is mounted on a tripod which permits the lamp to be raised and lowered within a range of from four to seven feet and to be inclined at any angle.

### CHEERFULNESS IN THE HOME

Cheerfulness in the modern home depends in a large measure upon light, plenty of natural light by day and a sensible arrangement of electric light for use at night. Evening, when the day's cares are over and the members of the household are gathered in the home circle, is the time when the home is appreciated to the fullest.

Electricity brings into the modern home not only the most hygienic, brilliant, economical and useful light but the same electricity may also be utilized in many ways which add greatly to the comfort and ease of modern house-keeping.

The many recent improvements in electrical appliances, the introduction in high efficiency lamps and repeated reductions in the cost of electric current have combined to put this great agent within the reach of thousands, who but a short time ago regarded it as a luxury for the few.

In laying out the scheme of illumination, two general considerations should be borne in mind; first, the every-day requirements, and second, the special requirements, such as the illumination needed for parties and entertainments of various kinds.

For most of the every-day needs, an economical arrangement of lights is necessary. The general illumination should not be intense, but by the use of portables strong illumination may be secured at points where needed. Sufficient candle-power must be provided, however, to give brilliant illumination when the home is open for the entertainment of guests.

### ELECTRICAL DECORATIONS

The birch bark lantern encircled with an artificial garland of autumn leaves illuminated with little electric lamps that appear to be berries, makes a pretty and



suitable house decoration for the fall months. Such lanterns have the first fundamental advantage of safety; they need no watching as there is no fire risk in electrical decorations.

“You should always be two to eat a truffled turkey. It is my invariable practice. I am going to dine off one today. We shall be two — the turkey and myself.” — Abbe Morellet.

**THE ELECTRIC HEATING PAD**

The electric heating pad is the most effective form of hot applications, because it gives a gentle, soothing heat that is continuous and even. It does not cool



Most Effective for Hot Applications

off like a heavy, leaky, hot water bottle. The heating pad is soft and flexible and can be used in any position. It is so light that it will not hurt the most sensitive flesh. On the connecting cord within easy reach is a heat regulating switch.

**BAVARIAN ROAST TURKEY**

Clean and season a fat turkey. Stuff with three raw potatoes, two apples and one onion grated. Mix with a lump of butter and one cup of bread crumbs; add one egg. Season with sage, thyme, salt and pepper, then put into a dripping pan. Pour in one cup of water and dredge with flour. Let bake in a hot oven until done.— Dishes of all Nations.

**PRACTICAL DOMESTIC SCIENCE**

A group of women who felt the importance of the work of teaching the domestic arts and sciences which was begun by the Armour Institute of Technology, Chicago, undertook to continue it when co-education was given up by the Institute. Through the kindness of Mrs. Philip D. Armour, the entire equipment of the department of domestic arts and science was acquired and with the co-operation of several women's clubs, the present school of domestic arts and science was established in the central business district of the city.

An interesting feature in connection with the work of the training class is the daily cooking and serving of a practical luncheon. This began with a luncheon served each day to the students of the school, the instructors and board of managers, but recently it has come to include the general public.

The work is done under Miss Farwell's direction; individual instruction is given in only one dish each morning, but the student assists wherever desired, thus gaining general experience. The training kitchen is open to persons who wish to become more efficient workers either in the home or in business and for students of the school who wish practice in cooking and serving in addition to the regular courses. Much of the baking in the demonstration room is done in an electric oven.

Here is a sample luncheon menu cooked and prepared in the training kitchen, then served at noon to the general public:

CREAMED CHICKEN AND SWEETBREADS  
 BUTTERED RICE  
 ASPARAGUS, CUCUMBER AND  
 CHEESE BALL SALAD  
 MIXED FRUIT ICE  
 ALTERNATES  
 VEAL LOAF WITH MUSHROOM SAUCE  
 FRENCH FRIED POTATOES  
 STUFFED PEAR SALAD  
 ORANGE TRIFLE      STRAWBERRY SHORT CAKE  
 COFFEE

### COST OF USING ELECTRIC APPLIANCES

Experience has shown that 300 watt-hours per meal per person is a liberal allowance for electric cooking; or in a family of five, four kilowatt-hours per day is an average.

#### COOKING DATA

Appliances used.....	Oven
Cooking.....	Bread
Quantity.....	3 pounds
Time to heat apparatus.....	25 minutes
Time cooking.....	32 minutes
Total time required.....	57 minutes
Kw-hrs. heating apparatus.....	0.58
Kw-hrs. cooking.....	0.45
Total cost, cents.....	5.15

The following is a good chart to consult for the costs of using the ordinary electric appliances, cost compiled on a basis of five cents per kilowatt-hour, the latter being equivalent to 1,000 watts for an hour. A seven inch, frying pan, consuming 500 watts, operating 30 minutes costs a cent and a quarter, likewise a six pound iron; an eight inch stove consuming 800 watts, operating fifteen minutes costs but a cent; the following appliances cost less than a cent during the given time of operation.

Article	Average Consumption Watts.	Period of Operation Minutes.	Cost during that period Cents.
Chafing dish.....	400	20	0.67
Pint milk warmer...	250	6	0.12
Quart food heater...	500	6	0.25
Coffee percolator....	300	20	0.50
Stove, six inch.....	500	15	0.62
Curler.....	60	15	0.07
Iron.....	250	30	0.62
Tea kettle.....	300	20	0.50
Heating pad.....	50	60	0.25

### PLUM PUDDING

Coffee cup of white sugar,  $\frac{1}{2}$  pound of suet (chopped very fine) 1 pound of dried bread crumbs, six eggs (yolks and whites beaten separately), allspice, a little cloves, cinnamon, 1 nutmeg, 1 pint of milk, 1 pound of currants, 1 pound of dried raisins,  $\frac{1}{4}$  pound of citron, well dredged with flour, 1 teaspoon of baking powder, white of eggs last. Boil four or five hours. — Famous Old Receipts.

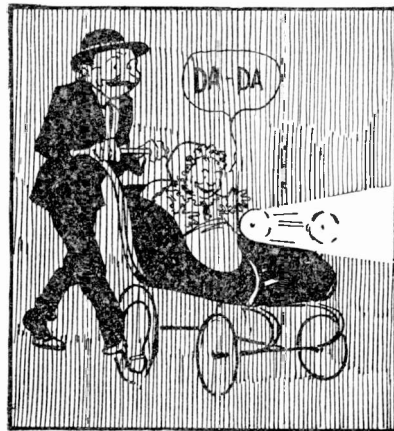
### FOOD SHOULD FIT THE SEASON

All people eat less for breakfast in summer than in winter. They require less food because they require less heat elements. Few people, however, refuse hot coffee and eggs and hot buttered toast for breakfast even in summer. Many people, also, like to minimize effort to the greatest extent possible. With an electric breakfast set — toaster, percolator and egg boiler — work is simplified, effort saved and breakfast is hot and delicious.

### BABY CARRIAGE VIES WITH AUTO

If a self assertative appearance is all that it takes to relegate "vehicles" from the sidewalk to the street, the streets of Cleveland will probably soon be enlivened with a sort of "fairy runabout" entirely new.

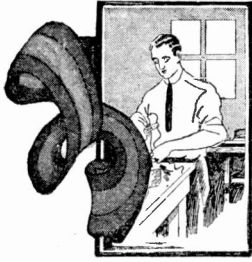
Some enterprising Cleveland firm has relieved the baby carriage of all of its former insignificance by placing upon



Of Self-Assertive Appearance

each side of the front two important looking electric lamps, operated from a small storage battery.

Whether or not it will be necessary to set a speed limit upon the proud and happy propeller of the new baby carriage has not been determined.



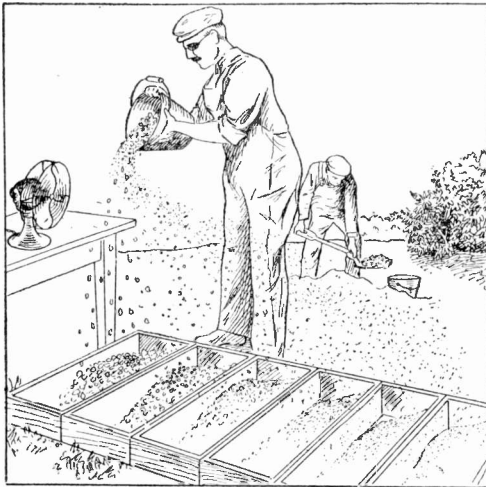
# For Practical Electrical Workers

## GRADING GRAVEL WITH ELECTRIC FAN

The writer had occasion, at one time, to separate gravel and sawdust into several sizes or grades for the making of stone articles. While there is on the market a grading-by-air apparatus, the writer did satisfactory work using a fifteen inch electric fan placed on the edge of a table.

The material was taken up by buckets, held above the stream of air from the fan and slowly poured out. The fast moving air at once caught the particles, whirled away the very light ones and carried them a considerable distance before they fell to the floor. The very heavy particles were scarcely affected by the blast, but fell right through it. The slightly heavier particles were carried farther, and so on.

To separate the several sizes, tin pans were



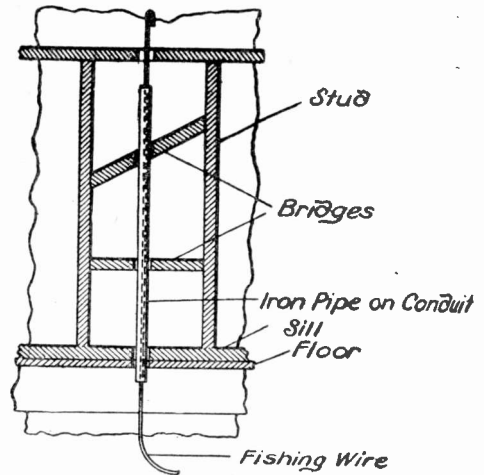
Fan Blows Light Material Farthest

made by bending up the edges of plain sheets of tin, the corners being notched. Six pans are shown and six grades or sizes are being separated by the apparatus as arranged. Sawdust may be graded as readily as sand.

—JAMES F. HOBART.

## IRON PIPE TO GUIDE FISHING WIRE

It is sometimes difficult to push fishing wire through the holes bored in bridges in a partition. Where such trouble is encountered, a piece of conduit can be temporarily inserted in the holes that have been bored in the 2 by 4's as outlined.



Pipe Guides Fishing Wire

Then the fishing wire can be pushed up through this conduit without difficulty. Iron pipe  $\frac{1}{4}$  inch in diameter, can be used instead of conduit to form a guideway for the fishing wire, but inasmuch as  $\frac{1}{2}$  inch conduit is usually available on any job, it is the more frequently used.—  
GEO. V. JEROME.

## ELECTRICAL SLIDE RULE

The Roylance slide rule, modified to fit the needs of the electrical engineer, is provided with scales by means of which the size, conductivity, and weight of copper wire may be found without resorting to the usual tables. Among other calculations the scale will also show the current carrying capacity of rubber covered wire, weather proof wire, etc., at a glance. Kilowatts may be converted to horsepower and vice versa.



# Elementary Electricity for Practical Workers

By W. T. RYAN

## CHAPTER VIII—ALTERNATING CURRENTS SIMPLY EXPLAINED

Experience with direct current circuits, involving as a rule Ohm's law in its simple form,

$$I = \frac{E}{R},$$

is very apt to make one think that alternating current circuits with their apparent and actual power, leading and lagging currents, etc., are very complex. As a matter of fact these relationships are almost as simple as the characteristics of a direct current circuit.

In direct current circuits the current flows uniformly in one direction; or as time elapses the value of the current does not change. In an alternating current circuit the direction of the

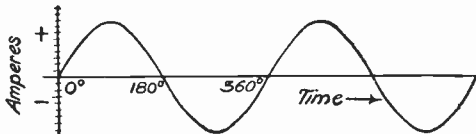


Fig. 29. Current Curve

current flow is continually changing. This is shown graphically by Fig. 29.

The complete set of values the current passes through repeatedly as time elapses is called a *cycle*. The number of cycles passed through in one second is called the *frequency*. For example, the current we use to light our homes ordinarily passes through 60 complete sets of values every second. For long distance power transmission and for electric railway purposes a frequency of 25 cycles per second is often used. An *alternation* is one-half a cycle. The frequency of an alternator is often expressed as so many alternations per minute instead of as cycles per second. Two alternating currents are said to be in *synchronism* or in *phase* when they have the same frequency and pass through their maximum and minimum values at the same time.

The first forms of generators were of the alternating current type, this being the simplest type of machine to build. It consists essentially of a single coil of wire or a number of coils connected in series.

(AB) shows a coil of wire revolving clockwise in a magnetic field set up between the poles N and S. When the coil is in the position (aa) the wires are moving parallel to the magnetic field

and the voltage generated, being proportional to the rate at which the lines of force are cut, is therefore zero. As the coil revolves, the voltage set up increases until the coil is in the position (bb) at which time the wires are moving straight across the magnetic field, therefore the rate of cutting and the voltage are a maximum. As the coil continues to revolve, the rate of cutting through the magnetic field becomes smaller and smaller until the position (bb) is again reached, at which time the voltage is again zero. As the wire (A) moves upward through the magnetic field it begins to cut through the magnetic field in the reverse direction, therefore the voltage produced is in the reverse direction. Continuing the revolution, the voltage reaches a maximum in the position (bb) and is then gradually reduced again to zero until the position (aa) is reached. It is thus seen that the voltage passes through a complete set of + and - values while the coil (AB) makes one complete revolution. If the machine had four poles, the voltage would pass through two complete sets of + and - values for each revolution of the coil. The frequency of the voltage produced by an alternator is thus seen to be equal to the product: (pairs of poles) times (revolutions per second).

If a voltmeter is connected across such a circuit it will read what is known as the *effective* or the square root of the mean squared value. During each cycle an alternating voltage passes through a large range of values varying from

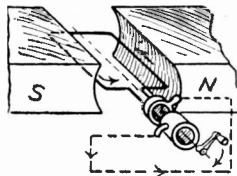


Fig. 30. Simple Generator

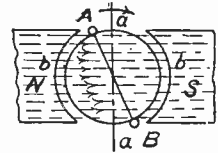


Fig. 31. Theory of Operation

zero to a maximum. This alternating voltage applied to any circuit will produce a current which also passes through a similar set of + and - values. It has become universal practice to express alternating current in terms of the value of the direct current that would produce the same heating effect in the circuit. The heating

effect of a direct current is equal to the product of the current squared, the resistance and the time ( $J=I^2Rt$ ). The heating effect of an alternating current at any instant is equal to the current squared (at that instant) times the resistance. It is thus seen that the heating effect

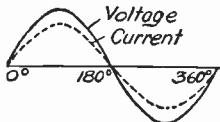


Fig. 32. Voltage and Current in Phase

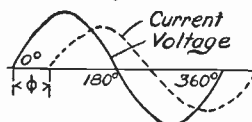


Fig. 33. Lagging Current

of an alternating current varies from zero to a maximum. The average heating effect is 70.7 per cent of the maximum. The *effective* value of the current is 70.7 per cent of the maximum. This is eleven per cent higher than the average value, which is only 63.6 per cent of the maximum. As an example, if the alternating current in a circuit varies from 0 to 100 amperes, the average value would be 63.6 amperes and the effective value, (the value an ammeter would read) would be 70.7 amperes. Voltmeters are also calibrated to read effective values. The maximum value is not used to any great extent, its principal use being to indicate the maximum strain to which the insulation of the system is subjected.

The curves representing voltage and current may be plotted together. If, as in Fig. 32, the maximum and minimum values of the voltage and current occur simultaneously they are said to be in phase.

If, as shown in Fig. 33, the current does not reach its maximum value for some time after the voltage does the current is said to be out of phase with the voltage and to lag behind it. If, as shown in Fig. 34, the current reaches its maximum value ahead of the voltage it is said to lead the electromotive force. A complete cycle represents an

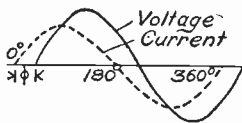


Fig. 34. Leading Current

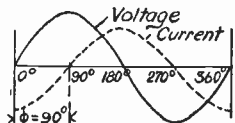


Fig. 35. Voltage and Current at Right Angles

angle of 360°. The distance between the zero value of the voltage wave and the corresponding zero value of the current wave may be measured in degrees, and is called the *phase difference* or the angle of lag or lead and is usually represented by  $\phi$ . When, as in Fig. 35, the voltage is zero when the current is a maximum there is a displacement of 90° ( $\phi=90^\circ$ ) and the current and voltage are said to be at right angles.

An alternator arranged to give to a two wire circuit a single voltage is called a single phase machine. An alternator arranged to give to two separate and distinct two wire circuits two voltages, one of which is a maximum when the other is zero and vice versa, as indicated by Fig. 36, is called a two phase machine. An alternator arranged to supply to three wires three voltages separated in phase from each other by an angle of 120°, Fig. 37, is called a three phase machine.

In a direct current circuit the power in the circuit is equal to the product,  $EI$ . In an alternating current circuit the power at each instant is equal to the product of the current and voltage at that instant. If the current and voltage are in phase it may be shown that the power is equal to the product of the voltage (effective value) and the current (effective value) as in a direct

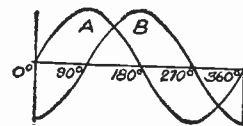


Fig. 36. Two Phase Current

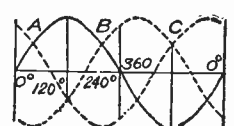


Fig. 37. Three Phase Current

current circuit. If they are not in phase the power is obtained from the following equation:

$$P = EI \text{ times (power factor)}$$

where,

$P$  = power in watts.

$E$  = effective value of the voltage.

$I$  = effective value of the current.

In considering alternating current circuits, we have the following four classes of circuits to consider: (1) circuits containing resistance only, (2) circuits containing resistance and self-induction, (3) circuits containing capacity and resistance and, (4) circuits containing resistance, self-induction and capacity.

(1) When an alternating voltage is applied to a non-inductive circuit, the current flows in accordance with Ohm's law,  $I = \frac{E}{R}$  and the

current and voltage will be in phase ( $\phi=0^\circ$ ).

(2) Imagine a circuit containing a magnetic field which is produced by a number of wires wound around an iron core. When the current is first started there is no magnetic field. As the current increases from zero to its maximum value, lines of force are established and while the current is decreasing, they collapse. These lines of force in being established and in collapsing cut the wires around the iron core and induce in them a voltage which is in opposition to the voltage applied to the circuit, therefore increase the voltage which must be applied in order to

send a given current through the circuit. When the current is a maximum, the magnetic field is a maximum and its rate of change is zero, therefore the voltage produced is zero, as shown in Fig. 38.

Therefore, this counter e. m. f. of self-induction is a maximum when the current is zero and vice

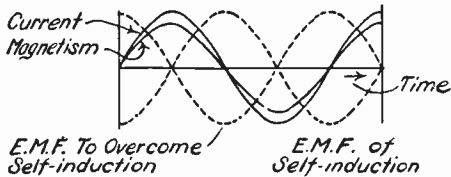


Fig. 38. Electromotive Force and Self-induction

versa. Hence self-induction not only increases the resistance of a circuit but it also causes the current to lag behind the applied electromotive force. If the resistance were zero, the current lag would be 90°. If the self-induction is zero, the angle of lag is 0°. So in a circuit containing resistance and self-induction the angle of lag is somewhere between 0° and 90° depending on the relative values of the resistance and self-induction. The voltage due to the building up and collapsing of the lines of force is given by the following formula:

$$E = 2\pi fLI,$$

where,

- $\pi = 3.1416,$
- $f =$  frequency in cycles per second,
- $L =$  coefficient of self-induction,
- $I =$  current in amperes (effective).

The quantity  $2\pi fL$  is called the inductive reactance of the circuit and is measured in ohms. The coefficient of self-induction,  $L$ , is numerically equal to the number of lines of force one ampere

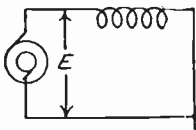


Fig. 39. Inductive Circuit

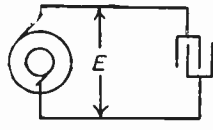


Fig. 40. Circuit Containing Capacity

will produce in the circuit divided by  $10^8$ , therefore,

$$L = \frac{NT}{10^8 I},$$

where,

- $N =$  number of lines of force due to the current  $I$ ,
- $T =$  number of turns,
- $I =$  current in amperes.

The effective resistance of an alternating current circuit is called its *impedance* and in a

circuit containing resistance and self-induction is obtained as follows:

$$Z = \sqrt{(R)^2 + (2\pi fL)^2}$$

where  $Z =$  impedance in ohms.

The current flowing in the circuit is

$$I = \frac{E}{Z},$$

where  $E =$  applied e. m. f.

The power factor is equal to  $R/Z$ . Take the example shown in Fig. 39.

The alternator is connected to the inductive circuit, the inductance is one henry, the resistance 100 ohms, the frequency 25 cycles and the c.m.f. 2200 volts. The current  $I$  would be:

$$I = \frac{E}{\sqrt{(R)^2 + (2\pi fL)^2}}$$

$$I = \frac{2200}{\sqrt{(100)^2 + [(2)(3.1416)(25)(1)]^2}}$$

$$I = \frac{2200}{192} = 11.46 \text{ amperes,}$$

$$\text{Power factor} = \frac{100}{192} = 52 \text{ per cent,}$$

$$\text{Power} = (2200)(11.46)(.52) = 13110 \text{ watts.}$$

(3) If an alternator be connected to a condenser, as shown in Fig. 40, current will flow into and out of the condenser as the alternating current reverses in direction, therefore, an alternating current will continue to flow through the circuit. The alternating voltage,  $E$ , necessary to overcome the capacity of the condenser is:

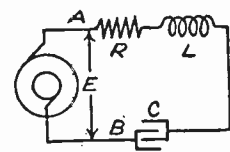


Fig. 41. Circuit Containing Resistance, Self-induction and Capacity

$$E = \frac{I}{\frac{1}{2}\pi fC} = 2\pi fCI$$

where,

- $I =$  current in amperes,
- $\pi = 3.1416,$
- $f =$  frequency in cycles per second,
- $C =$  capacity in farads.

If the resistance is zero, the current leads the voltage by an angle of 90°, instead of lagging, as was the case with self-induction.

The quantity  $\frac{1}{2}\pi fC$  is known as the capacity reactance of the circuit and is measured in ohms. The current in a circuit containing resistance and capacity is,

$$I = \frac{E}{Z} = \frac{E}{\sqrt{(R)^2 + (\frac{1}{2}\pi fC)^2}}$$

Power Factor =  $\frac{R}{Z}$ .

(4) The effect of the presence of resistance, self-induction and capacity is easily understood if it is remembered that self-induction and capacity tend to neutralize each other. Suppose

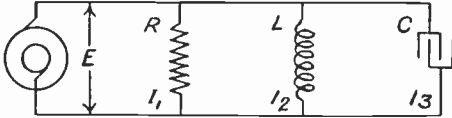


Fig. 42. Resistance, Induction and Capacity in Parallel

an alternator is supplying current to the circuit (AB) shown in Fig. 41.

The impedance of the entire circuit is:

$$Z = \sqrt{(R)^2 + (2\pi fL - \frac{1}{2}\pi fC)^2}$$

The current in the circuit due to the voltage, E, is:

$$I = \frac{E}{Z}$$

Power factor =  $\frac{R}{Z} = \frac{R}{\sqrt{(R)^2 + (2\pi fL - \frac{1}{2}\pi fC)^2}}$

As an example, suppose that in Fig. 41, R=50 ohms, L=.25 henry, C=40 microfarads, E=2200 volts, and f=60 cycles per second:

The inductive reactance is,

$$X_L = (2) (3.1416) (60) (.25) = 94.2 \text{ ohms.}$$

The capacity reactance is,

$$X_c = \frac{I}{(2) (3.1416) (60) (.000040)} = 66.3 \text{ ohms.}$$

The impedance is,

$$Z = \sqrt{(50)^2 + (94.2 - 66.3)^2} = 57.4 \text{ ohms.}$$

The current in the circuit is:

$$I = \frac{2200}{57.4} = 38.3 \text{ amperes.}$$

Power factor =  $\frac{50}{57.4} = 87.1 \text{ per cent.}$

Power = (2200) (38.3) (.871) = 73338 watts.

In the circuit shown in Fig. 42 we have resistance, inductance and capacity in parallel instead of in series. The current, I, in the main line is the resultant of the currents I<sub>1</sub>, and I<sub>3</sub>.

The currents I<sub>1</sub>, I<sub>2</sub>, and I<sub>3</sub> are obtained as follows:

$$I = \frac{E}{R}, I_2 = \frac{E}{2\pi fL}, I_3 = \frac{E}{\frac{1}{2}\pi fC}.$$

The total current, I, is obtained as follows: Suppose I = 10 amperes, I<sub>2</sub> = 20 amperes and I<sub>3</sub> = 10 amperes.

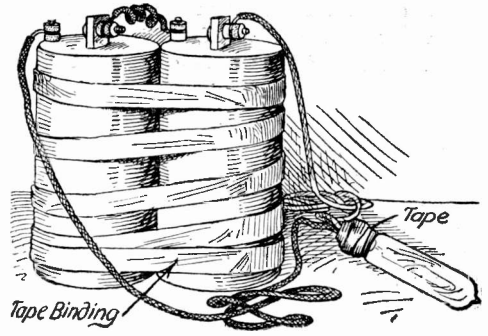
$$I = \sqrt{(10)^2 + (20 - 10)^2} = 14.1 \text{ amperes.}$$

Power factor (main line) =  $\frac{10}{14.1} = 70.7 \text{ per cent.}$

(To be continued)

### ILLUMINATING THE INTERIOR OF PARTITIONS

An outfit that is well worth its cost is detailed in the illustration. The arrangement is used for illuminating spaces within partitions when an obstruction is encountered and the wireman desires to find out what the difficulty is. It consists of a miniature incandescent lamp connected to two cells of dry battery. A single point switch, not shown in the illustration, should be inserted so that the circuit to the lamp can be readily opened or closed. When it is desired to



explore the space within a partition, the lamp is dropped down by its flexible conductors through the hole or outlet. Candles attached to the ends of wires have often been used for the same service, but they are decidedly undesirable because of the fire risk that they involve.—GEO. V. JEROME.

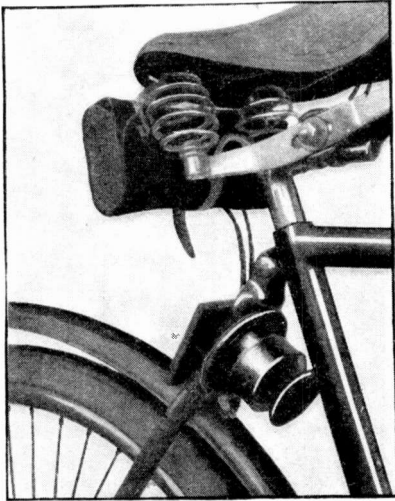
### RECHARGING DRY CELLS

If a battery is not too far gone, this method of recharging will prove to be effective. Remove the outside paper cover and with a 1/4 inch drill make about six holes around the side of the zinc, 1/2 inch from the bottom. Then drill another row of holes about half way up the side. After stuffing all the openings tightly with pulverized sal amoniac, cover the places that have been filled with sealing wax. Replace the battery in the paper box, and allow it to set at least half a day before using.—WILLIAM WARTHEN.

**INSTALLING A BICYCLE HORN**

Some time ago a friend asked me to fit an electric horn to his bicycle. The accompanying picture shows the bicycle equipped.

To clamp the horn to the framework I bored and threaded holes in the flanged base of the



Fastening Horn to Bicycle

horn to take 8/32 machine screws. I then made a suitable clamp of oak board  $3\frac{1}{2}$  by  $3\frac{1}{2}$  by  $\frac{1}{4}$  inches and in this I bored two  $\frac{3}{16}$ -inch holes placed to correspond to those in the base of the horn. Then the horn was clamped to the frame of the rear forks by means of two 8/32 machine screws about one inch in length. Before the horn was clamped on, the wires were taken out from the binding posts and a piece of oilcloth inserted at the base of the horn in order to keep out moisture.

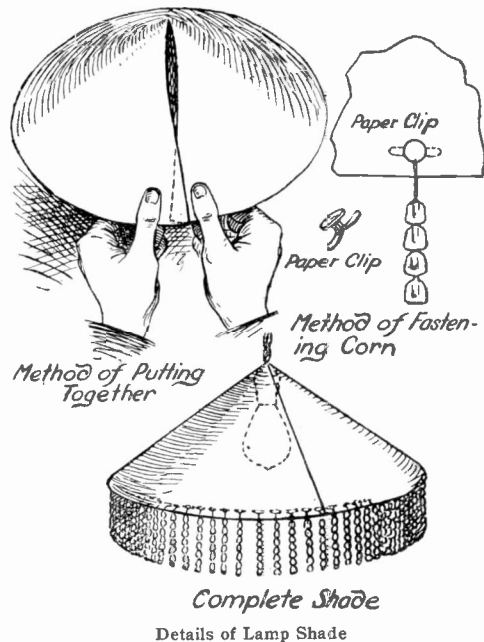
The battery used is a three cell Tungsten flashlight battery and is connected to the push button and horn in the usual manner. The push button is located on the saddle in a position convenient to get at. The equipment has given good satisfaction.—ALEX. POLSON.

**CLEANING CARBON BRUSHES**

A very simple method of cleaning carbon, dynamo or motor brushes is to take a piece of sandpaper the width of the brush and slip it between the brush and the commutator (the rough side to the brush) and draw it back and forth until all of the dirt is removed. This method does not require taking the brushes out of position and also keeps them true to the face of the commutator.

**MAKING A PAPER LAMP SHADE**

From the local printing office get two sheets of heavy paper about 30 by 40 inches, one sheet white and one of a suitable color to harmonize with the hangings of the room in which the shade is used. A circle 30 inches in diameter should be circumscribed on both sheets. These circles should then be cut out, and out of each a sector about eight inches wide should be cut away. The two pieces should then be placed one on top of the other with the white underneath and the edges should be folded as in the illustration. When the base is about 20 inches in diameter the two thicknesses of paper may be fastened by round headed brass paper fasteners. These cost but ten cents a box of one hundred. Strings of corn, 65 in number, each six inches long may now be made. Yellow field corn is preferable because it is more transparent than other colors. These strings are fastened on by

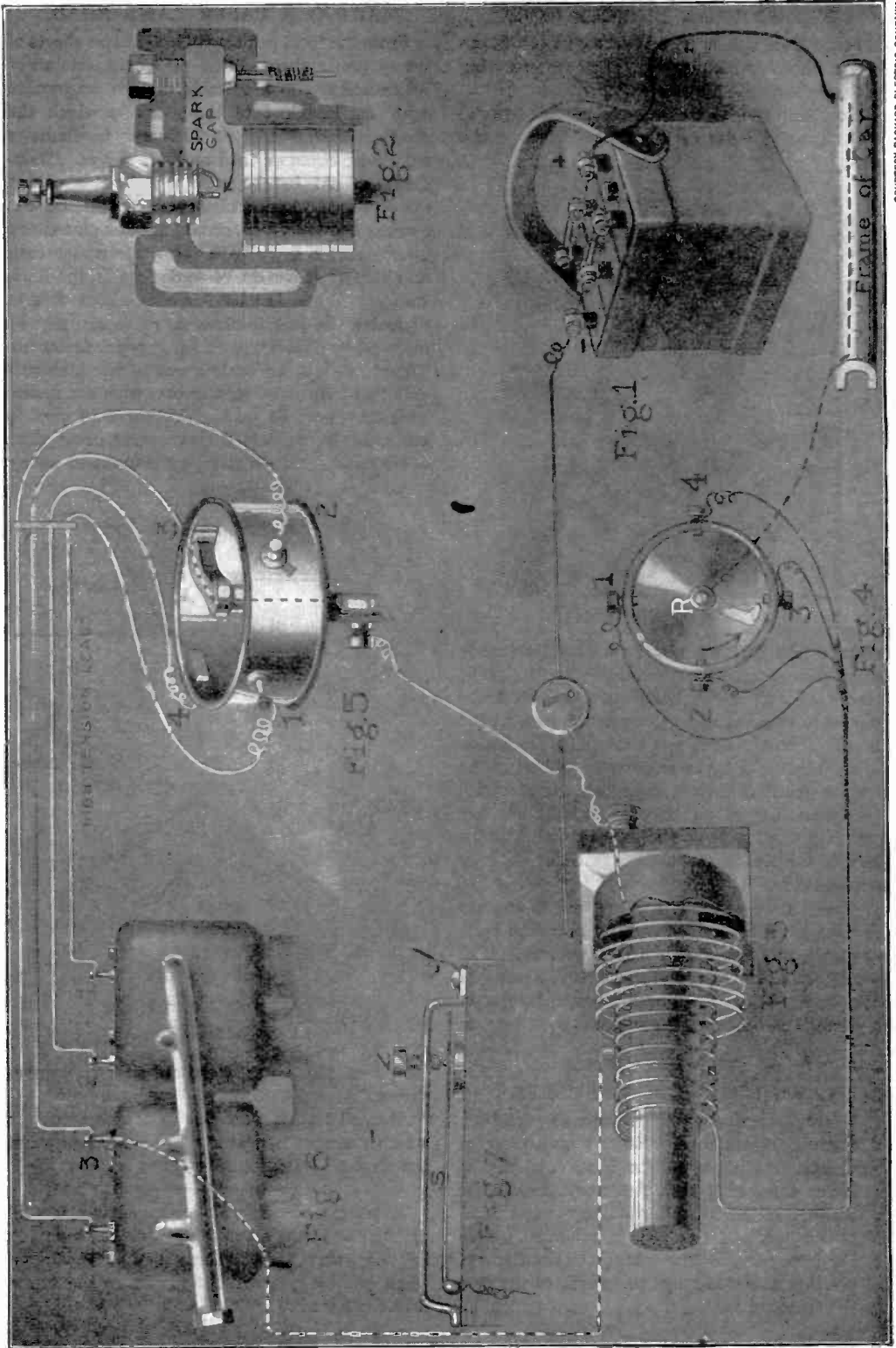


Details of Lamp Shade

means of the paper fasteners in the manner shown.

A small hole is now cut in the top through which the cord is drawn. The socket supports the shade.—WILSON S. SUTFIN.

To place a screw in an inaccessible place, fill up the slot in the screw head with common yellow soap, then "stick" them on the screwdriver, when one can place them anywhere the screwdriver will reach.



COURTESY PACKARD ELECTRIC COMPANY

Battery and Coil Ignition System



## BATTERY AND COIL IGNITION SYSTEM

In the battery and coil system for automobiles and motor boats the battery may be a set of dry cells usually not less than five connected in series, by which we mean that the outside binding post of one cell is connected to central binding post of its neighbor and so on for all the cells used. It may also be an accumulator, commonly called a storage battery, this being a single unit having its positive terminal marked with a + sign and its opposite terminal with a - sign as in Fig. 1, on the preceding page.

The current produced by the battery is not a high pressure current and unless aided by some other device it could not overcome the resistance of the wire and have enough "push" to force a passage across the spark gap, Fig. 2, to say nothing of its increased resistance due to the highly compressed mixture.

The battery current, however, does have ample volume and this volume is used to accomplish an increase of pressure, the device which accomplishes this increase or "stepping-up" being commonly known as the coil, Fig. 3.

The coil accomplishes two things—it takes the low pressure current of large volume and employs it to produce (by induction) a high pressure current of smaller volume. It also changes the character of the current. When flowing from battery to coil and returning to battery the direction of current flow is always in one direction and it is therefore called direct current. But the current which flows from the coil to spark plugs and back to coil flows alternately in one direction and then in the reverse direction and thus gets its name of alternating current.

In the drawing, a heavy wire will be seen leading from the battery to switch to coil. By this wire low pressure current enters and passes over the heavy wire which is shown coiled around a bundle of straight wires.

The heavy wire carrying low pressure battery current leads from the coil to a device for closing the circuit, Fig. 4. The construction of this device varies somewhat with various makers but its purpose is always to close the circuit at the moment a spark is required in the cylinder. When used with engines operating on the four cycle principle it is usually operated by a shaft rotating at half the speed of the main crankshaft. A spark can occur in the cylinder only when the low pressure or primary current is flowing from battery to coil and thus it will be seen that this device, the timer must close the, primary or battery circuit at the right instant.

From the timer the current returns to the battery through the framework of the car, thence through a wire attached to the opposite terminal of the battery from the one to which is attached the wire leading to the coil. We have now traced the primary circuit. Current in this circuit has generous volume but little pressure. Batteries in general use for ignition have a pressure or potential of six volts. Low pressure current cannot leap across the spark gap in the spark plug so the coil is employed to produce a high voltage current.

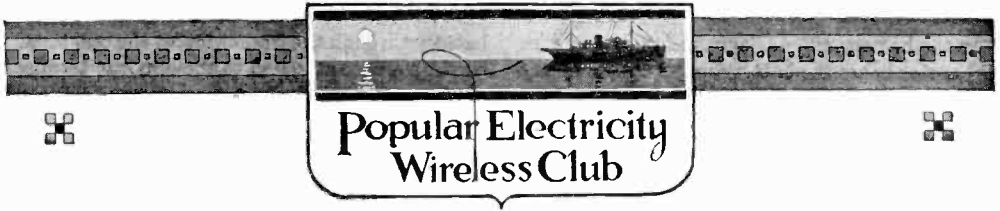
In the drawing, Fig. 3, is shown a coil with the cover removed. In actual construction the bundle of straight wires is insulated from the coil of large wire, which likewise is itself insulated from the coil of fine white wire. The fine wire has many more turns than has the inner (primary) winding. The primary winding is of large wire to enable it to carry the volume of current.

When current from the battery is flowing in the primary winding, the core of straight wires becomes a bar magnet. If now the primary circuit be suddenly broken, the core will promptly lose its magnetism. The act of breaking the circuit will, however, cause something to happen in the fine windings surrounding the primary winding. It is this—by a peculiar characteristic of electricity, known by the technical term induction, the sudden "break" in the primary circuit causes electrical pressure (voltage) to be "set up" (induced) in the fine wire windings surrounding the primary winding.

The current resulting from this induced voltage (when the circuit is closed) is of high pressure (high tension) and is carried to the distributor, Fig. 5, from thence to the spark plug where it leaps across the spark gap and returns to the other end of the fine winding by way of the engine frame, Fig. 6.

If the primary circuit were broken only by the timer, only one high tension impulse would be set up in the outer (secondary) winding and transmitted to the spark plugs, but by means of a contrivance called a trembler, vibrator, or buzzer, Fig. 7, it is possible to break the primary circuit with great rapidity and thus produce a rush of sparks across the gap.

A substation foreman on an electric line in Indiana was explaining to his men regarding some high tension wires. Taking his stiff hat in his hand he indicated one of the wires by touching it with the rim of the hat. The steel wire about the rim carried current to his hand and as he stood on the ground the shock proved fatal.



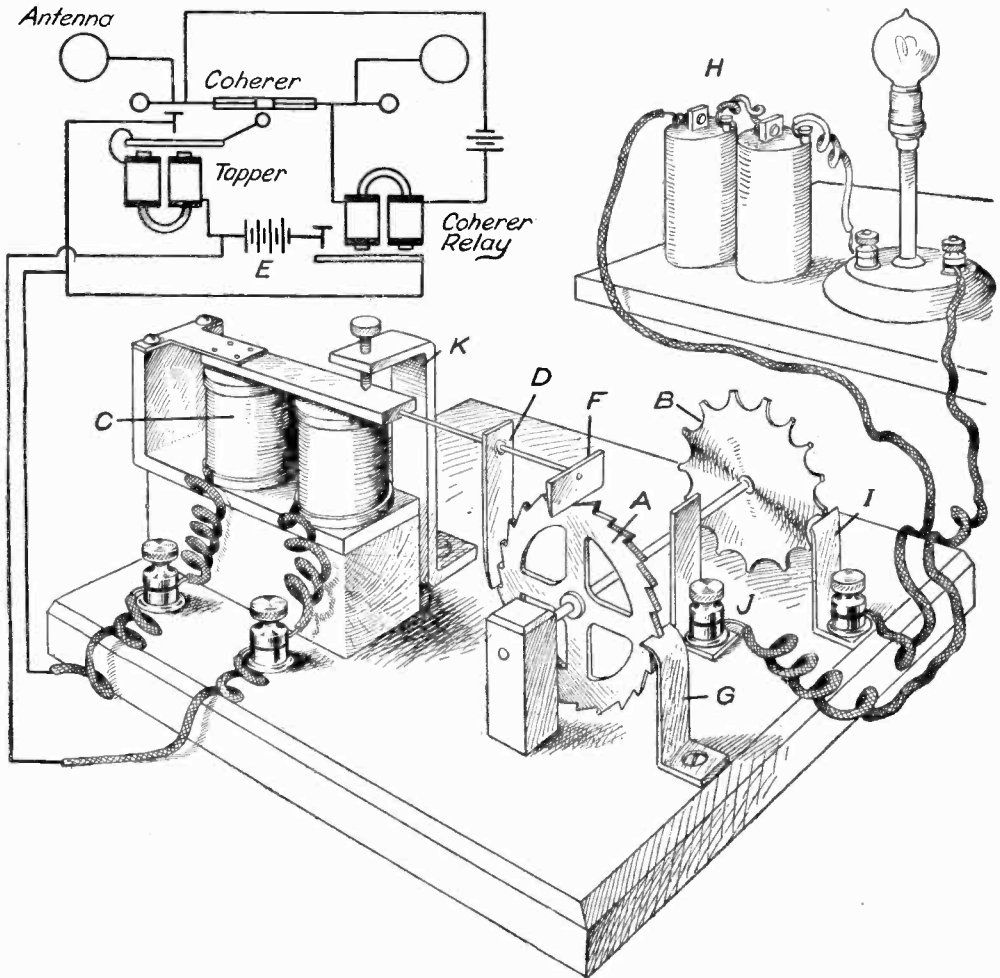
Popular Electricity  
Wireless Club

LECTURER'S WIRELESS DEMONSTRATING  
EQUIPMENT

BY H. B. DAILEY

The alternate impulse relay here described is an easily made device with which, by means of Hertzian waves, lamps may be lighted and extinguished at will from a distant station, small motors started and stopped, charges of powder

or gun cotton ignited, and various other interesting effects produced through wireless control from a distance of a local source of energy at the receiving end of the system. The apparatus is used in conjunction with the regular filings



Connections and Arrangement of Apparatus

coherer, sensitive relay and tapper of early wireless experiments and through its employment the existence and effects of the Hertzian waves may be demonstrated to a large audience.

Two toothed wheels, (A) and (B), are fixed two or three inches apart upon a short horizontal shaft. These wheels, from the works of an old clock, should preferably be of the same size and the number of teeth in each should be divisible by two. The cogs of the wheel (A) are filed into ratchet shape, as shown, while every alternate tooth of the wheel (B) is filed away entirely and the spaces between its remaining teeth are hollowed out to leave a series of long contact points around its periphery, these points being half as many in number as there are ratchet teeth in the other wheel. An electro-magnet (C) (from an electric bell) is connected in parallel with the tapper magnets of the coherer system, as shown in the diagram, and acts upon an armature having a projecting arm carrying a pawl, (D), made from a piece of watch spring, whose lower end is slightly curved in to engage the ratchet notches. When a wave from the induction coil at the sending station strikes the antenna of the coherer, the coherer relay is brought into action and the circuit of the tapper battery (E) is closed; the armature of the magnet (C) is drawn down at the same instant the tapper acts, and the wheel (A) is moved forward one notch. At the same time the plate (F), fixed upon the end of the armature rod, enters between the teeth at the top of the wheel and prevents the latter from jumping ahead by its own momentum more than one notch at a time. A light spring (G) engages the ratchet wheel on its opposite side and prevents backward movement of the shaft.

Since, as will be remembered, the wheel (B) has but half as many teeth as the wheel (A), the single successive movements of the latter through a distance of one tooth each time will cause an alternate opening and closing of the circuit of the local battery (H) operating the small lamp or motor by bringing the contact spring (I) alternately against a tooth and opposite a space in the wheel (B). The contact spring (J) bearing against the shaft, completes the local circuit through the apparatus. The adjusting screw (K), which is without electrical connection, confines the movement of the ratchet armature within proper bounds.

As it is desirable that the wheel (A) shall move but a single notch for each pressure of the key at the sending station, it is necessary that the contact at the sending key shall be very brief — just a mere tap in fact, or just sufficient to cause

the coil to emit a spark. If a longer contact be made, the action of the coherer relay instead of being a single, clean-cut contact is apt to be a succession of brief repeated contacts, which cause the ratchet mechanism to execute a series of uncertain spasmodic movements.

For laboratory demonstration through a space of 40 or 50 feet the apparatus needs no earth connection, which makes the effects obtained seem all the more curious to the spectator seeing them for the first time. A short vertical wire antenna four or five feet high rising from one terminal of the secondary of the induction coil, with an equal length of antenna depending downward from the other terminal, and a similar equipment of antenna for the terminal rods of the coherer is all that is necessary for short distance experiments. If desired, the special battery (H) may be omitted and current for the experiments taken instead direct from the battery (E).

An interesting application of the apparatus before an audience consists in placing the sending and receiving mechanism in different rooms of a building and closing all the doors between them, demonstrating the passage of the wave through walls and floors.

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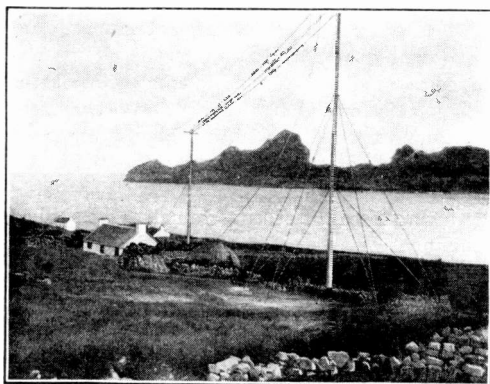
#### GOVERNMENT CRUISER ON A TEST VOYAGE

The scout cruiser Salem has been detached from the United States Atlantic reserve fleet and has sailed on a voyage across the Atlantic to undertake the most extensive wireless experiments ever carried on by the Navy Department. The purpose of the voyage is to test to the limit of its capacity, if possible, the government's new high power station which has been built at Arlington, Va.

An attempt will be made to keep the Salem in communication with the Arlington station practically all the time, both day and night, while she is steaming across the Atlantic. Those who designed the station did so with the idea in mind that when operating at its highest efficiency it would be able to communicate direct with London, Berlin, Paris and other European cities, and also that it would be able to establish direct communication with the great station the government is to erect on the Isthmus of Panama. Likewise, it is believed that eventually the station will be able to establish communication with any warship in the navy, using relays when the ship is at a distance of more than three thousand miles from the station.—*Marconigraph*.

### LONELY ISLANDERS IN TOUCH WITH WORLD

The wireless station recently erected on the Island of St. Kilda off the coast of Scotland places the hitherto isolated inhabitants in communication with the outside world. Something of the



Exterior of St. Kilda Station

desolation of the island is impressed upon one by the station site and the distant rocky coast.

Messages have been heard from Eiffel Tower, Paris and Vanen, Germany. With the opening of the station the Kildans for the first time in their history will be able to know the correct time. Hitherto it has been roughly guessed by the sun's position.

The masts carrying the acrials are 70 feet high and as the weight of each was one and one-half tons their erection was the most difficult part of the installation to accomplish.

#### CONSTRUCTION OF A RESONATOR

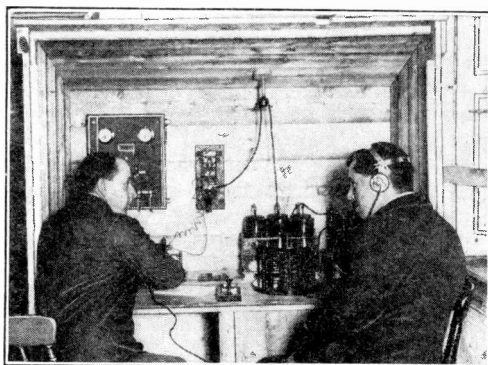
This resonator will produce a five inch spark when used in connection with a quarter kilowatt transformer and suitable condenser of about .005 microfarad capacity. This apparatus is found in almost any wireless amateur's station. A much smaller model of the resonator built on similar lines produced a 1½ inch spark from a ½ inch spark coil.

The material required is as follows:

Secondary tube,  $\frac{3}{8}$  inch thick card board 3½ inches in diameter, fifteen inches long; secondary wire, four ounces, No. 30 d. c. c. magnet wire; primary tube, ¼ inch thick cardboard 6 inches in diameter by three inches long; primary winding, six turns No. 12 rubber covered wire (eleven feet); one brass ball  $\frac{3}{4}$  inch in diameter; hardwood base 7 by 9 inches and a few small pieces of hard wood.

An excellent grade of paper tubing can be obtained from wireless supply companies but if this is not obtainable, the tubing can be made by wrapping a few turns of cardboard sheet around a form three inches in diameter and about fifteen inches long. While the wrapping is being done it is well to stick the cardboard with strong liquid glue. When the glue becomes dry, soak the tube with melted paraffin. A similar process is employed in making the primary tube.

The secondary tube is wound with one layer of No. 30 d. c. c. magnet wire and about ¼ pound will be required. This wire does not have to be spaced but is wound on as on a tuning coil. This winding is coated with melted wax and is afterwards heated until the wax soaks into the insulation, after which another coat is applied. A suitable wooden cover is then made to fit in the top of the secondary tube and in the center of it is fastened a three-quarter inch brass ball. The secondary winding is connected to this ball. There is a piece of wood glued into the bottom of the secondary tube and then the whole is glued to the wooden base. The primary tube is next wound with six turns of No. 12 rubber covered wire and this winding is secured to the tube with rubber tape. The primary tube is then slipped over the secondary tube and the primary leads connected to suitable binding posts in the base. The second secondary lead is connected to one of these posts, Fig. 2. The primary tube is held tight against the base and wax is poured into the space between the two tubes, Fig. 1. This must be done slowly at first lest the wax leak out.



Operators of St. Kilda Wireless Station

The wax makes a good insulation between the coils and secures them together very well. The coil is now ready for use.

When the apparatus is connected up as shown in Fig. 2, and the transformer or spark coil is working, a bluish brush discharge takes place at

the brass ball on top of the resonator. Take a piece of metal in the hand and bring it near the brass ball. A beautiful brush takes place and if brought closer a spark about five inches in length

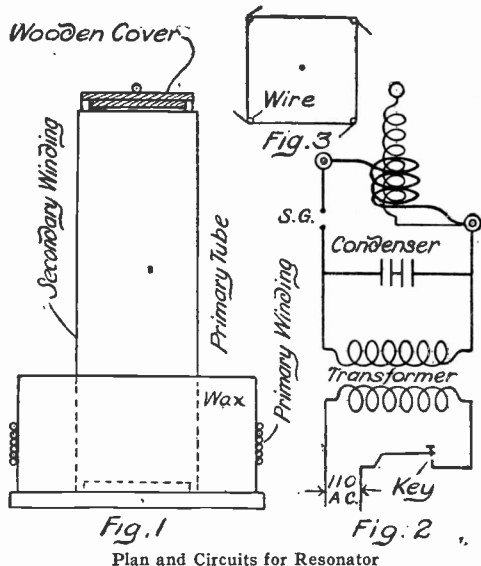


Fig. 1

Fig. 2

Plan and Circuits for Resonator

is formed. If the apparatus is properly adjusted, especially the spark gap and condenser, a spark at least this long should be obtainable at any time when a  $\frac{1}{4}$  kilowatt transformer is used. A peculiar breeze is noticeable from the resonator when it is working.

If a suitable pin wheel is made by gluing a wire, about No. 30, to the corners of a light metal sheet about one inch square, Fig. 3, and the plate is pivoted on a needle point and the latter is connected to the resonator, the disk will rotate rapidly giving off a violet brush. If a lamp bulb held in the hand is brought near the resonator, the bulb will light up brightly with a bluish light. A Geissler tube will glow brightly when brought into the field of the resonator. The empty space in a mercury thermometer tube will also glow when brought near the ball. Wires twisted into any desired shape will emit brushes and show off nicely in the dark. Numerous other experiments can be worked out with this apparatus and the best of it is that discharges from the secondary of the resonator are harmless.—ALEX. POLSON.

The Bureau of Navigation, Department of Commerce, has issued a new set of instructions under the date of July 1, 1913, which supersedes all former editions of "Regulations Governing Radio Communication."

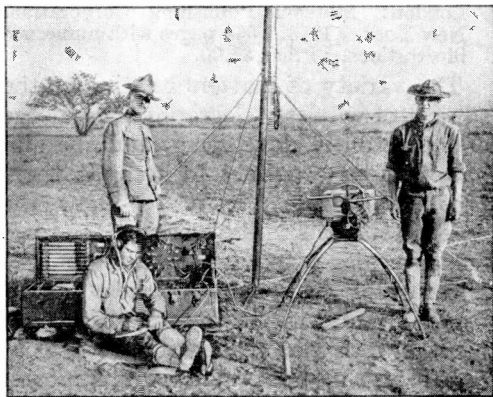
### PREPARING DETECTOR CRYSTALS

The writer has found that very desirable pieces of silicon and similar hard materials can be readily chipped off from larger pieces for use in detectors by means of an ordinary hammer and cold chisel. Using a one-half inch cold chisel, place the crystal in a clean metal pan or can cover on an anvil or similar sturdy support and with a little practice you will be able to cleave off pieces of almost any size you wish. Pieces about  $\frac{1}{4}$  inch square make a suitable size, although other shapes and sizes are also good. This new method is economical and has the advantage of affording pieces of any desired size.—PHILIP E. EDELMAN.

### WIRELESS PRACTICE ON MEXICAN BORDER

With the unexpected liable to happen in Mexico or along the border enough United States troops are kept near at hand to protect life and property upon this side. This field experience is utilized to the best advantage as is indicated in the picture in which the signal corps is working with a portable field wireless apparatus.

Upon the four-legged stand is a hand operated



Army Signal Corps Wireless Outfit

dynamo to supply current for sending. At one end of the carrying case may be seen a set of tubular condensers.

"There is always something doing in wireless invention or in the perfection of wireless apparatus, but there is no public talk about it; it goes on silently but effectively. We hope to bring the cost of the wireless messages down to a point where all merchants will use the wireless and it will be generally used by the newspapers."—GUGLIELMO MARCONI.

## NEW BOOKS

**ELECTRIC INTERLOCKING.** By the Engineering Staff of the General Railway Signal Company. Rochester, New York: General Railway Signal Company. 1913. 416 pages with 282 illustrations. Price, \$3.00.

A work containing data on the installation, operation and maintenance of electric interlocking and much valuable information for the use of the signal engineer and those who are in any way connected with railway signaling.

**ELECTRICITY FOR THE FARM AND HOME.** By Frank Koester. New York: Sturgis and Walton. 1913. 274 pages with 53 illustrations. Price, \$1.00.

This is the first extended work on the subject of electricity on the farm. The book covers the field in a comprehensive manner, pointing out in both America and Europe the wide use of electricity at the present time by hundreds of farmers.

**YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY.** By Marconi Press Agency, Ltd. London: Marconi Publishing Corporation, New York. 1913. 564 pages with numerous illustrations. Price, \$1.00.

The variety of matters relating to the subject of wireless telegraphy is immense and constantly developing, and the aim has been so concisely to compile them that, whether he desire to know the wireless stations of the world or the rates for a message, to understand the laws and regulations governing wireless telegraphy or to learn the progress of experimental work, the reader will be able to find it in this book with a minimum of effort.

**ELECTRICAL INSTALLATIONS ON AUTOMOBILES AND MOTOR BOATS.** By G. L. Chandler. Warren, Ohio: Packard Electric Company. 48 pages with fourteen illustrations. Price, 25 cents.

The purpose of this book is to describe the various electrical devices, found upon an automobile or motor boat, and their relation one to another so that mystery is no longer a mystery and the non-technical man can prevent electrical trouble or remedy it when it occurs.

**GROWING CROPS AND PLANTS BY ELECTRICITY.** By E. C. Dudgeon. London: S. Rentell and Company, Ltd. 36 pages with twelve illustrations. Price, 25 cents.

This book is intended to serve a double purpose: to interest the general reader and at the same time to give the farmer, the market gardener and the amateur horticulturist a clear idea of what has been and is being done in the application of electricity to growing plants.

**HOW TO MAKE THINGS ELECTRICAL.** Chicago: Popular Electricity Publishing Company. 1913. 200 pages with 184 illustrations. Price, \$1.50.

This book is for experimenters and students who desire to build their own electrical apparatus. Electric clocks, transformers, small motors, storage batteries, apparatus for numerous experiments, Geissler tubes, rectifiers for small currents and an infinitely large number of miscellaneous devices are described as to their construction.

**FACTORY LIGHTING.** By Clarence E. Clewell. New York: McGraw-Hill Book Company, Inc. 1913. 156 pages with 100 illustrations. Price, \$2.00.

This book aims to tell in a simple way how to obtain good lighting. The scheme in the text is somewhat of a departure from prevailing methods in the treatment of illumination information. Actual results are given precedence over generalized statements and the practical application of the text will require, therefore, a selection from one or another of the cases described, to be used as a guide in any particular class of work. The office, drafting room, and power house are considered part of the factory.

**RESUSCITATION.** By Charles A. Lauffer. New York: John Wiley & Sons. 1913. 47 pages with seven illustrations.

This book includes a reprint of a paper on this subject delivered by the author before the Philadelphia section of the National Electric Light Association. The author, after explaining a number of successful results which have been obtained from employing resuscitation methods on men who were supposedly



dead, gives a clear description of the mechanism of respiration, illustrating same by a number of views of the various parts of the anatomy.

The Prone Pressure or Schafer method of resuscitation which has been adopted by the National Electrical Light Association, is described in detail.

**ELECTRIC WIRING AND LIGHTING.** By Charles E. Knox and George E. Shaad. Chicago: American School of Correspondence. 94 pages with 160 illustrations. Price, \$1.00.

The book is divided into Part I, Electric Wiring, and Part II, Electric Lighting. The volume is especially adapted for purposes of self instruction

and home study. Each subject has been treated so as to make it appeal not only to the technically trained expert, but also to the beginner and practical man who wish to keep abreast of the times in this field of electrical work.

**A LABORATORY MANUAL OF ALTERNATING CURRENTS.** By John H. Morecroft. New York: Longmans, Green and Company. 1912. 247 pages with 175 illustrations. Price, \$2.80.

A laboratory course should be designed to teach the student methods of analysis and to emphasize the theory rather than to merely give directions as to performing a set of experiments. The first plan is used in this text.

### UNIVERSAL DANGER SIGNAL

The "safety first" idea has gained tremendous impetus within the last year, and there is no question about the good which has already come from the movement. In carrying on the work there is the necessity of making and posting signs in dangerous places, on hazardous machines, etc., and we find



The Warning Hand

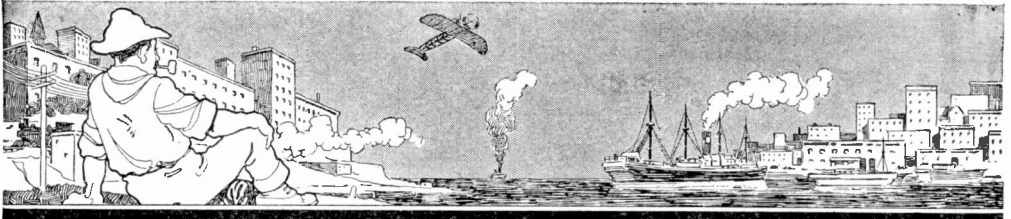
manufacturers and others trying to originate their own designs and going to the expense of having them printed in small quantities.

Why not have a universal sign? — one that would become instantly recognizable by everybody the country over. The idea is a good one and is already being

promoted by a company in Denver. The illustration here shown is the "Universal Danger Signal" which it has designed and copyrighted — a hand held up in warning, which "hits you in the face," so to speak. The company gets out stock sizes of this sign and in consequence of buying in quantities can furnish cuts or the printed signs at more reasonable prices than the small individual consumer can obtain. Besides, when sufficiently large numbers of the sign have been distributed its value as a warning will be enhanced by being universally recognized by the public.

### LOG RAFT LIGHT

In accordance with government regulations on the Columbia River, the log rafts — unquestionably the largest in the world — can only be towed down the river at night on account of the interference with navigation in the daytime. A raft light has, therefore, been devised which consists of a storage battery and lamp which are suspended from poles set up on the raft. The electric light is placed directly over a case containing the batteries, thus doing away with practically all wiring. The lamp is equipped with two four candle-power lamps wired in parallel and the battery consists of two six volt Exide cells having a capacity of 100 ampere hours.



# On Polyphase Subjects

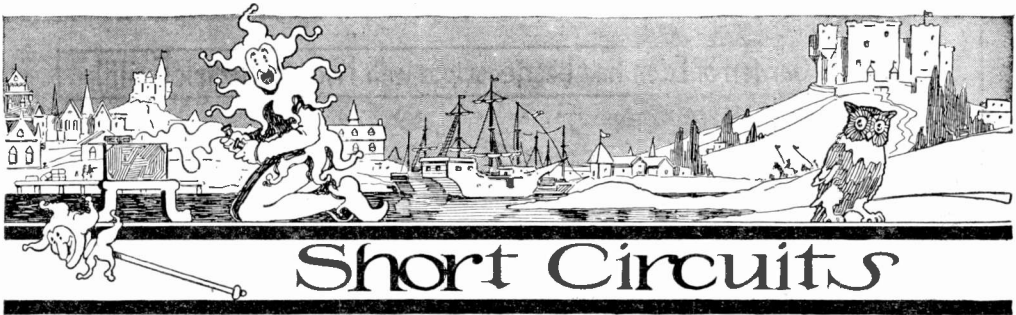
## A DAY WITH EDISON

That Edison is an extremely active man and indefatigable in his labors is well known to every one. Only a few weeks ago, it will be remembered, he took a fortnight's vacation, and the unwonted change and rest so acted to throw him out of the clocklike regularity of his daily routine that he became ill and his physician humorously suggested that he should take no more vacations.

When it is said that, as a worker, Edison is a human dynamo, just what is meant by the statement? Wherein does his day differ from that of many another strenuous worker? In the next issue of this magazine you will find out for the first time exactly what constitutes an Edison Day — not one of his ultra-strenuous days, when he may work 20 hours or more, but just an ordinary, representative day as he lives it at the present time. This interesting account has been written by Mr. W. H. Meadowcroft, already well known to our readers, who, from long years of work side by side with the great inventor, enjoys his confidence as much, perhaps, as any one living, outside of his immediate family.

From the time the great man arises in the morning until he retires far into the night, you will follow all his goings and comings. You will be with him when he reads and digests, with lightning like rapidity, great quantities of current literature; with him in the laboratory, shop and test room; so close to him that you can have a glimpse, even, of that wonderfully interesting mail which finds its way to his desk from all over the civilized world, and read some of the queer and freakish problems that are propounded to him by would-be inventors. With Edison it is half an hour here, 20 minutes there, ten minutes in another place; meeting instantly and squarely a staggering number of difficult situations and intricate problems. It is astonishing, as you will see when you come to read of it, the number of things he does in a day, and how he makes every minute and every second count.

It is with pleasure, therefore, that we make announcement of this article which, being far out of the ordinary and bearing upon a life ever interesting to men the world over, we know you are going to enjoy.



## Short Circuits

"Well, I am surprised," said the teacher, a little severely, and turning to the new pupil: "Johnny, perhaps you can be serious long enough to tell me who swallowed Jonah?"

"I don't know," was the new boy's amazing response, "but I'll bite if nobody else will. What's the answer?"

\* \* \*

A lady with a wasp-like waist fainted in a city street the other day and was carried into the nearest shop. An Irishman who had observed the occurrence looked into the shop after a few minutes and inquired:

"How is she now?"

"Oh," said the shopman, "she's coming to."

"Ah," replied Pat, "come in two, has she? Poor thing! Bedad, it's just what I was afraid of."

\* \* \*

Willie — Pa, what are the zones?

Pa — Son, when I went to school they made me learn my geography. The zones are torrid, frigid, Panama Canal zone and ozone.

\* \* \*

A lanky country youth entered the crossroads general store. He was seventeen years old and was passing through that stage during which the vocal organs are wont to cause the voice to undergo sudden and involuntary changes from high treble to low bass.

In an authoritative rumbling bass voice he demanded of the busy clerk. "Give me a can of corn" (then, his voice suddenly changing to a shrill falsetto, he continued) "and a sack of flour."

"Well, don't be in a hurry. I can't wait on both of you at once," snapped the clerk.

\* \* \*

A certain sales manager was very tight with his men. The expense book of a certain salesman showed "Porter—10c." The manager remarked that liquid refreshments were not chargeable to the company. Said the Salesman: "Why, that isn't for refreshments; that is a fee to a carrier." "Then put it down as 'porterage.'" When the salesman had occasion to take a cab he stuck it down as "cabbage," and the manager charged it to meals.

\* \* \*

Said a dog by the name of Tomatso,  
To a pussy he'd met at the cat show,  
"I see, madam, you've dined,  
And I hope you have wined."  
"Good Lord," said the cat, "does my rat show?"

"Ma," inquired Bobby, "hasn't pa a queer idea of Heaven?"

"Why do you ask that?"

"'Cause I heard him tell Mr. Naybor that the week you spent at the seashore seemed like Heaven to him."

\* \* \*

"Your brother who waits on the table is much more countrified than you," remarked the Summer boarder. "He's a regular Rube."

"That isn't my brother," replied the farmer's daughter. "He's an actor papa hired in the city to kid the guests."

\* \* \*

It is to be feared that a great many persons agree in practise, if not in theory, with the idea of a certain Washington schoolboy to whom the question was put: "What is a synonym?"

"A synonym," explained the lad, "is a word you use when you don't know how to spell the one you thought of first."

\* \* \*

Burlesque Manager (after first performance)—So you consider Lola the Live Wire's dance a little too—er—advanced for this burg, eh? Anything we can do to conform to the local requirements?

Police Captain—More insulation might help.

\* \* \*

"Here's something queer," said the dentist. "You say this tooth has never been worked on before, but I find small flakes of gold on my instrument."

"I think you have struck my back collar button," replied the victim.

\* \* \*

The clergyman, visiting the hospital, stopped at the bedside of a pale young man swathed in bandages.

"Cheer up, young man," he said unctuously, "keep smiling—it's the best medicine."

"I'll never smile again," replied the young man.

"Nonsense. Yes, you will!"

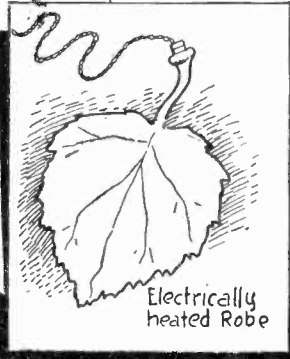
"No," sadly continued the battered one, "no nonsense about it. I'll never smile again—at least, not at another fellow's girl!"

\* \* \*

"What would happen if an irresistible force met an immovable body?" asked the professor of science.

"The result," replied the pretty co-ed, "would be some very interesting by-products."

the Garden of Eden had been equipped with Modern Electric Facilities



ELECTRIC THEATRE

ENTRANCE

TO-NIGHT-  
THE GREAT  
APPLE  
ROBBERY  
IN  
2 REELS

HOW MANY?

At the "Movies"

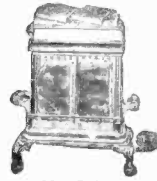
DEBELL



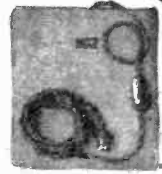
No. 533  
Percolator  
\$10.00



No. 537  
Chafing Dish  
\$10.00



No. 543  
Toaster  
\$4.75



No. 546  
Heating Pad  
\$6.50

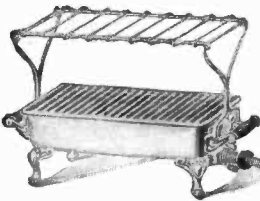


Pelouze  
"Progressive" Iron  
\$3.75

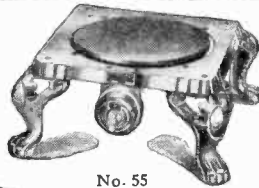
*Be Sure You Say*  
**"PELOUZE"**  
*When Purchasing*  
**ELECTRICAL APPLIANCES**



Pelouze  
"Standard" Iron  
\$5.00



No. 544  
Toaster-Stove  
\$8.50



No. 55  
Single Table-Stove  
3 Heats \$9.75



No. 542  
Hair Drier and Curling Iron  
\$3.50



No. 52  
Disc Stove  
\$6.00



No. 546  
Tea Kettle  
\$10.00



No. 545  
Egg Boiler  
Water Heater \$6.50

## Why Do Particular Housewives Look for the Name "PELOUZE"?

Satisfaction! That's the secret of "*Pelouze*" success. The test of time and actual use has proved that every "*Pelouze*" Electrical Appliance is a standard of perfection. To get the best results we have spared no expense or effort. And hence, every "*Pelouze*" Appliance bears our unqualified guarantee of satisfaction.

No longer is it safe to buy *just any* electrical appliance. See that the name "*Pelouze*"—your safeguard—is on the article you choose. "*Pelouze*" Electrical Appliances cost least to operate, because in every appliance the

heating unit is so placed that all the heat goes exactly where needed. The beautiful, heavy nickel finish makes each "*Pelouze*" Appliance a real ornament in any home. On sale at the better dealers everywhere; or, if your dealer cannot supply you, send his name and the price of the article you wish and we will send it to you postpaid.

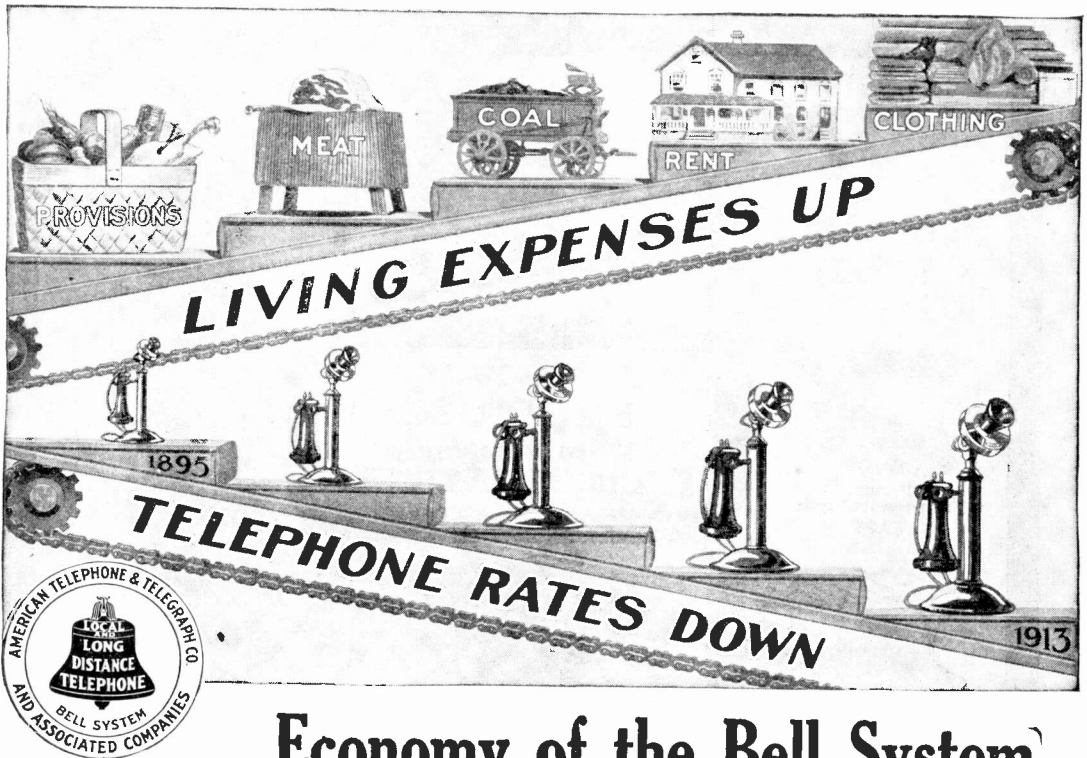
### DEALERS

*It will pay you to handle the full "Pelouze" line. It means pleased customers and bigger business.*

**Send for Catalog and Prices**

*Write Today for New Catalog—28 Electrical Appliances*

**PELOUZE MANUFACTURING CO.**  
232-242 East Ohio Street Chicago, Illinois



## Economy of the Bell System

Consider this significant fact: While most of the necessities of life have gone up, the price of telephone service, which is one of the essential factors in our commercial and social life, has moved steadily downward.

Although a pound of these necessities still contains but sixteen ounces, the telephone user has been getting more and more service for less money.

On the average, the people of this country pay 49% more today for food, fuel and clothing than they did in 1895. Since then, the decrease in the average rates for telephone service has been more than one-half.

At the same time, the efficiency and value of the service to the subscriber has vastly increased. Today he can talk to an average of five times as many persons in each exchange as he could eighteen years ago.

This is the inevitable result of the comprehensive policy of the Bell System, which brings together the associated Bell companies and the communities they serve.

Through the very size and efficiency of their organization they accomplish improvements and effect economies which give the greatest service at the lowest rates.

**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.





You Want a Cleaner That Has Enough Power to Clean Thoroughly One Time Over

**DUMORE**

## Electric Vacuum Cleaner

Is a time and labor saver. It gets every particle of the dust and dirt.

### Double Power—Saves Time

You don't have to go over your carpets or rugs several times with the DUMORE before they are clean. The twin fans bring out all the dust and dirt with one going over. The large 12 in. intake enables you to cover a wide strip with each stroke. There is nothing to break or get out of order. It is strong, durable, simple and easy to operate.

### Guaranteed for Five Years

You cannot afford to buy a cleaner that is poorly constructed that the manufacturers will not stand back of for more than a year. Why should you? The DUMORE is guaranteed for five years and costs no more than poorly made, cheaply constructed outfits.

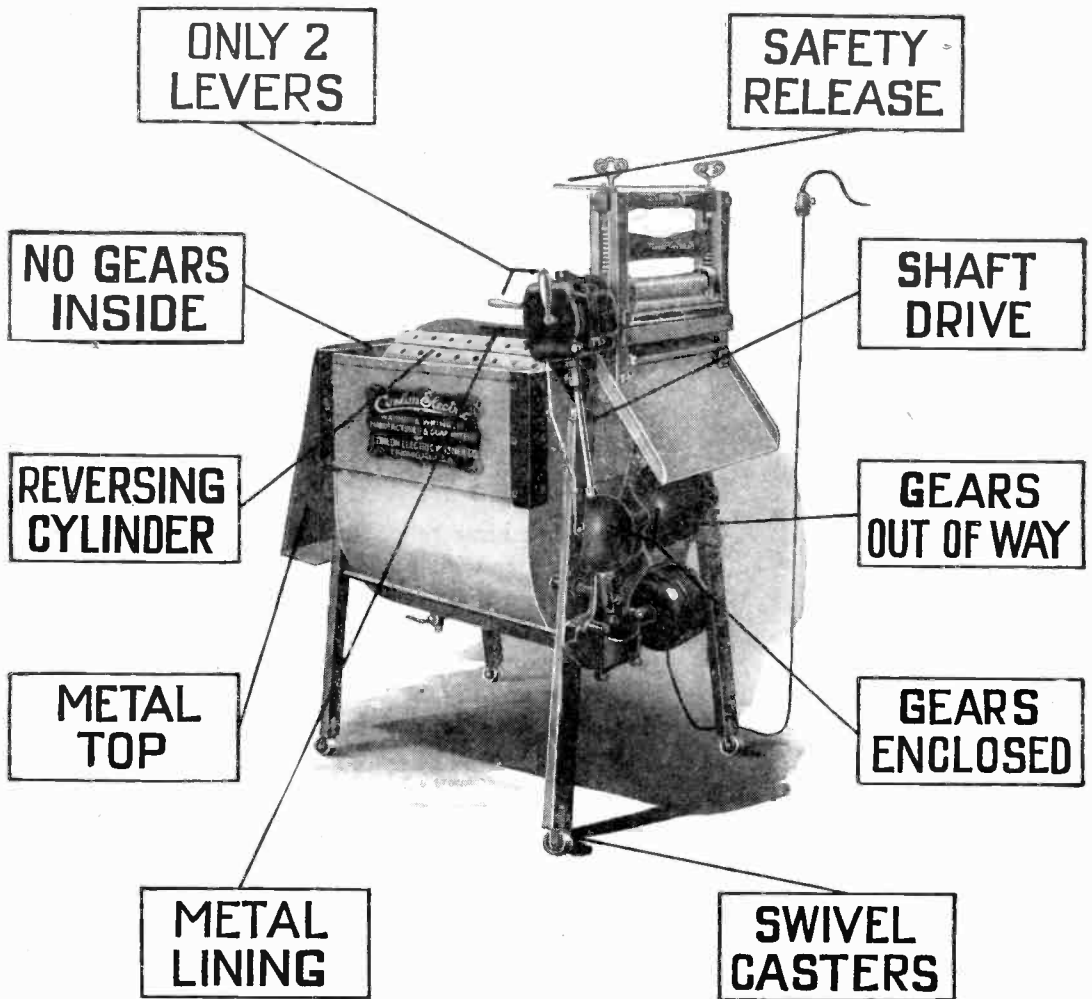
House cleaning time is on and our dealers are being crowded with orders. Don't fail to get your DUMORE this fall. It will save you hours and hours of hard work. Write for descriptive booklet and give us your dealer's name.

**Ask Your Dealer** to show you in your own home, just what the DUMORE is—prove to yourself that it is the cleaner you should buy.

**WISCONSIN ELECTRIC CO.**

1610 Junction Avenue

RACINE, WISCONSIN



# Conlon Electric Washer and Wringer

## The Machine With Distinctive Features

The great number of new and improved features on the CONLON ELECTRIC places it far in advance of other washers.

### FREE TRIAL

Let us place a CONLON ELECTRIC in your home for 15 days at our expense. Use it every day; wash everything from carpets to lace curtains. If it is not satisfactory send it back; we pay the bills.

### REMEMBER

A child can operate it. Cannot injure clothes in patent wringer. Will go through any door-

way. Can be used as a table when not in use. Strictly sanitary. Nothing to get out of order. No belts or chains to cause you trouble. Every machine is fully guaranteed.

### WRITE TODAY

Write us today for complete information and free trial offer. Prove it for yourself that the CONLON ELECTRIC will do all we claim and more.

Every one who visits the New York Electrical Show, Oct. 15 to 25, should call at booth 40 to see our machines in operation.

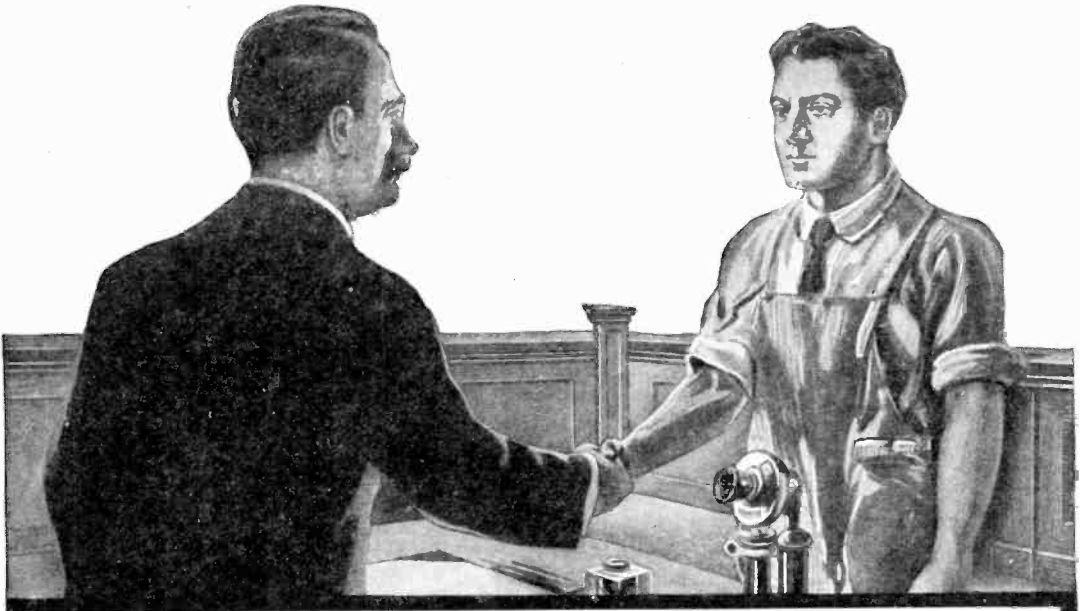
## CONLON ELECTRIC WASHER CO.

314 N. MAY STREET

CHICAGO, ILLINOIS

**Dealers:** *This machine is the leader for new improvements. Your customers will like it. Write us at once for particulars.*

For our Mutual Advantage mention Popular Electricity when writing to Advertisers.



# Training Makes Men Equal

*Every Man Can Succeed  
In Some Line of Work*

Success is not a prize to be won by a favored few—it is a divine *right* that *every* man should enjoy. And gaining success is simply a matter of training those talents that *every* man possesses—but that so *few* know how to use.

The successful men of today almost invariably started at the bottom. But they trained their *brains*—they developed their *natural ability*. The *unsuccessful* man plugged away at whatever he *happened* to find, entirely unaware of the talents he possessed that might have enabled him to succeed in some other line of work.

You have *natural ability* for *some* line of work. Examine yourself. Find out what work you like best—where your natural ability lies—and then train yourself along that line.

For twenty-two years the International Correspondence Schools have been training men for better jobs by helping them to develop their natural ability. They can do the same for *you* right in your *own home* during your *spare time*.

Just mark and mail the attached coupon—it won't obligate you in the least—and the I.C.S. will lay the proof before you—they will show you how they can train you for a successful career in the line of work you like best.

**Mark the Coupon—NOW**

**INTERNATIONAL CORRESPONDENCE SCHOOLS**

Box 1102-V, 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
- Electric Lighting
- Electric Railways
- Electrician
- Electric Car Running
- Dynamo Foreman
- Wireman
- Mining Engineer
- Telephone Expert
- Surveyor
- Automobile Running
- Agriculture
- Poultry Raising

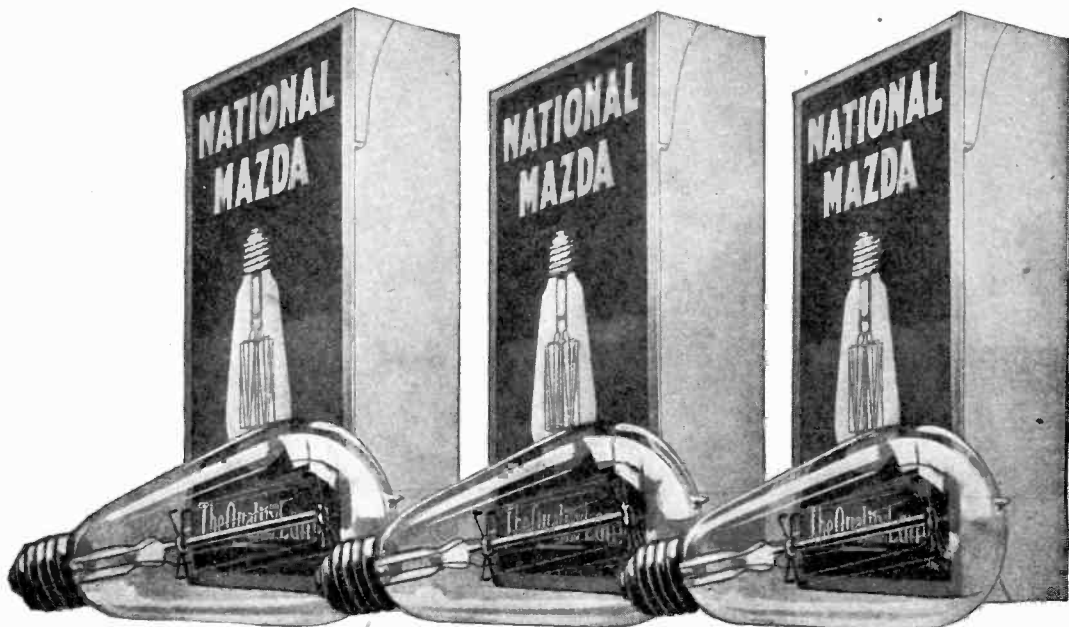
- Mechanical Engineer
- Mechanical Draftsman
- Shop Foreman
- Concrete Construction
- Architect
- Contracting and Build'g
- Architectural Draftsman
- General Illustrating
- Chemist
- Bookkeeper
- Advertising Man
- Civil Service Exams.
- Salesmanship

Name \_\_\_\_\_



St. and No. \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Present Occupation \_\_\_\_\_



## What National Quality Means to You

It is National Quality that gives you 48 candle power from a National MAZDA  Lamp with the same current that gives only 16 candle power in a carbon  lamp.

It means better light and whiter light. It means no current waste, less heat, no flicker, no blackened bulbs.

It was National Quality that gave electric lights to trains and automobiles.

It was National Quality that put daylight into the New York Subway.

It is National Quality that resists the terrific shock of a broadside on a man-of-war fifty per cent better than wasteful carbon lamps.

It is rugged, generous, scientific National Quality in MAZDA lamps that is tripling

the lighting value of electricity everywhere without increasing the bills.

Back of National MAZDA Quality is an organization of technical men who specialize on light; who have facilities and data that excel and exceed those of the best universities; whose services go continually into making still better lamps and devising still better ways of using them.

Be sure that every incandescent lamp in every socket has National MAZDA etched on the bulb. Buy lamps in the Blue Convenience Carton, with any of the labels shown below—each a guaranty of National Quality.

For free literature and information on Scientific Illumination address



Each of these labels is a guaranty of National Quality.

### NATIONAL LAMP WORKS

OF GENERAL ELECTRIC CO.

67 Nela Park, Cleveland



Each of these labels is a guaranty of National Quality.



For our Mutual Advantage mention Popular Electricity when writing to Advertisers.



Weight.  
2 pounds

From  
this  
size  
up

# FORT WAYNE

## Fractional Horse Power Motors

Not toys, but real, efficient, reliable power producers for actual service.

Specializing as we do in small motor applications of all kinds, we are called on continually to design and build some peculiar types.

Sometimes it's light weight, or noiselessness, or unusual size or shape, the ability to work equally well on A. C. or D. C., or perhaps it's extraordinary starting torque, or overload capacity that's required.

It's all the same to us--if one of our standard motors (and no one makes a more complete line) won't fill your requirements our Engineering Department challenges you to put an application up to them that they can't solve.

If you have a machine or especially if you market a product and wish to equip it with the best fractional horsepower motor it will pay you to send for our Bulletin 1146 and learn what we are doing for the majority of the leading manufacturers of industrial and domestic power driven devices.

## Fort Wayne Electric Works

Of General Electric Company  
"WOOD" SYSTEMS

1603 Broadway

Fort Wayne, Ind.

BRANCHES IN ALL LARGE CITIES

M42

The New Serial  
in  
**THE  
AMERICAN  
MAGAZINE**



**"THE  
WOMAN'S  
LAW"**  
by Maravene  
Thompson

This woman, for the sake of her son, pitted her wit and daring against the mighty machinery of justice—and won.  
Her law—

**"The Woman's Law"**—triumphed.

Her husband has wantonly taken a human life. She finds a double to impersonate him, while he flees the country. The substitution, the amazing complications that follow as the double accepts the identity thrust upon him—that of a husband, a father, a murderer—make a story of swift action that throbs with excitement. Beginning in

The November  
**American Magazine**





## THE AMERICAN MAGAZINE *for the Coming Year*

### Those Who Have Come Back

Down, down, down, down! Despairing, sinking, falling. Clutching at straws, regaining foothold. Up a weary step—then down, forever down. Down for half a lifetime, for forty wasted years. Down, and all the world sneering and pitying and patronizing and—passing by. Down and out!

*And then, miracle of miracles, UP! Step by step, painfully, desperately, up, up and up. Frantically upward, joyously upward. Strength returning, will-power returning, courage, self-respect, faith returning! Life itself returning. Up, up, to the very top! A down-and-out has come back!*

Is such a thing possible? Can a failure succeed? Can a down-and-out come back? Peter Clark Macfarlane says, "YES!" and his answer is inspiring. If you know what it is to fail; if you know what it is to struggle against yourself—and lose; if you know one who is fighting this fight and losing it, read "THOSE WHO HAVE COME BACK" in THE AMERICAN MAGAZINE.

#### The Woman's Law

By Maravene Thompson

A thriller that begins with a murder. There is a mother who dares anything to protect her child, and a man who has lost his memory—a substitute husband who accepts the identity thrust upon him.

#### Ray Stannard Baker

His second article on the Panama Canal sets the pace for Mr. Baker's work this coming year. He sees in the canal something of revolutionary significance. When labor is regarded as human, something is bound to happen—as it did at Panama.

#### Hum Drum

By Alfred Ollivant

The author of "Bob, Son of Battle" tells one of the cheerfulness, most human and most inspiring of tales, which he calls, "a slice of every-day life." The heroine is a widowed washerwoman—Anne Wellington.

#### Hugh Fullerton

Mr. Fullerton has been making a personal investigation of gambling and professional gamblers in America. The result is a series of intensely interesting articles, a graphic narrative of facts that are as startling as they are enlightening—a powerful arraignment of the vice.

#### Angel Island

By Inez Haynes Gillmore

"The most remarkable serial in ten years," has still to reach its most absorbing and important chapters wherein is shown how the women solved the great feminist problem—theirs and that of all women.

#### Ida M. Tarbell

For two years Miss Tarbell has been investigating a revolution in business, a new relation between master and man. Nowadays Success must pay dividends in human happiness as well as in money. They are wonderful articles in their facts and in their presentation.

### Your Funny-bone!

Can you find it? Don't try. Let George do it—George Fitch. And after George, try Stephen—Stephen Leacock. You'll laugh with the readers of The American Magazine, "I've got you, Steve," and you'll be glad you have. For to find your funny-bone is to find the silver lining back of every cloud. That's why The American Magazine believes in fun, and that's why you will find Henry Wallace Phillips in it and James Montgomery Flagg—and Peter Dunne—Finley Peter Dunne, alias "Mr. Dooley." He's going to tell you the story of his own life. It's funny, joyously funny, a silver lining from beginning to end; brimful of the fascination, charm, humor, sentiment and dramatic power which made "Mr. Dooley" your friend and mine.

# 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 December issue close November 1st.

## AERONAUTICS

COMPLETE PLAN, DRAWN TO SCALE, with complete instructions for building a Curtiss 3-foot Model Flying Boat, 25c. Other plans: Blériot, 15c; Wright, 25c; Nieuport, 25c; Curtiss Hydro, 35c; "Peoli" Racer, 25c. Set of six, \$1.25 48-page Model Supply catalog, 5c. Ideal Aeroplane Co., 86B West Broadway, N. Y.

## AGENTS WANTED

\$1.00 BICYCLE MONOPLANE PRINTS 30c coin. Thomas Hofmeister, Overlea, Maryland.

AGENTS SEND FOR FREE SAMPLES. Joseph Duoba, 2409 S. Hoyne Ave., Chicago, Ill.

AGENTS AND MAIL ORDER DEALERS: Get my wholesale prices on fast selling specialties. Lock Box 683, Downers Grove, Ill.

AGENTS—COST 3c, SELL 25c. SIGN LETTERS put on with roller. Samples free. Embossed Letter Co., 237 West Illinois St., Chicago.

PHENOMENAL SUCCESS AWAITS SALES-AGENTS, of application, with our "Sales-Driving" specialties. The Emporium Co., Minneapolis, Minn.

ALUMINUM SPOONS, LOOK AND WEAR like Sterling Silver. Easy to sell. Big Profits. Samples 10c. Reese Aluminum Co., Mt. Pleasant, Pa.

AGENTS—\$4.50 TO \$10 A DAY DURING all seasons; investigate; repeat order getters. Catalogue free. M. P. Cook, 802 Merchants' Exchange Bldg., San Francisco, Cal.

BETTER LIGHT FOR 1/5 COST OF ELECTRICITY. Suitable for Home or Store. Easily installed, no experience necessary, big demand. Write for FREE catalogue. Doud Lighting Co., 175-A N. Sangamon, Chicago.

THE OIL, DUSTING AND POLISHING Mop Industry offers the richest opportunities to Live Crew Managers, General and Local Agents. Annual sales now exceed Two Million Dollars. Our New Invention is rapidly revolutionizing the business. Largest factory in America. Highly remunerative contracts. Prompt action necessary. Frederick Mfg. Co., 1118 Marbridge Bldg., New York.

## AGENTS WANTED

SEE WHAT I SAY UNDER "TYPE-writers." ATCHISON.

I WILL START YOU IN THE MAIL ORDER business free, if you will handle my goods. Crest Co., B, Atlantic City, N. J.

SAMPLE HAT BANDS SEVEN CENTS. Great Christmas present for him or her, one dollar, satisfaction guaranteed, Rose., 631 Hanover, Baltimore, Maryland.

STOP CANVASSING! MAKE \$10 A DAY without canvassing or selling to retailers traveling for us. Splendid new plan. Write quick. Ziebarth, 4210 S. Evans Ave., Chicago, Ill.

100 PER CENT PROFIT, SAN-A-TA-REE absorbent dust cloths. Absorb dust instead of scattering it. Sun-Brite metal polishing cloth. Dry. Sell at sight. Samples 25c. Particulars free. A. G. Parker, Box 93, Waterbury, Conn.

AGENTS—PORTRAITS 35c, FRAMES 15c, Sheet Pictures 1c. Stereosopes 25c. Views 1c. 30 days' credit. Samples and catalog free. Consolidated Portrait Co., Dept. 5453, 1027 W. Adams 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, 612 Crilly Bldg., Chicago.

AGENTS DON'T MISS THIS. MAKE BIG money selling Magic Vacuum Massager. Absolutely new. Sells on sight. Sells for \$1.00, good commissions. Sells to both men and women. Exclusive territory. Send now for full particulars. La Brier Manufacturing Co., Pekin, Illinois.

LIVE MAN OR WOMAN CAN MAKE \$10 a day easily, selling the latest novelty on the market; everybody wants one; sells on sight; sample, 25c, postpaid. Write to-day for territory. Wm. Muller, U. S. Sole Agent, Security Bldg., San Francisco, Cal.

WE FURNISH YOU CAPITAL TO RUN A profitable business of your own. Become one of our local representatives and sell high grade custom made shirts, also guaranteed sweaters, underwear, hosiery and neckties, direct to the homes. Write Steadfast Mills, Dept. 21, Cohoes, N. Y.

REGULAR WEEKLY SALARIES TO Agents—for introducing our swell line of Toilet Products—there's our brand new offer. We take all risk and guarantee satisfaction—one month's trial. Nothing ever like this before. Send postal for details—now. E. M. Davis, R. 51 Davis Block, Chicago.

AGENTS—LIVE HUSTLING MEN TO canvass the homes and offices, selling my new electric device. Cuts electric bills in half. A demonstration sells it, repeat order getter. You can make big money without previous experience. Complete outfit and selling instructions \$5.45 I and guarantee money back if not satisfactory. Exclusive territory is going fast. Write me to-day for my proposition. Stanley B. Freiberg, 237 Station F, Cincinnati, Ohio.

**AGENTS WANTED**

ADDING MACHINES \$1.00 AND UP. Agents, send for our offer. J. Bassett, 5921 Indiana Ave., Chicago.

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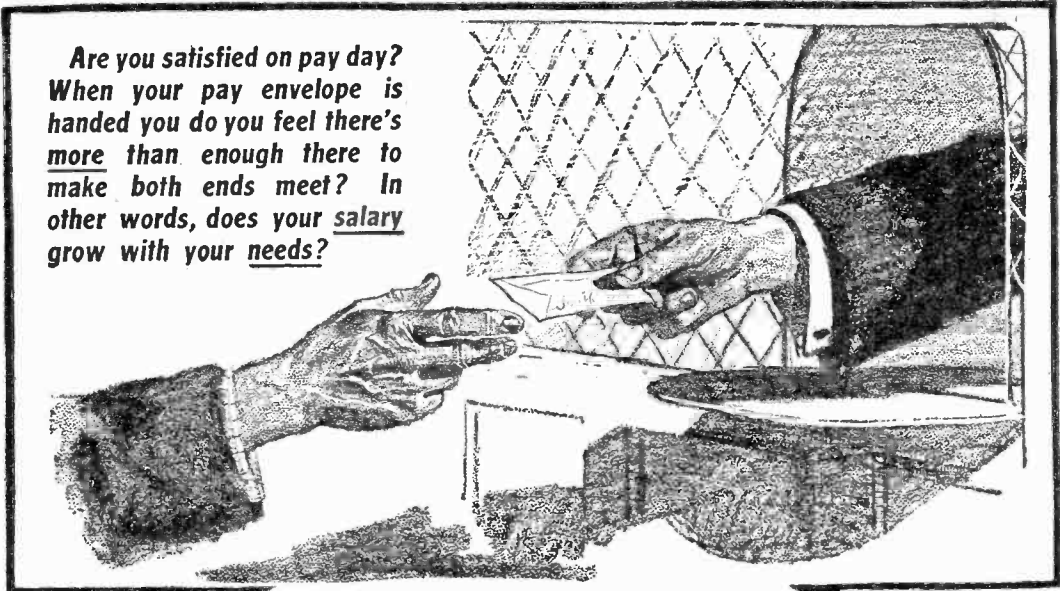
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# An Old Man at Fifty

## —A Young Man at Seventy

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By C. E. PAGE, M. D.

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At 50 he was partially bald. To-day he has a thick head of hair, although it is white. At 50 his eyes were weak. To-day they are as strong as when he was a child. At 50 he was a worn-out, broken-down, decrepit old man. To-day he is in perfect health, a good deal of an athlete and as young as the average man of 35.

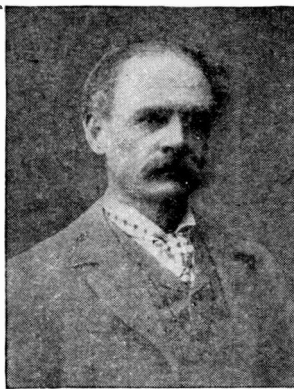
All this he has accomplished by some very simple and gentle exercises which he practises for about ten minutes before arising in the morning. Yes, the exercises are taken in bed, peculiar as this may seem.

As Mr. Bennett explains, his case was not one of preserving good health, but one of rejuvenating a weak middle-aged body into a robust old one, and he says what he has accomplished, anyone can accomplish by the application of the same methods, and so it would seem. All of which puts the Dr. Osler theory to shame.

I haven't room in this article to go into a lengthy description of Mr. Bennett's methods for the restoration of youth and the prevention of old age. All of this he tells himself in a book which he has written, entitled, "Old Age—Its Cause and Prevention." This book is a com-

plete history of himself and his experiences, and contains complete instructions for those who wish to put his health and youth-building methods to their own use. It is a wonderful book. It is a book that every man and woman who is desirous of remaining young after passing the fiftieth, sixtieth, seventieth, and as Mr. Bennett firmly believes, the one hundredth milestone of life, should read.

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Sanford Bennett  
at 50



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This booklet they will send free to anyone sufficiently interested to write for it.

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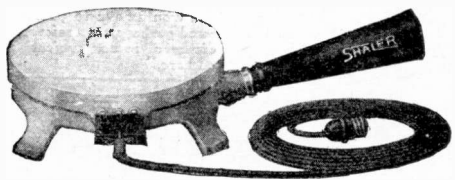
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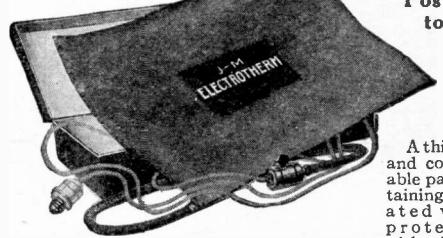


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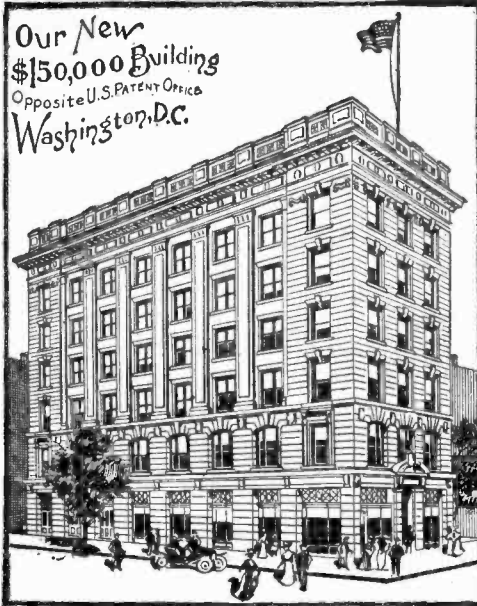
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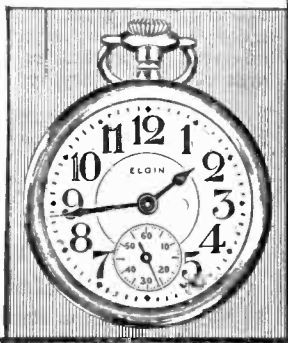


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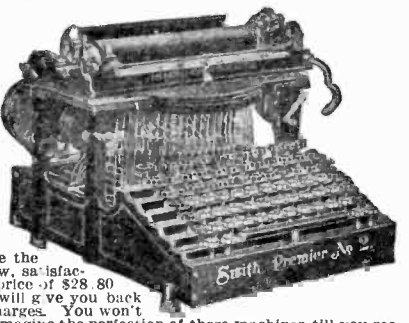
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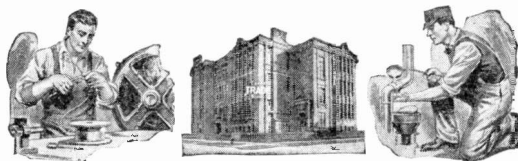
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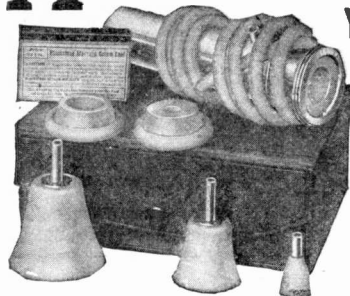
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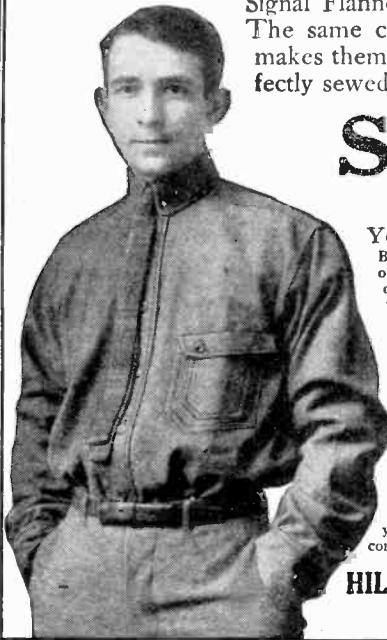
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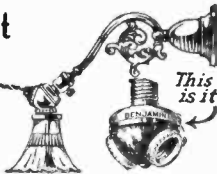
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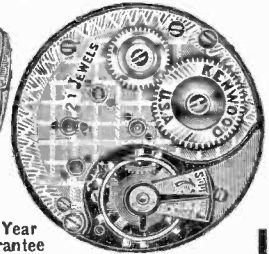
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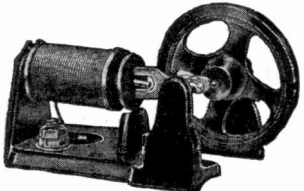
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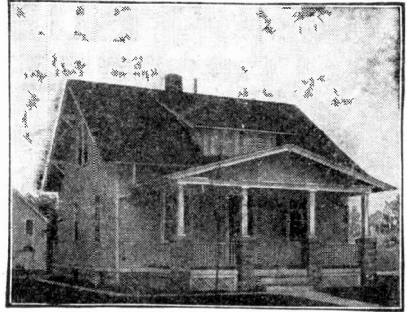
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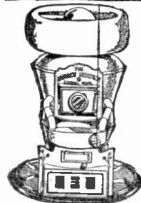
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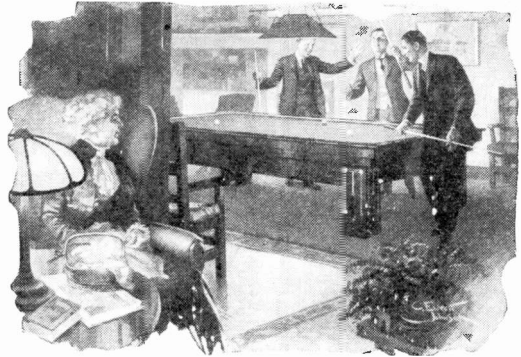
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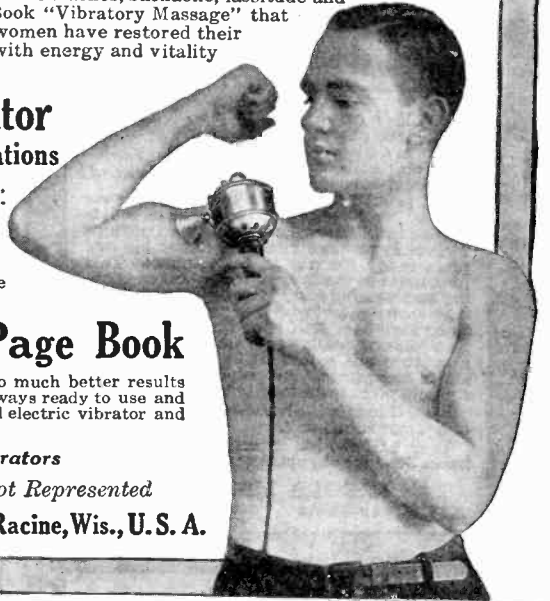
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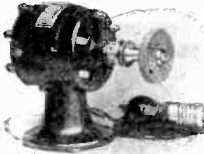
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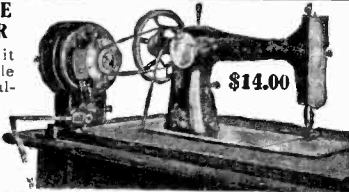


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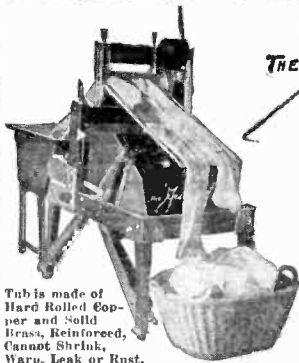
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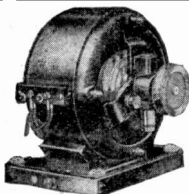


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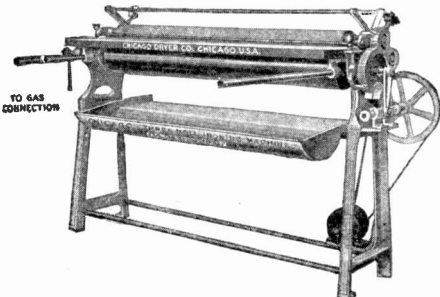
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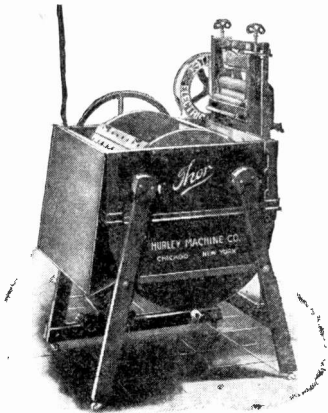


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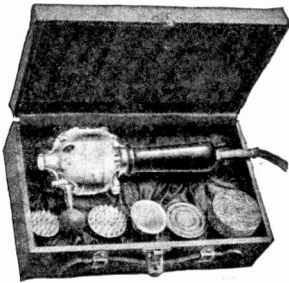
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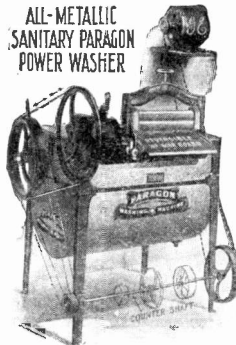
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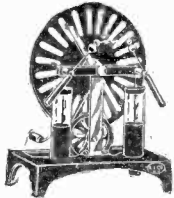
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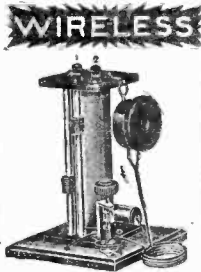
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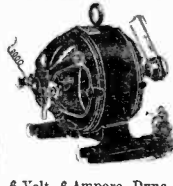
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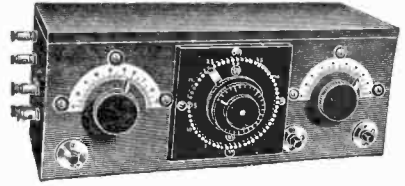


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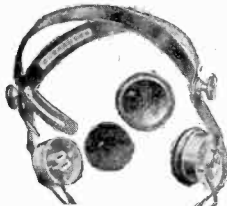
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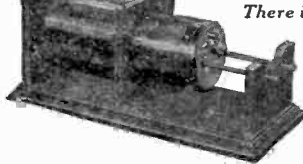
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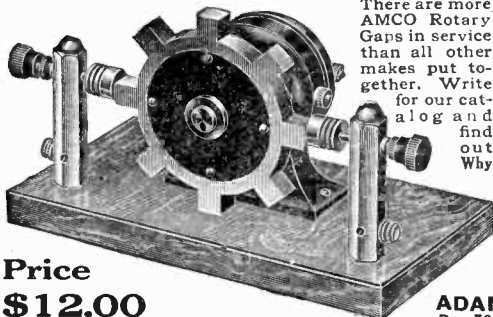
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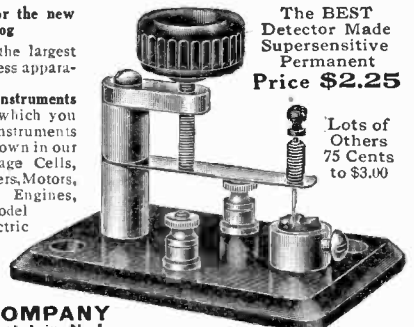
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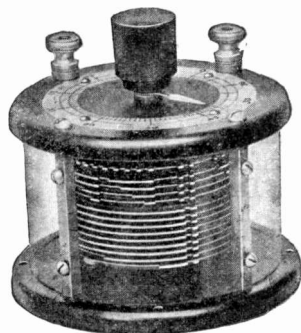
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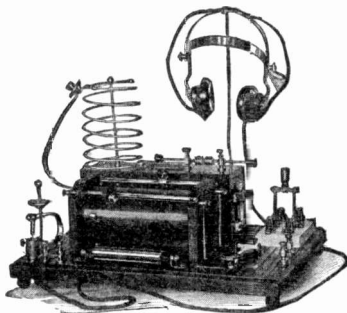
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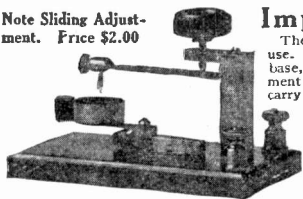


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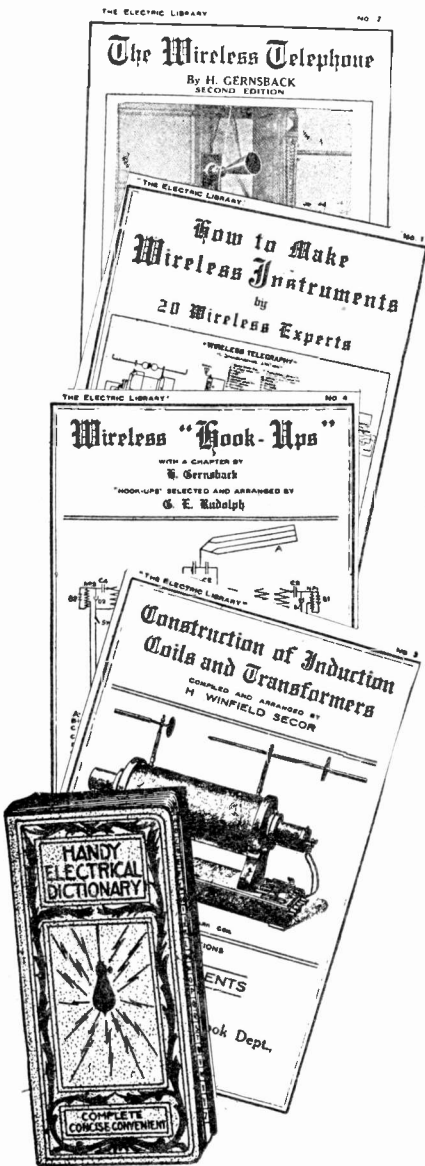
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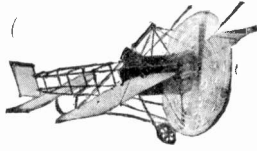
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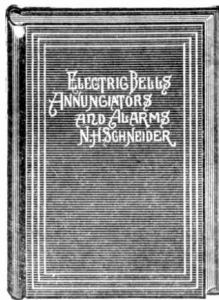
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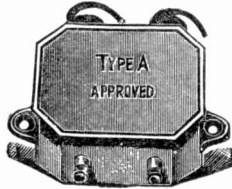
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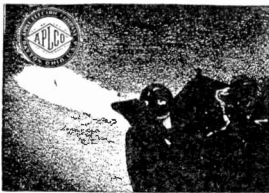


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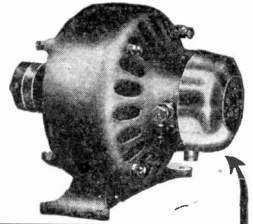
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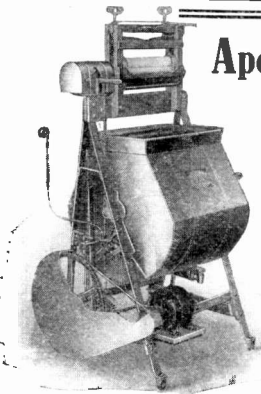
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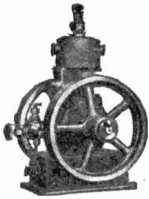
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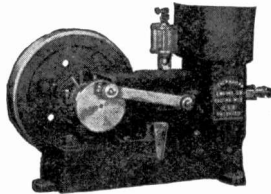
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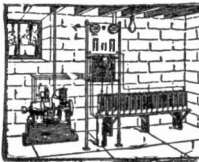


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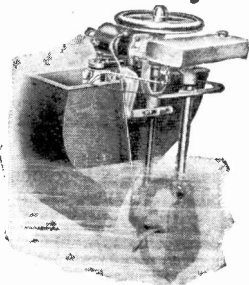
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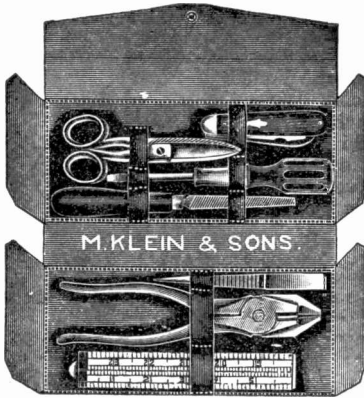
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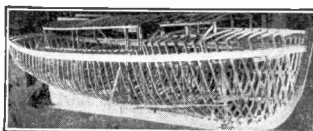
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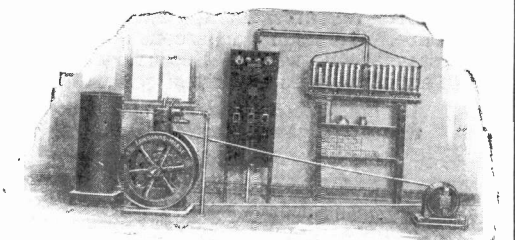
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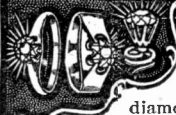


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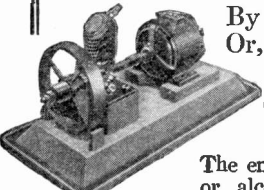
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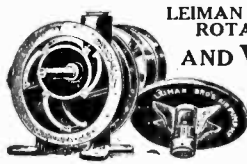
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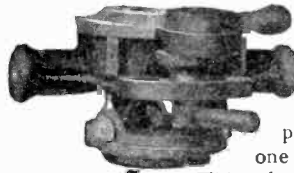
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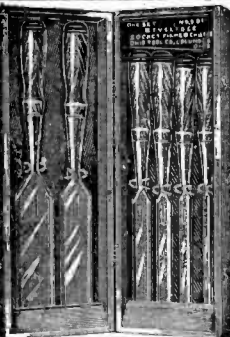
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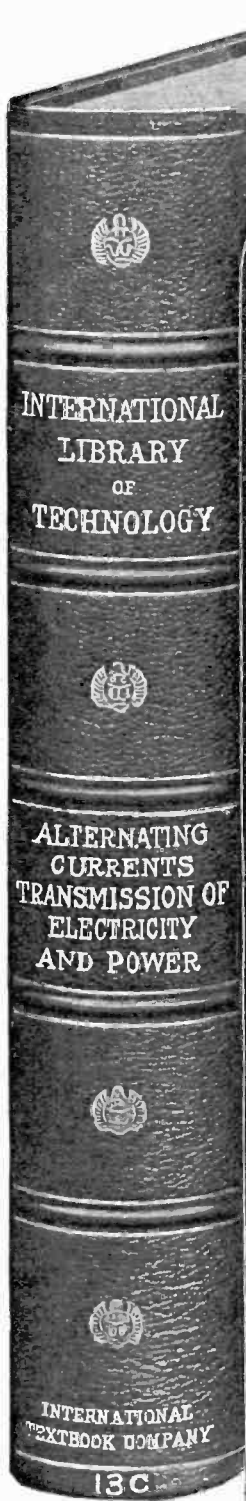
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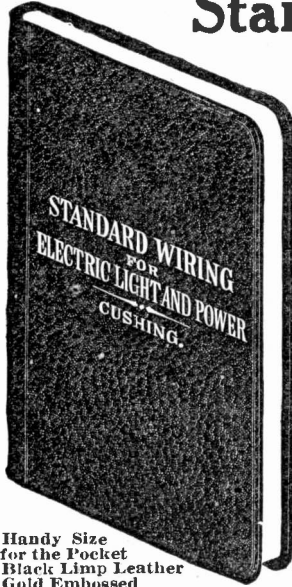
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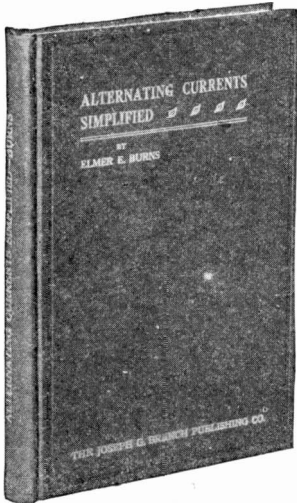
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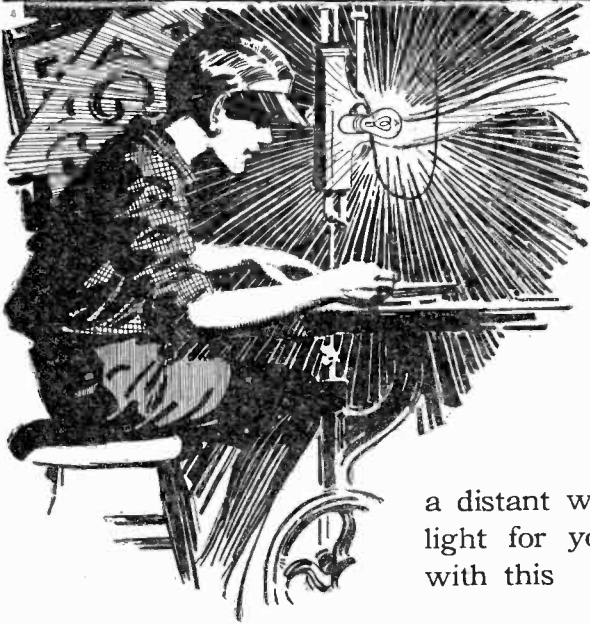
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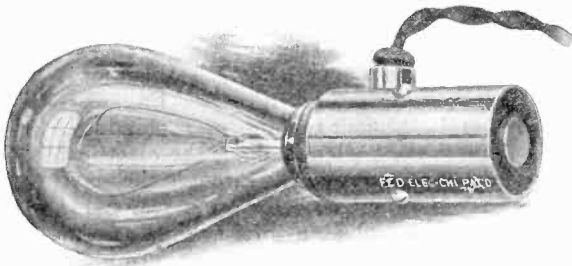


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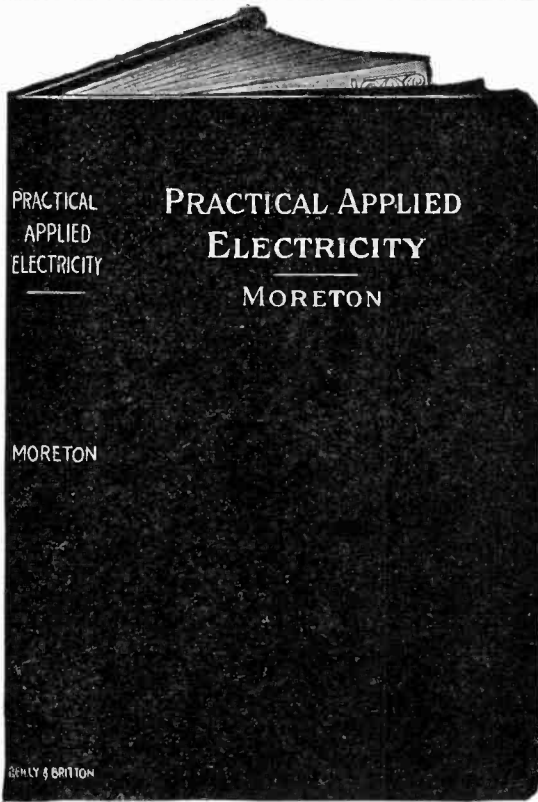
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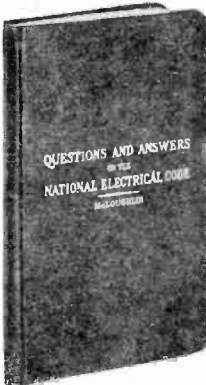
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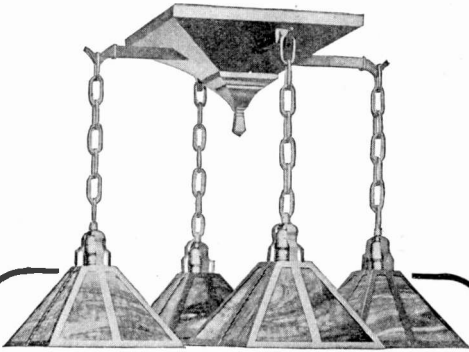
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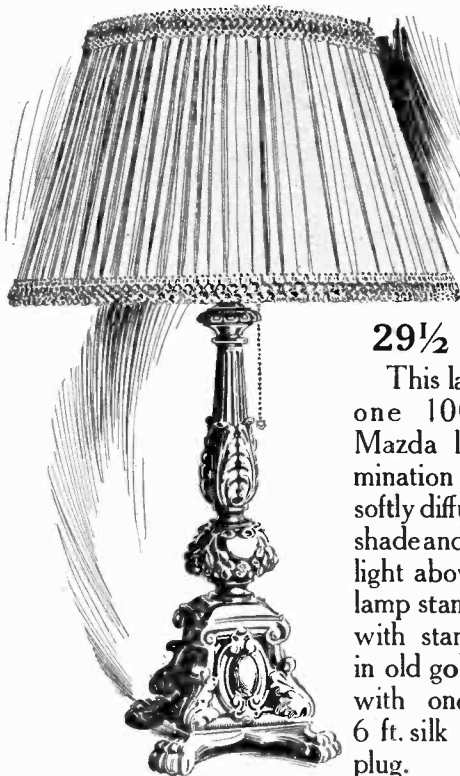
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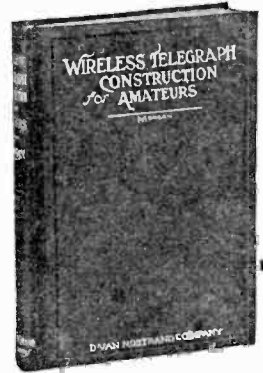
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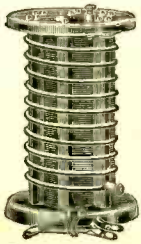
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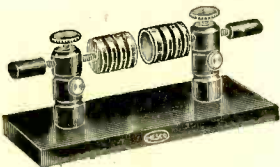
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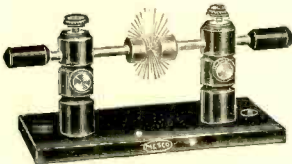
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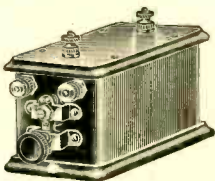
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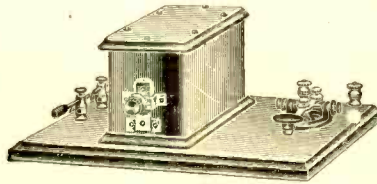
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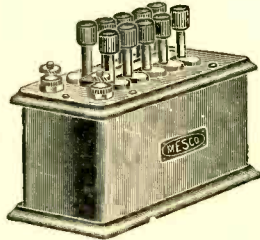
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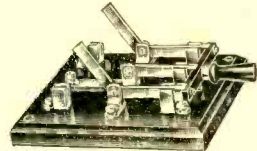
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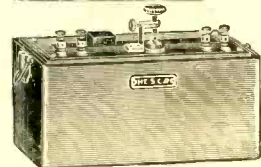
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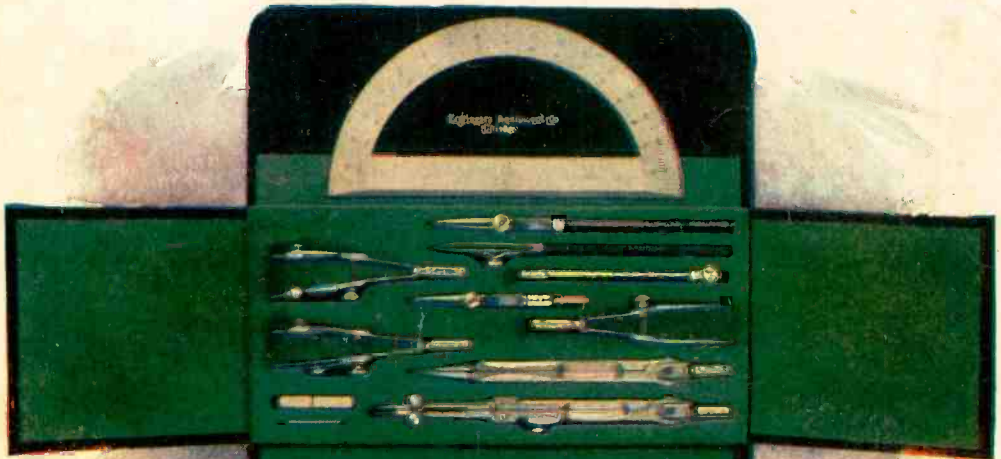
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