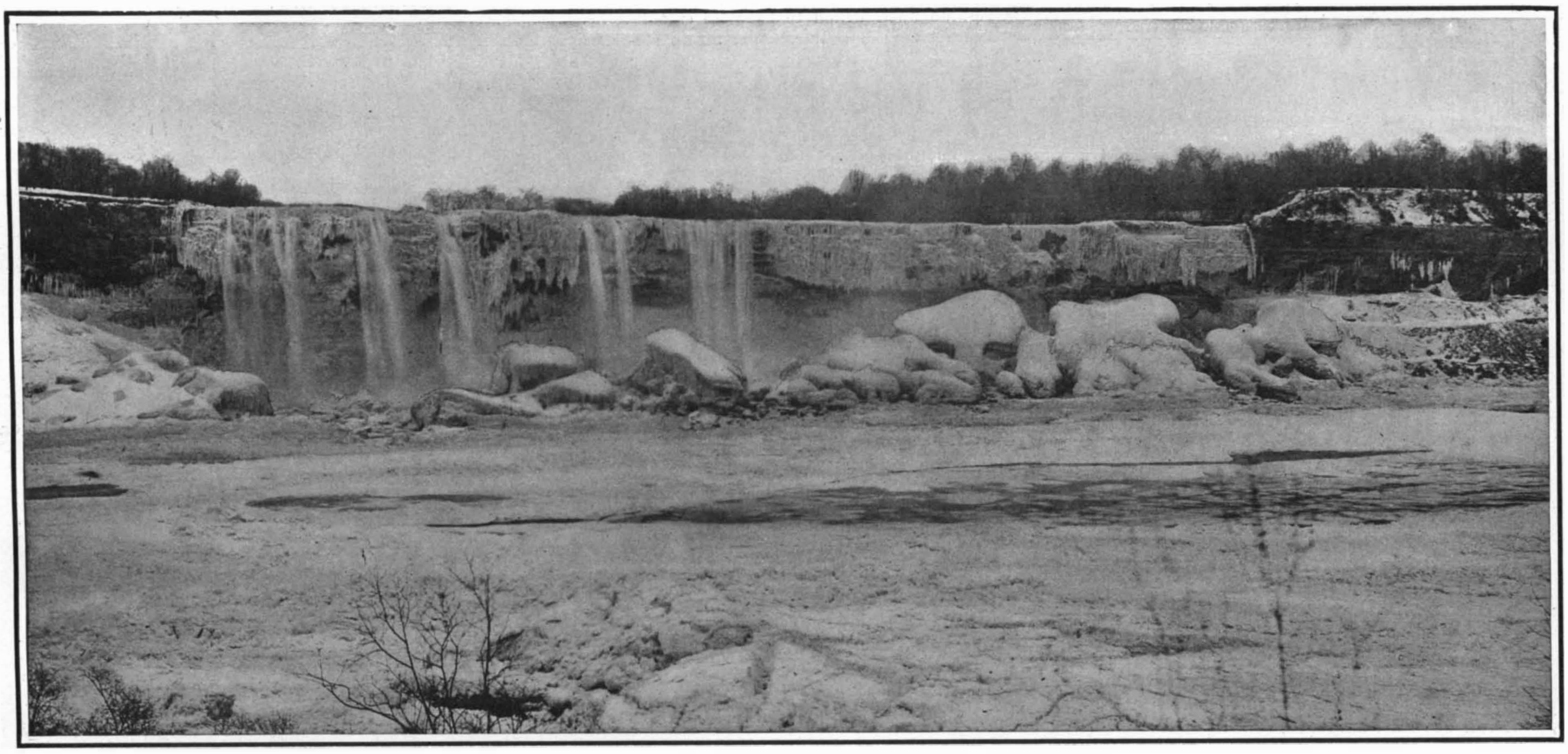
SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1909, by Munn & Co.]

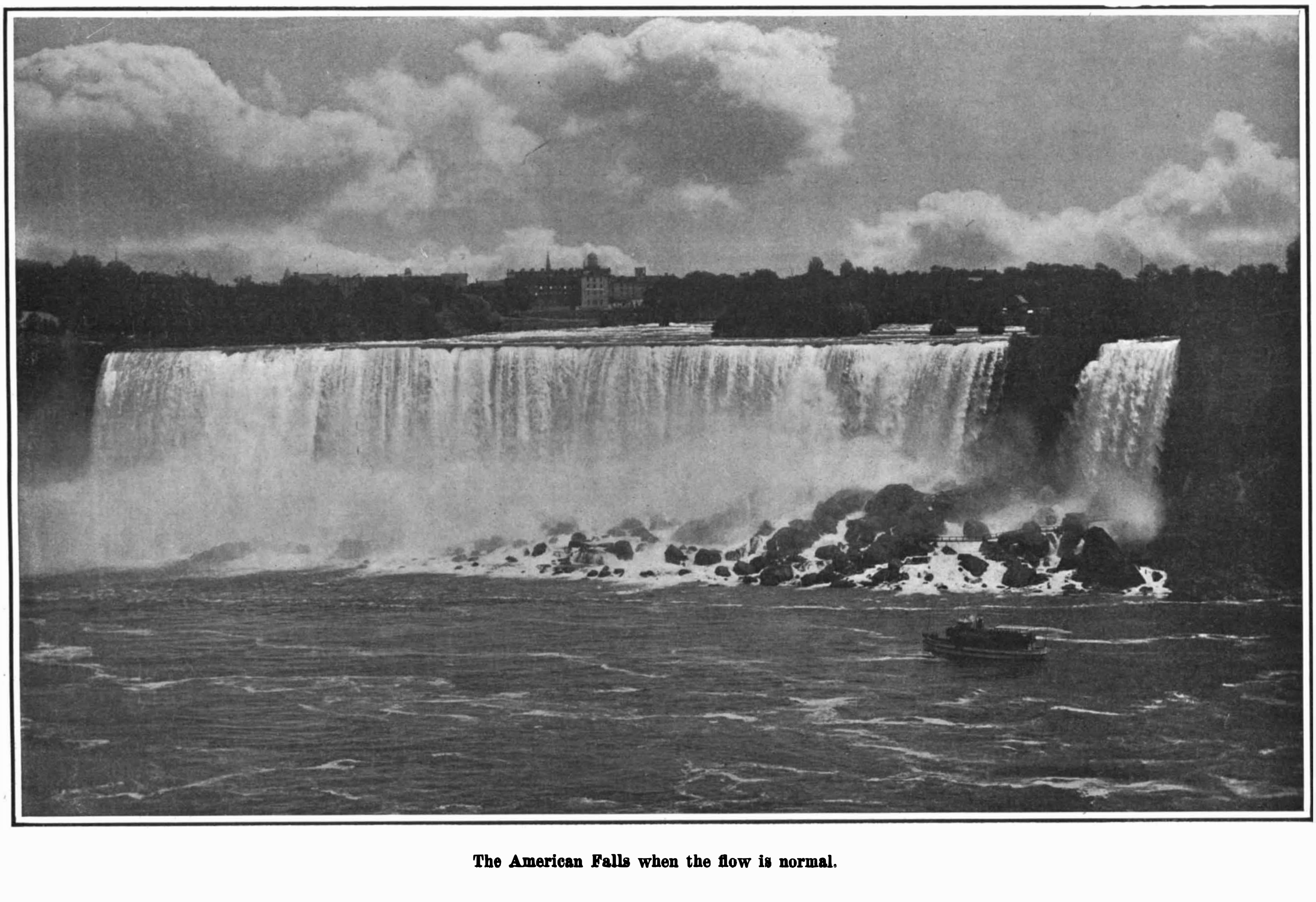
Vol. C.—No. 10.
ESTABLISHED 1845.

NEW YORK, MARCH 6, 1909.

10 CENTS A COPY
$3.00 A YEAR.



The drying up of the American Falls due to the backing of the water of Lake Erie. An east wind blew up the lake and drove the water back so that the amount ordinarily discharged into the channel which feeds Niagara Falls was greatly reduced. An ice jam helped to dam the flow.



The American Falls when the flow is normal.

THE RECENT SUBSIDENCE OF NIAGARA FALLS.—[See page 187.]

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO. - - Editors and Proprietors

Published Weekly at
No. 361 Broadway, New York

CHARLES ALLEN MUNN, *President*,
361 Broadway, New York.
FREDERICK CONVERSE BEACH, *Sec'y and Treas.*
361 Broadway, New York.

TERMS TO SUBSCRIBERS.

One copy, one year, for the United States or Mexico $3.00
One copy, one year, for Canada 3.75
One copy, one year, to any foreign country, postage prepaid, 18s. 6d. 4.50

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (established 1845).... .... $3.00 a year
Scientific American Supplement (established 1876)........... 5.00 "
American Homes and Gardens .... 3.00 "
Scientific American Export Edition (established 1878). ...... 3.00 "

The combined subscription rates and rates to foreign countries, including Canada, will be furnished upon application.

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, MARCH 6TH, 1909.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE NEW STEEL.

The recent statement by one of our leading ironmasters that the steel industry of America had progressed to a point where it was secure against foreign competition, and particularly against British competition, has been followed by the announcement of an important discovery by the Sheffield manufacturers, which the British steelmakers regard as one of the most important advances in the art of steel manufacture of recent years. They even go so far as to assert that the new steel will give Great Britain a considerable lead, at least as far as quality is concerned, for some years to come. The announcement, which was made by Prof. Arnold of Sheffield University, had reference to the production of a new tool steel, which is stated to possess from three to seven times the cutting endurance of the best known high-speed steel, and which has the further advantage that it can be water-hardened.

Now, although the new invention cannot be regarded as revolutionary, and, considered in respect of tonnage output, will affect but a very small percentage of the total steel production, it will, of course, have a far-reaching effect upon shop practice, and must greatly reduce the labor cost of the output of the machine shops. Prof. Arnold states that it is a new departure in metallurgy to have produced a water-quenched steel, which will make an all-day run with the cutting edge of the tool at a bright red heat, without the necessity which exists in the present steel of four or five visits to the grindstone.

AMERICAN AND BRITISH TURBINES.

The fact that the British government has ordered an American turbine for one of its new high-speed cruisers will afford an opportunity for a test of the two leading types of marine turbines, the Parsons and Curtis, similar to that which was made last summer, in the trials of our scout cruisers "Chester" and "Salem"—a contest which is to be repeated in the forthcoming long-distance trials of these ships. Because of the early start and brilliant record of the Parsons marine turbine, the American type, as designed by Curtis, has a severe handicap to overcome. Therefore, the fact that it should have equaled, and in some respects excelled, the Parsons turbine in the very first comparative test that was made, must be regarded as significant; and the decision of the British government to give the American type a trial was prompted, no doubt, by the excellent results obtained by the turbines of the "Salem." In speed and in steam and fuel economy, the two types of turbines showed approximately the same results; but in convenience of operation the advantage lay strongly with the American type. The Parsons turbines cannot be reversed, the Curtis can; and the former must include a special turbine for driving the ship astern. For ships of large power the Parsons must use six turbines, four shafts, and four propellers. The Curtis gives the same results with two turbines, two shafts, and two propellers. To secure the best results on four shafts, the propellers must be small and must be run at very high speed, and there is a resulting vibration which is very disturbing to the gunner. With the power developed in two shafts, the propellers may be larger; they can be run at a lower rate of revolution; superior propeller efficiency is obtained; and the vibration, as was proved in the trials of the "Salem," is practically negligible—so much so as to win the enthusiastic comments of the naval officers who were on board at the trial. The American type of turbine is now being tested in a British cruiser; in the latest Japanese "Dreadnought" battleships and cruisers; and in the "North Dakota," one of our "Dreadnoughts." The determination of the relative all-round efficiency of these two leading representatives of the new type of motive power will afford one of the most interesting competitions in the history of steam engineering.

THE SECOND SEA POWER—AMERICA OR GERMANY?

BY OUR ENGLISH CORRESPONDENT.

The SCIENTIFIC AMERICAN has earned the right to be considered an expert authority on naval affairs, and it is so considered both in America and in England, where this article is being written. For this reason it becomes more than ordinarily important that any statement it may make on this subject should be absolutely trustworthy, giving to the nation a reliable guide upon which to base its calculations. It is proposed by the writer to submit to a close examination a statement, made editorially in its issue of January 23d last, to the effect that the annual construction of two battleships is sufficient to maintain the position of America as the second naval power.

The only other aspirant for that position is Germany. France may, in the course of a dozen years or so, attain a naval strength which will entitle her to be taken into consideration, but for the present her deficiency in large armored ships of modern type, the slowness of construction, and the inefficiency of her personnel, rule her out of the reckoning. Russia, too, may be ignored for similar, and stronger, reasons; while Japan, although strong at sea and contemplating the construction of some very powerful ships, is too handicapped by financial considerations to become a rival candidate for the position for many years. There remains Germany; and her present strength, the efficiency of her personnel, and the rapid expansion of her fleet in recent years, all entitle her to be reckoned—and reckoned seriously—as a candidate for the position now held by our own navy.

What, then, is the position at sea as between Germany and the United States? Here is a summary of the completed armored ships of the two fleets:

	United States.	Germany.
Battleships less than ten years old from date of launch	16	18
More than ten years	9	6
	25	24
Armored cruisers less than ten years old from launch	13	7
More than ten years old	2	1
	15	8

It will be seen from these figures that the United States' superiority in armored ships over Germany is quite appreciable, and it becomes greater as one examines the details. The 25 battleships of the United States have a total displacement of 334,180 tons normal to a total of only 287,140 for the 24 German vessels, while the figures for the armored cruisers are: United States, 186,915 tons; Germany, 79,030 tons. Further, all the battleships of the former carry either 12-inch or 13-inch guns as their main armament, while of the German ships fourteen have 11-inch and the remainder only 9.4-inch guns as their principal weapons.

It is, however, when one comes to look at what has been happening within the last two or three years, and, more important still, what is going to happen in the near future, that the inadequacy of the suggested programme of two battleships annually becomes evident. It will have been seen from the analysis given above, that the United States have three more battleships over ten years old than Germany, but that that nation has two more under ten years than we have. This dangerous tendency—vulgarly known as "living on our fat"—is growing, and the following comparison of the programmes of the United States and Germany for the last few years will show how serious it is becoming:

ANNUAL PROGRAMMES, 1904-1909.

	United States.		Germany.	
	Battleships.	Armored Cruisers.	Battleships.	Armored Cruisers.
1904	2	0	2	1
1905	1	2	2	1
1906	2	0	2	1
1907	2	0	2	1
1908	2	0	3	1
1909	2	0	3	1
	11	2	14	6

These figures show that in six years Germany has laid down three battleships and four armored cruisers more than America. Further, ten of the German battleships and three of the crusiers are of the "Dreadnought" type, whereas only six of our battleships answer to that description. It is interesting to note that in the same period Great Britain (whose programme for 1909, however, is not yet known) has laid down only ten battleships and seven armored cruisers, so that Germany has been building warships even more energetically than the first naval power herself.

A scrutiny of the above figures will show that a yearly programme of two battleships has not been sufficient in the past to guarantee the position of the United States as second naval power; nor will it be in the future, for the enlarged programme upon which Germany embarked in 1908—three battleships and one armored cruiser per annum—is to be repeated again in 1910 and 1911; and although from 1912 onward only one battleship and one cruiser yearly are as yet contemplated, it is confidently expected that a new navy bill will be introduced in two years' time which will keep the rate of construction up to its present level. If, therefore, we carry our calculations only as far as 1911, it will be found that in that year Germany will possess the following armored ships, built and building:

	Battleships.	Armored Cruisers.
Completed by or before 1908	24	8
Provided for—		
In 1906	2	1
In 1907	2	1
In 1908	3	1
In 1909	3	1
In 1910	3	1
In 1911	3	1
	40	14

Sixteen of the battleships and five of the cruisers will be of the "Dreadnought" type.

Under the suggested annual programme of two battleships, the increase in and position of the United States navy in 1911 would be as follows:

	Battleships.	Armored Cruisers.
Completed by or before 1908	25	15
Provided for—		
In 1906	2	0
In 1907	2	0
In 1908	2	0
In 1909	2	0
In 1910	2	0
In 1911	2	0
	37	15

Of these totals, ten battleships would be of the "Dreadnought" type, but not a single cruiser, so that Germany would have, all told, twenty-one "Dreadnoughts" to America's ten, built and constructing. Already Germany has ten "Dreadnought" battleships and three "Dreadnought" cruisers under construction to our six battleships building and authorized, and it would seem to an impartial observer that nothing short of an annual programme of five "Dreadnoughts" can save the United States from being ousted from her position. Great Britain herself can only maintain a bare "Dreadnought" lead over Germany by laying down seven "Dreadnoughts" this year (according to rumor six will be provided for), so that the seriousness of German naval ambitions and of the position of the United States can easily be seen. For many years the authorities in England have shut their eyes to the marvelous naval expansion of Germany, hoping against hope that something would turn up to nip her ambitious projects in the bud. They have at last been forced to admit the growing seriousness, with the result that the economy of the last three years has got to be made good in one. It is just the same with the United States. If they wish at the same time to reap the advantages of steady shipbuilding and to keep their position as second naval power, then they must formulate their programmes according to the efforts that are being made to eject them from it. Germany—now the third in strength—is building three battleships and one armored cruiser every year; surely the United States cannot be content with a smaller programme than this—not to mention one only half the size.

With regard to the accessories of naval power—scout cruisers and torpedo craft—the following figures summarize the position:

	United States.	Germany.
Protected cruisers and scouts of 22 knots and over	5	13
Torpedo-boat destroyers over 400 tons)	21	72

Of the five American cruisers, the "Columbia" was built in 1892, the "Minneapolis" in 1893, and the "Salem," "Chester," and "Birmingham" in 1907. None is building. All the German vessels have been built since 1903, and there are under construction six cruisers of 25.5 knots. Fifteen destroyers are building and authorized for the American fleet and twenty-four for the German, while the latter country will lay down twelve every year up to 1917. It is, therefore, not only in armored ships that Germany is outbuilding the United States, but also in cruisers and torpedo craft; and since no fleet is properly equipped without a full complement of these vessels, it follows that if the United States are to keep their position at sea, they must be prepared to provide a large number of these, as well as an adequate force of armored vessels.

ENGINEERING.

The engineers who built the Cortlandt Street tunnel below the Hudson River are justly proud of the fact that the whole 5,900 feet of pnuematic work was driven through without the serious injury through air pressure of a single workman. The tunnel was built under air pressures of from 25 to 35 pounds to the square inch, and the enviable freedom of the workmen from attacks of the "bends" is due mainly to a searching medical examination of all candidates for the compressed-air work.

The facts regarding the improvement in gunnery in the British navy are readily ascertainable, thanks to the government practice of regularly publishing this information. In 1905 the percentage of hits to rounds fired in the navy was 20.02; in 1906 it rose to 34.60; in 1907 it was 35.81; and last year there was a big jump to 58.32. The number of hits per gun per minute in 1908 was 0.56 for the 10 and 12-inch guns; 2.20 for the 9.2-inch; 2.51 for the 7.5-inch; 3.98 for the 6-inch, and 3.32 for the 4.7-inch and 4-inch.

The January rainfall at the Panama Canal was the heaviest on record for that month since American occupation. The average at fifteen stations was 4.34 inches as against 1.19, 0.87, and 1.04 inches in the three preceding months. The total excavation for the month was 2,924,551 cubic yards, which is 391,316 yards less than the December output. There was a temporary disturbance of the work on the central division, due to a heavy freshet of the Chagres River, when a maximum height of 66 feet above sea level was reached. No serious damage was done to the work.

The United States and Canada have decided to limit the total amount of water that may be taken from Niagara River for power purposes. The average discharge of the river is 250,000 cubic feet per second; and if the total fall from Lake Erie to Lake Ontario were utilized, it would represent about 7,000,000 horse-power. The total available horse-power at the Falls is estimated at about 4,000,000. According to the treaty, the power companies on the Canadian side are to be limited to 36,000 cubic feet per second, and those on the American side to 20,000.

The various steamship companies are taking steps to apply to their wireless apparatus the lessons learned from the "Republic" disaster. It will be remembered that the flooding of the engine room put out of commission the generator which supplied the current for the wireless plant of that ship; and this fact has shown the necessity for providing an auxiliary source of current supply, located preferably on one of the upper decks. The North German Lloyd Company use for this purpose two dynamos in separate compartments, and two emergency dynamos located in the Marconi house on the boat deck. To this equipment is added two sets of storage batteries. This is characteristic German thoroughness; it should serve as a model for all transatlantic passenger ships.

Since the London and South-Western Railway Company took over the dock system of Southampton, seventeen years ago, the development of the port has been extraordinarily rapid. Then, 5,000 tons was the displacement of the largest liner entering the port. In a few years the tonnage had increased to 10,000. It soon rose to 12,000, and now, with the advent of the White Star Line, the latter figures have more than doubled. Within the next three years, the 25,000-ton "Adriatic," the largest vessel at present entering the port, will be dwarfed by the two 60,000-ton leviathans, which are being built for the White Star Line at Belfast.

A large blast-furnace gas engine of the Nürnberg type, recently erected for the Barrow Haematite Iron and Steel Company, is representative of the latest practice in this direction. The engine, which works on the Otto cycle, is double acting, with two cylinders placed in tandem. The gas cylinder is 35 inches diameter by 43¼ inches stroke, and the engine develops 1,100 brake-horse-power at 90 revolutions per minute. The piston rod, piston, and exhaust valve chambers and outlet valves are cooled by water under pressure, and the gas mixture is ignited by current taken from a small accumulator battery. The governor of the blowing engine controls a small safety governor, which throws out the ignition when the engine exceeds 95 revolutions.

One of the limitations set upon the securing of high speed in ships of the navy and merchant marine is the difficulty, particularly on the last day of a run, of getting the coal from the bunkers to the furnaces as fast as the latter require. The best solution of the problem would seem to be the use of some form of mechanical conveyer; and that this mechanism may be successfully applied has been proved in the case of the "Minnesota," one of the largest steamships in the world, which is now running in the service of the Great Northern Steamship Company. A conveyer of the link-belt type has been installed, which is so located as to deliver coal at the rate of 45 tons an hour directly in front of the boilers.

ELECTRICITY.

Visitors to Niagara Falls last summer, who were enthusiastic in their admiration of the electrical illumination, will be glad to learn that prominent citizens of Niagara are endeavoring to raise a fund to pay for the permanent illumination of the Falls during summer seasons.

In connection with his new system of wireless telephony, Prof. Q. Majorana uses a liquid microphone. This consists of a small tube attached to the diaphragm of the microphone and through which a stream of water flows between a pair of platinum electrodes. The water is slightly acidulated so as to complete the circuit between the electrodes. However, when the microphone is vibrated by the voice the stream of liquid fluctuates, varying the electrical resistance in accordance with the sound of the voice.

A grout mixing machine is in use by the United Railways Company of St. Louis. It consists of an old mail car, one-half of the body of which has been removed to make room for a mixing tank. The latter is furnished with paddles driven by an electric motor, which keep the sand and cement thoroughly mixed while the car is traveling to the point where the grout is to be used. When the car arrives at its destination water is added and the mixture is immediately ready to be discharged through a spout to the desired point.

The Aero Club of New England is fitting the dirigible balloon "Massachusetts" with a wireless telegraph plant so that it can communicate with a land station located in the city. It has often been suggested that wireless telegraphy could be used to advantage in communicating with airships, but the danger of igniting the hydrogen gas of the balloon with the sparks used in the telegraph apparatus has deterred experiments of this sort. However, it would seem a simple matter to incase the telegraph apparatus in such a way as to obviate all danger.

According to daily press reports wireless telephony has not proved an unqualified success on the battleship fleet. It was impossible to send messages over any great distance except under the most favorable conditions, and when the telephone was in use the telegraph had to keep silent. Wireless telephony is still in its infancy and cannot be expected to compete with wireless telegraphy at the present time. The main trouble seems to be the difficulty of controlling in so delicate an instrument as a telephone transmitter the powerful currents necessary in any spark-gap system.

One of the principal objections to the use of the telephone for railroad dispatching is the fact that many vocal sounds are lost or very poorly transmitted by the very best of instruments now in use. For this reason it is often necessary to repeat a word or spell it out before it can be understood. Mr. Edison has recently been endeavoring to improve the telephone so that all sounds can be transmitted with perfect clearness. He is experimenting with a new transmitter of "variable pressure type with novel electrodes," with which he expects to obtain the desired result.

An electrical anemometer has recently been devised which is based on the fact that the resistance of platinum varies in proportion to its temperature. Prof. R. B. Goldschmidt, of the University of Brussels, is the inventor of this apparatus. It consists of two wires, one of which is exposed to the wind, while the other is shielded from currents of air, but yet is subject to the surrounding temperature. The wires form two branches of a Wheatstone bridge, and the galvanometer connecting the bridge is not affected when there is no wind, as the temperature of the two wires must remain the same whether the surrounding temperature rises or falls. In case of a current of air striking the wire, there will be a difference of temperature which will be recorded by the galvanometer. The direction of the wind is indicated by a recording weather vane, which is used in connection with the anemometer.

The principle on which silicon, perikon, and molybdenite detectors operate is discussed by their inventor, G. W. Pickard, in a recent number of the Electrical Review and Western Electrician. He finds that the crystals used act as rectifiers, permitting the current to flow in one direction, provided the contact points at opposite sides of the crystals are unequal in area. In order to get the maximum effect, the crystal is imbedded in lead so as to provide a large contact surface, while the other contact is microscopic in character, consisting of a fine metallic point resting against the opposite side of the crystal. The current then flows from the small point to the large contact area. A hydraulic analogue is adduced to explain the phenomenon. It is quite possible that this explanation may clear away the mystery of the electrolytic detector, the precise action of which is still in dispute, some claiming that it is thermal in character, and others that it is electrolytic.

SCIENCE.

The fineness to which the rags are ground has no direct influence on the durability of the paper, for even broken cells of linen and hemp remain unchanged for thousands of years in favorable conditions. The employment of strong alkalies and of starch size appears to be the cause of rag paper becoming yellow and brittle, while neutral or mildly alkaline treatment and animal size favor durability. Great discoloration and "water stains" are probably due to excessive rotting and liming. Air drying favors the durability of paper. Even the best rag papers are injured, if not destroyed, by soaking or excessive dampness. It is impossible to speak with certainty of the durability of modern papers containing few or no rags, as the ultimate effect of the new process of making, sizing, loading, and calendering cannot be foreseen. Many new papers have already proved their lack of permanence. Very few newspapers, for example, are likely to survive many years.

The French physicists Bethisy, Fonchard, and Vignes are said to have succeeded in making an incombustible substitute for celluloid. The material is made from tetranitrocellulose, containing about 40 to 45 per cent of water; a product of a liquid hydrocarbon. After thorough mixing of the mass, the water is expressed therefrom, and the remaining material changed, by treatment with albumen, vinegar, ether, acetone, amylacetate, and alcohol, into a plastic mass. After standing twenty-four hours it is worked into rods between hot rolls, until it is of a firm consistence; is then cooled, and next denitrized by suitable means. The working with rollers is then repeated, and the sheets thus obtained are worked for six hours in a steam chamber under a hydraulic pressure of 150 atmospheres (2,250 pounds per square inch). The pressure is then increased to 200 atmospheres; and instead of steam, cold water is employed. This process brings the material into the form of very hard blocks, which are then cut into sheets and dried. In order to make tubes, rods, etc., the material is shaped in suitable molds.

The last year of the American Museum of Natural History has been the most notable in the history of the institution. In the last eight years the museum has expended directly $932,008 on its explorations and collections. The estimated total value of the collections secured during this period by exploration, by purchase, and by gift to the museum is more than $2,000,000. For every dollar which has been expended by the city more than a dollar has been added to the enlargement of the collections. The present endowment fund, including the Jesup bequest, is $2,048,156.61. To keep pace with the very rapid growth of the city and the demands it is making for public scientific education, an endowment fund of $5,000,000 is sought. In every part of the world the advance of civilization and the spread of firearms are rendering more scarce the objects of natural history of all kinds, including the works of the primitive races of men. It is deemed vitally important to push the explorations of the Museum in all parts of the world, while it is still possible to secure these fast vanishing works of nature and of primitive man.

Recent discoveries in regard to the nature of soil fertility have suggested the employment of various novel fertilizers. Manganese has been applied with success, and now M. Rigaux has published an account of a series of experiments, made in Belgium, in the employment of magnesia as a fertilizer for cereals, potatoes, beets, and leguminous crops. The magnesia was applied in the form of kainit, or Stassfurt potash salt, which contains 14 per cent of magnesium sulphate. Rigaux had previously proved that the quantity of magnesia in arable land is smaller than is generally supposed, and that the surface soil always contains less magnesia than the subsoil. Magnesia is found in plants in considerable quantities, constituting, for example, 13 per cent of the ash of wheat and 8 per cent of the ash of oats. Hence, if no magnesian fertilizer is applied, repeated cropping must exhaust the magnesia of the soil, to the detriment of succeeding crops. It appeared probable, therefore, that the application of magnesia would produce a beneficial effect. This theoretical conclusion was fully confirmed by the experiments. The yield of sugar beets was increased by 4,500 pounds per acre, and the percentage of sugar was not diminished. With grains, the increase varied from one-seventh to one-fifth of the total crop. On barley magnesia had the peculiar effect of diminishing the proportion of nitrogenous constituents. This property is of advantage to brewers, who find great difficulty in making beer of good keeping qualities from barley rich in nitrogen. The crop of potatoes was increased from 21,000 to 27,000 pounds per acre and was rendered immune to the attacks of the *Peronospora* (mildew fungus), which infested the part of the field on which no kainit was used. Finally, the yield of hay from natural meadow land was increased from 3,000 to 4,150 pounds per acre.

POSSIBILITIES OF THE FUSIBLE CORE PROCESS.

The fusible core process permits the construction of rubber to a desired thickness, and a reinforcement of the rubber with fabric to procure a desired strength upon a core or mandrel that will fuse or melt at a desired temperature, and can be removed from the interior of a rubber article in the form of a liquid after vulcanization.

Previous to this invention, gases had to be relied upon to expand within the rubber under heat. Expansion of this kind was naturally haphazard, and the thickness of the shell of rubber necessarily an unknown quantity.

If a solid mandrel was used to secure proper compression of the rubber, it has heretofore been necessary to cut the rubber to remove the mandrel or core; and revulcanization has had to be relied upon to close up the aperture. Second vulcanization of rubber is never reliable. By this process it is possible to produce, for illustration, water bottles on a core, building them to a desired thickness, compress them with hydraulic pressure, cure from the exterior to the interior, and fuse the core and remove the same through the neck of the bottle in the form of liquid, making a one-piece article built to a proper thickness and desired strength.

A bicycle or automobile tire may be built up in layers around a fusible core, subjected to pressure, cured, and the core fused and removed through the aperture used as a valve stem, in the form of a liquid. Pneumatic recoil cushions can be constructed of any desired strength by building up rubber and canvas around a core to a thickness the strength of which can be mechanically estimated, curing the rubber, fusing, and removing the core in liquid form through the valve stem, which can be afterward used to convey air to the interior of the cushion.

Life preservers can be constructed of a desired thickness to withstand the elements to which they are subjected, and a sufficient aperture constructed in the same to admit such a quantity of air as may be necessary to produce the proper buoyancy. By this process it is possible to cast a core of any desired dimension, building rubber to any desired thickness upon the same, and so secure the exact strength required for the gas container of dirigible balloons. Navigation in the air has heretofore been made practical by the construction of balloons by a combination of silk and rubber with lapped seams. The pressure of the atmosphere is such at various altitudes as to rend the seams, and in this manner destroy the balloon.

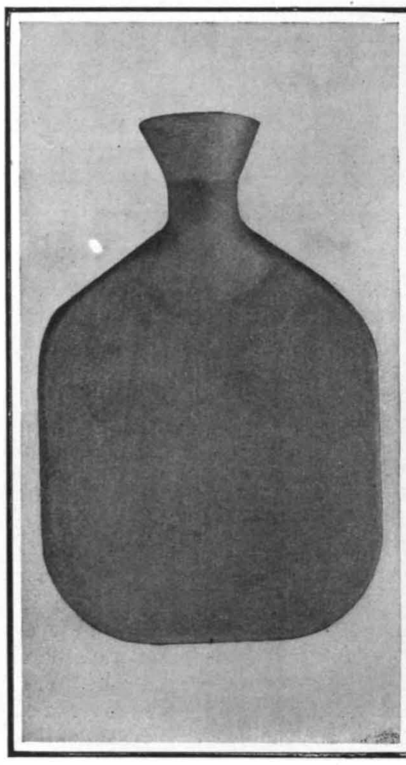
By the fusible core method a reliable thickness of rubber could be constructed over the core and molded, the rubber cured, and the core fused and removed through the valve stem, afterward used as a passage for the hydrogen gases. Construction of this nature can be made absolutely reliable.

This process can be carried still further, and the fusible core cast hollow and filled with air or gases. The rubber can then be built to the desired thickness on the outside, compression used, in conjunction with heat that is not sufficient to soften the core, to compact the rubber by external pressure, and the temperature then raised to a heat necessary to cure the rubber. This heat, radiating as it will to the inside of the core, expands the gases in the core, and when the core liquefies the gases continue their expansion, and assist the external pressure by pressing outward.

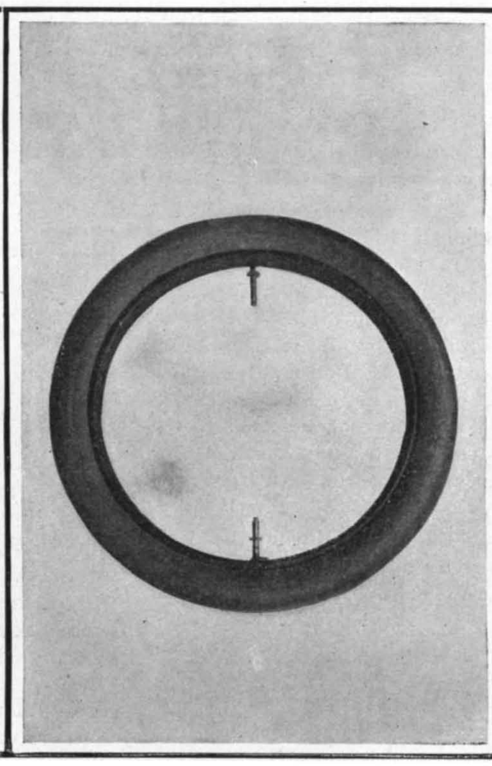
Articles cured in this manner have been subjected in the laboratory of the Massachusetts Chemical Company's Walpole Rubber Works to an external pressure of 2,000 pounds to the square inch, and internal gas pressure of 200 pounds per square inch. In this manner the rubber is compressed from all directions into one solid mass. Compression from all directions is as essential to procure perfect rubber goods as curing is.

Some of the large manufacturers of pneumatic tires have discovered this fact, and at the present day many tires or auto shoes are semi-cured on a solid mandrel, the said mandrel removed from the shoe, and a gas bag replaced where the mandrel is removed, and curing continued, so as to get external pressure followed by internal pressure to compact the rubber.

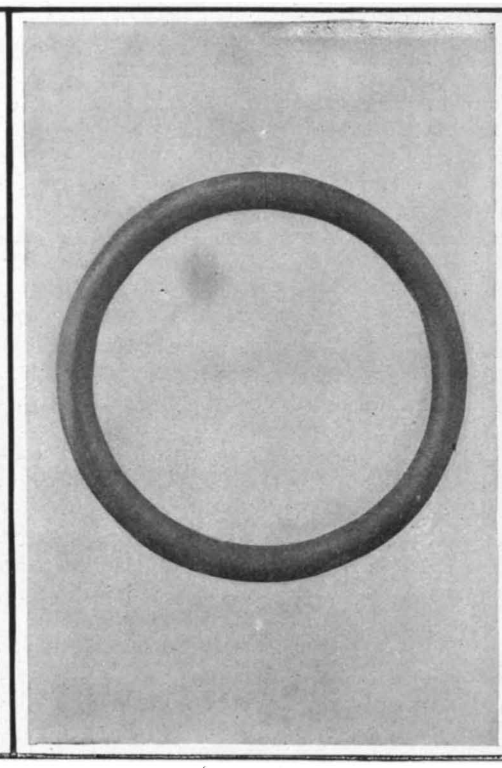
The fusible core process, as worked out and perfected by Mr. F. J. Gleason, vice-president and general superintendent of the Massachusetts Chemical Company's Walpole Rubber Works, bids fair to revolutionize not only many articles of everyday use, like hot-water bottles, rubber goods of every description, automobile and bicycle tires, but those of a more limited use as well, such as balloons, life preservers, etc.



Fusible core upon which water bottle is molded.



The core is melted and discharged through the air valves.



Core upon which adjoining tire was molded.

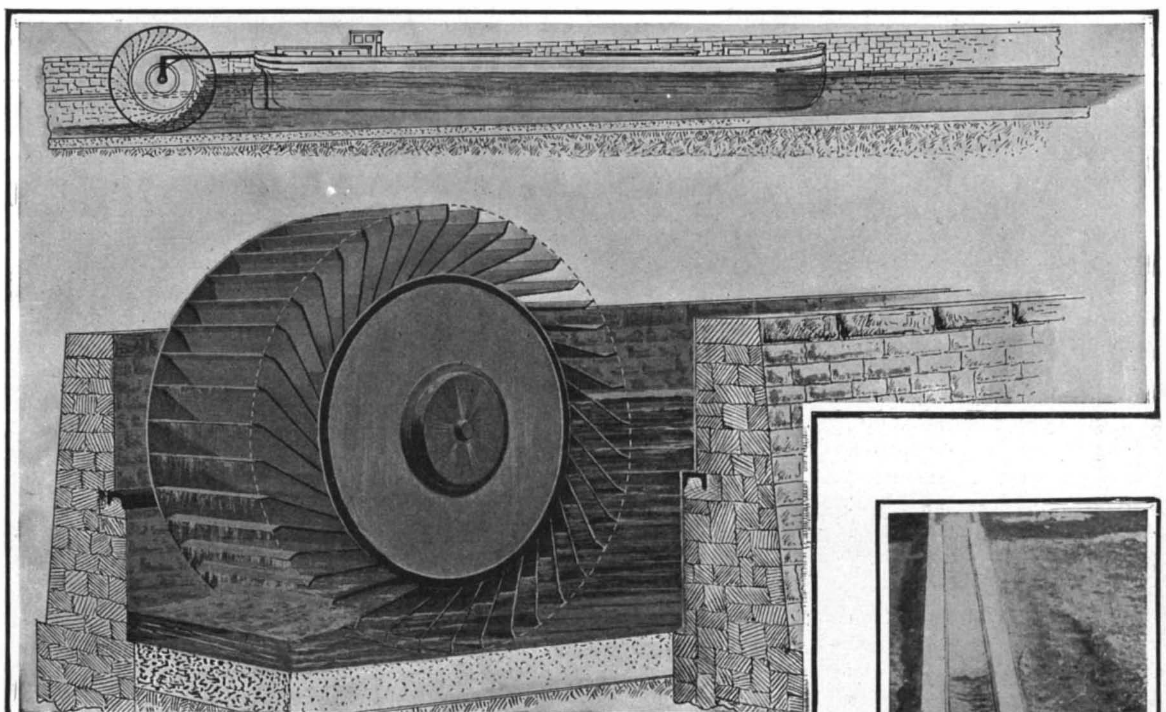
Bottle after fusible core has been melted and run out.

POSSIBILITIES OF THE FUSIBLE CORE PROCESS.

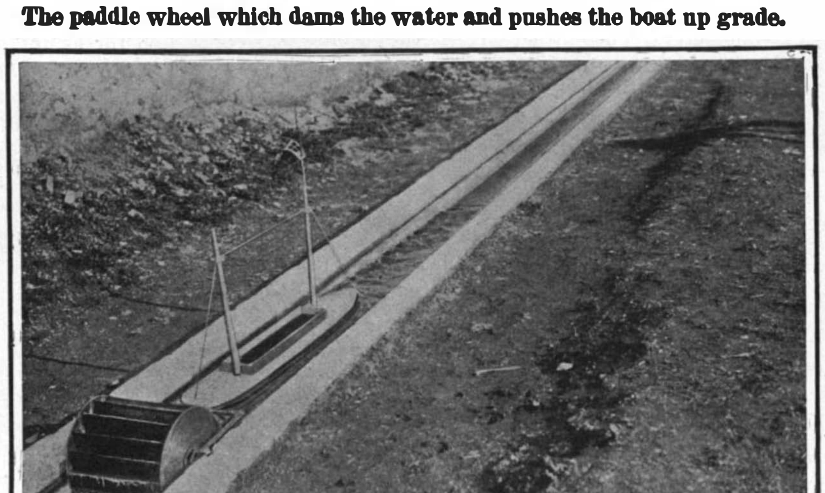
A MOVABLE LOCK FOR INCLINED CANALS.

BY H. PRIME KIEFFER, C.E.

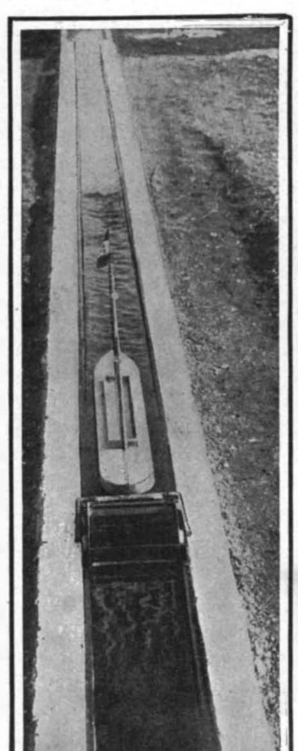
Engineer Giuseppe Bartolomei of Rome, Italy, has recently invented a movable self-propelled canal lock, which forms one of the cleverest and most ingenious advances since the employment of canals for transportation purposes was begun.



The paddle wheel which dams the water and pushes the boat up grade.



Model boat afloat in the dammed-up water being propelled up the canal.



Note the water backing up in front of wheel.

A MOVABLE LOCK FOR INCLINED CANALS.

The movable canal lock as designed by Signor Bartolomei consists primarily of a paddle wheel placed across the section of the canal, with the axis of the wheel resting on iron rails set into the retaining walls at the sides. It is presupposed that the canal is an inclined one, as otherwise there would be no use for locks. The canal may have an inclination of from 3 to 6 or even 7 per cent, and the grade need not necessarily be constant, but different stretches have different grades.

A clear idea of the system can best be obtained from the accompanying drawings and photographs, which were made from the model of the system which Signor Bartolomei has built near Rome. The writer made a thorough study of the model while on a visit to Rome recently. The model canal is about 80 feet long, the width between the rails 14 inches, while the distance from the base of the canal to the running base of the rails is 6 inches. The sides of the canal are perpendicular, and the bottom in cross section is horizontal. The iron T-rails are placed on offsets in the walls, at a distance of about 2 inches from the top of the walls, the base of the rails being placed flat on the offsets. The small boat used is barge shaped, is 3 feet 6 inches long, and draws 4 inches of water. The canal has 25 feet each of 3, 4, and 5 per cent inclines, the remaining 5 feet being open. As may be readily seen from the drawings, the paddle wheel just about closes the canal, the opening below the wheel being about ⅜ inch, or just enough to allow a slightly less quantity of water to pass under the wheel than comes down the canal. The wheel is then locked by a simple device, and the water backs up for a distance of 15 to 20 feet, thus giving a head of about 6 inches. The wheel is then unlocked and immediately begins to revolve, rolling upstream by the aid of the power generated with this head. The greater the head, the faster the wheel moves, thus allowing the water to pass under the wheel faster. When the water has reached its normal head of 6 inches, the wheel assumes its normal speed, which in the case of the model was about one-half mile per hour. It will be seen that the movement of the lock, if it may be so called, is automatic. It should be mentioned that the amount of traffic would make no difference, so long as the boats keep a few hundred feet apart. To stop or hold the boat at a certain point, it is necessary only to lock the wheel and raise it enough to allow the ~rect quantity of water to pass under to keep the .t afloat.

So far we have been concerned only with the movement of the lock up the canal. A separate canal should be used for the traffic in the other direction, but exactly the same principle of the water wheel is employed. The main axis of the wheel for the descent is carried upon a truck supported by four wheels running directly upon the rails. With the action of a hand wheel, the wheels on either side of this truck may be brought closer together, so that they will raise the axis of the main wheel, taking it off the rails for a fraction of an inch; in other words, just enough to keep it from exerting its tractive force on the rails, and still not measurably increase the flow of water under it. Although the rotation, as well as the action, of the wheel will be exactly as in the upstream movement, the power will be transmitted through the two wheels direct to the rails. The rails of the truck will turn in the opposite direction from that of the water wheel; and as they, and not the water-wheel axis, rest on the rails, the boat and the wheel are propelled downstream, and with the same velocity as in the opposite direction.

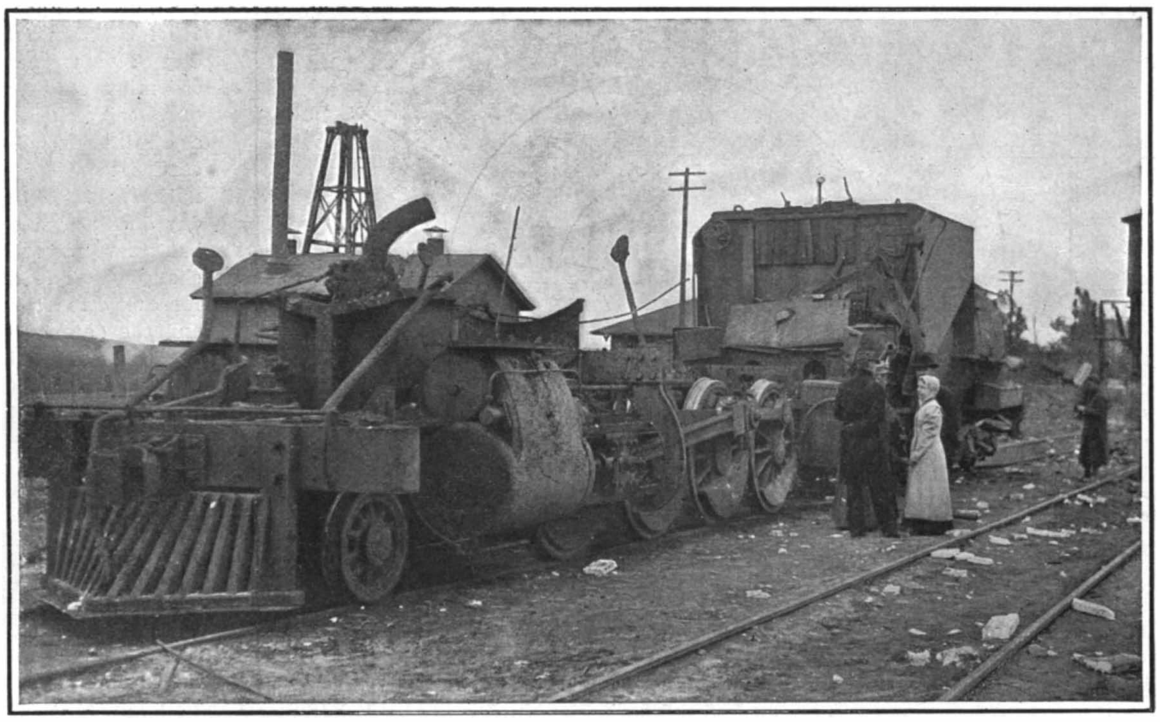
The getting of the boats in and out of the canal is done by having slips connected with the canal at certain points, in which the water would be held at a definite level. At the entrance to the main canal there would be no obstruction excepting the rail on one side, and this could be lifted to permit the ingress and egress of the boats. The wheel would be allowed to propel itself down the canal for a short distance, while boats were taken in and out of the canal proper.

Mr. Alexander Potter, the well-known consulting engineer and an expert in the subject of hydraulics, has made an examination of the plans for this type of lock, as well as of the various hydraulic questions which enter into the solution of the problem. Mr. Potter states: "In a canal built upon a grade of 4 per cent, boats 120 feet long can be passed through the canal where there is an available water supply of 12 cubic meters per second. Comparing this with the amount of water supplied in passing boats on a flight of locks such as those on the Erie Canal at Cohoes and at Lockport, the amount of water required for the Bartolomei system is no more than that required for the operation of the Erie Canal for the same tonnage.

"From a theoretical standpoint, there is no question that a movable canal lock designed on the Bartolomei principle will operate satisfactorily. The device will be self-regulating, that is to say, when the tendency of the wheel is to go too slowly, the head of the water back of the wheel will increase, thus creating a greater force to make it move faster; and when the tendency is for the wheel to move too fast, the head will fall, thus decreasing its speed.

"There are certain problems in connection with this interesting device which have not been worked out by the inventor in sufficient detail; among these may be mentioned a mechanism for arresting the lateral motion of the wheel and for reversing the same; also prompt removal of the water wheel to permit egress from and ingress to the movable canal lock by the boats. While these problems may at first appear difficult, they can be readily mastered. The structural details of the wheel have not been worked out for a large scale, but this also is a problem capable of proper solution.

"In places where this invention can replace a flight of locks, there is no question that there will be a saving in the time of the passage of a boat through the locks, and its adoption would result in an economy of construction. Where ample water is not available, the value of the invention is of course greatly reduced."



The locomotive after the boiler had been blown away.

EXPLOSIVE ENERGY OF A BOILER.

The accompanying photographs illustrate in a striking manner what a magazine of explosive energy a steam boiler may be. They represent the wreckage of a locomotive, the boiler of which exploded at Beaumont, Cal., on the 12th of last month.

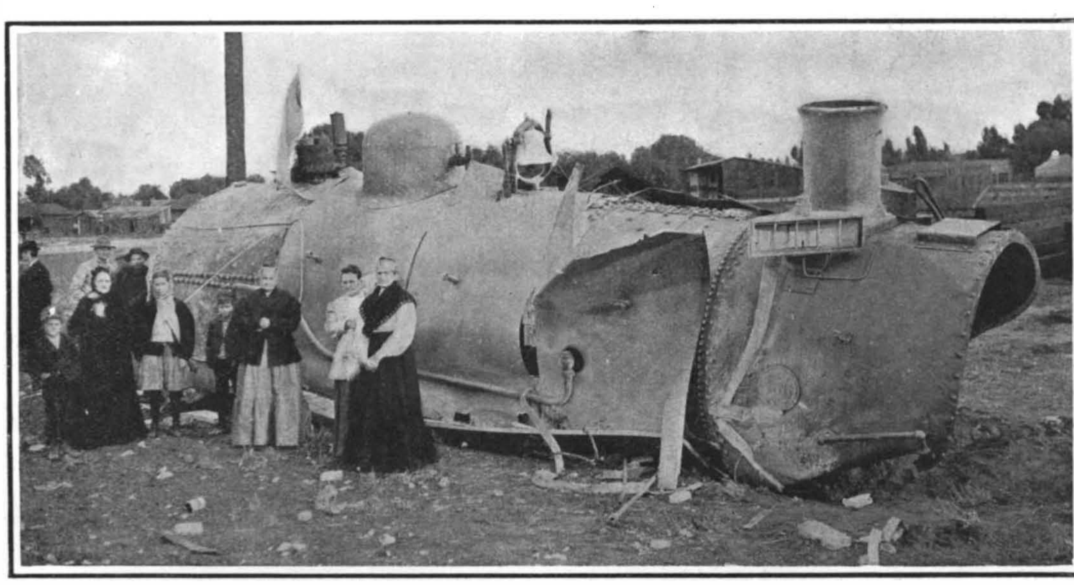
The boiler was wrenched from the trucks and shot upward and forward, turning end over end several times, according to an eye-witness, before it fell on its forward head 65 yards from its trucks, striking an empty oil-tank car. From this it ricocheted another 30 feet, turning end over end, alighting on its firebox end and again 40 feet before coming to rest in the position shown.

When the boiler struck the oil tank it drove in the head of the latter, twisted its steel frame, and drove two of its truck wheels down through the rails, which were broken in four places.

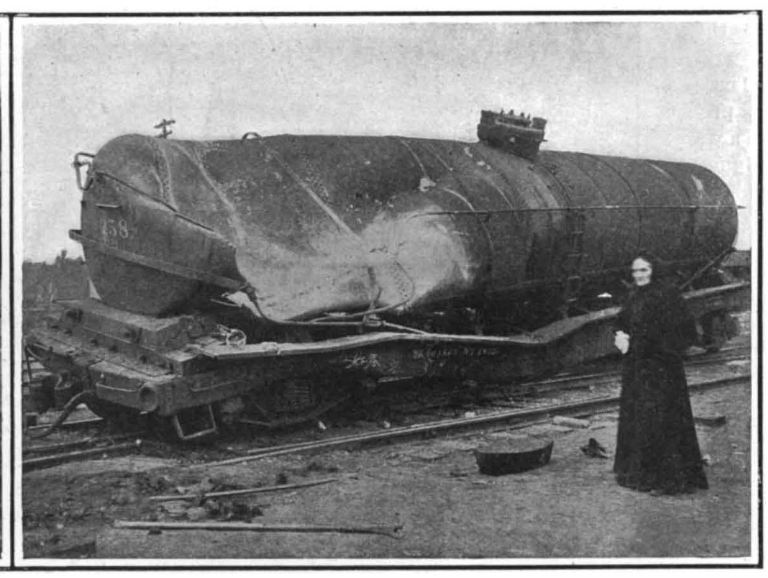
The front end of the locomotive, with its smoke-box door, was blown clean off, alighting 100 yards ahead of the engine and bounding over a pile of ties onto a side-track.

A small piece of wreckage was shot straight up in the air, and descended upon the tender with sufficient force to cut a clean, smooth, perpendicular slot, 12 inches long, through the side of the water tank, emptying the tank of water. The force of the explosion wrecked a freight car standing on a siding opposite the engine, although the car apparently was not struck by any heavy part of the locomotive.

A local board of inquiry reported the explosion as being due to low water, stating that the crown sheet of the boiler must have been 7 inches uncovered, although the evidence indicating this is not mentioned and must have been difficult to determine. Evidence of stoppage or other failure of the water-gage was inconclusive, so that it is difficult to see how the en-



Portion of boiler after being blown 265 feet through the air.



Oil-tank car struck by the boiler in its flight.

EXPLOSIVE ENERGY OF A BOILER.

gineer, a careful and steady man, who was, unfortunately, killed, could have permitted his water to get so low without being aware of the fact.

The rupture of the crown sheet was, however, sufficiently evident as the probable initial failure; and the turning of the boiler end over end in its flight is further evidence of one end having been thrown violently upward.

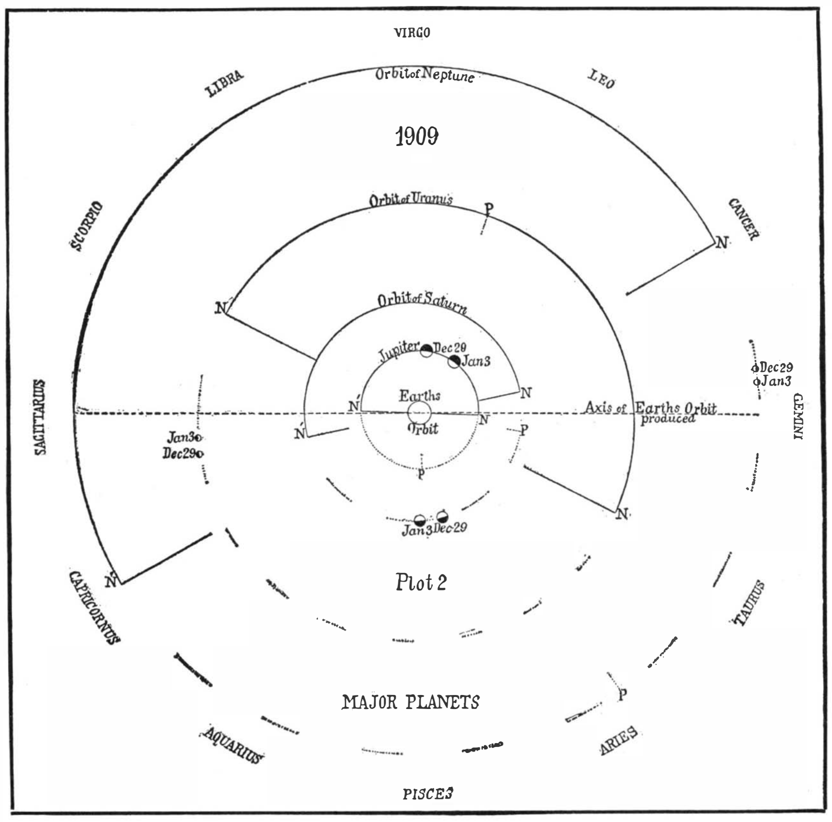
MORNING AND EVENING STARS FOR 1909.

BY FREDERIC R. HONEY, TRINITY COLLEGE.

The observer of the heavens whose purpose is to become familiar with the positions of the stars in their apparent daily revolution around the earth will be greatly assisted by a star map. A star map gives the positions of the fixed stars; the celestial equator, from which declinations are measured; the first meridian, whose intersection with the celestial equator is the point from which right ascensions are determined; and the ecliptic, or intersection of the plane of the earth's orbit with the celestial sphere. It is desirable to locate these circles approximately by actual observation. This is easily done by observing a number of conspicuous stars which in the star map are near the circle whose position is sought. For example a line stretched across the heavens from Polaris to β Cassiopeiæ will give approximately the first meridian. This is the leader of the five stars which form the irregular W. If this line be extended in the opposite direction, it will pass between γ and δ of Ursa Major, and divide the northern heavens into two equal parts. The fixed stars appear to revolve around the earth, rising and setting nearly four minutes earlier each day. Their distances from the earth are so great that to the ordinary observer their apparent positions are not disturbed during the year by the motion of our planet in its orbit at the rate of eighteen and a half miles a second; and it is only necessary to observe them often enough to become familiar with their places in the heavens.

The positions of the members of our planetary system are not so easily determined. The planets revolve around the sun with varying velocities, and are continually changing their places relative to each other and to the earth.

The plots herewith presented have been designed to assist the observer in seeing at a glance which of the planets are above the horizon before sunrise; and those which are above after sunset. The orbits of the four terrestrial planets are shown in Plot 1; those of the four major planets in Plot 2. The plane of the earth's orbit, or the plane of the ecliptic, may for convenience be regarded as horizontal. This is obviously an assumption, because the positions of the heavenly bodies are relative, and there is in reality no plane of reference. It is convenient, however, to place this page horizontally, and to regard it as representing the plane of the ecliptic. When a planet is on one side of this plane it will be described as above, and when on the other side as below this plane.



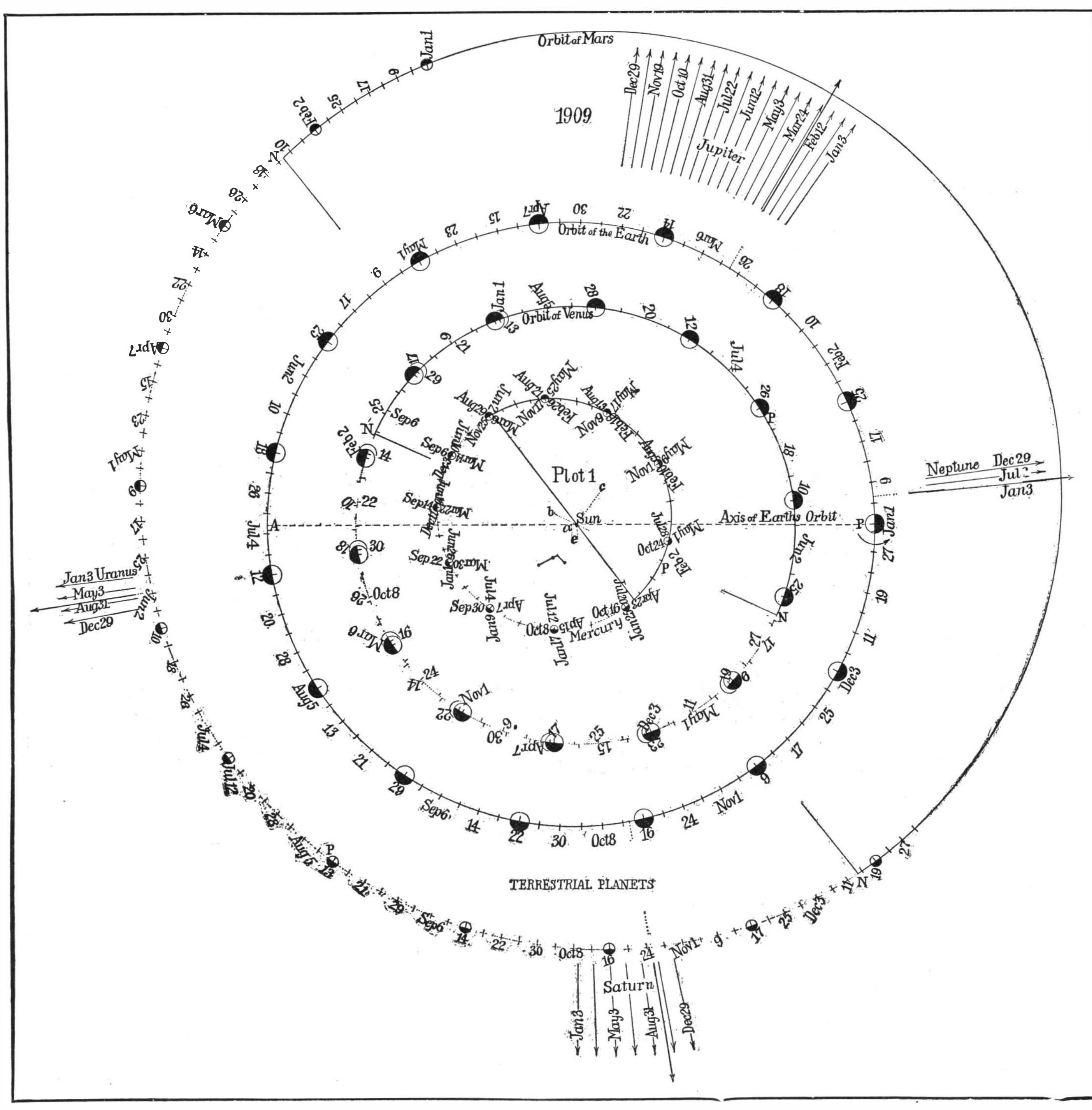
PLOT II.—SHOWING THE POSITIONS OF THE MAJOR PLANETS FOR THE YEAR 1909.

THE EARTH.

Since observations of the planets are made from the earth, a brief description of the terrestrial orbit (Plot 1) is first in order. It is an ellipse with the sun at one focus. The distance from this focus to *a*, the center of the orbit (= *e*) is a little over one and a half million miles. At *P*, the point of nearest approach, or perihelion, the earth's distance from the sun is nearly 91½ million miles. At *A*, the other extremity of the orbit's axis when the earth is at aphelion, this distance is increased to nearly 94½ million miles. Since the earth makes one revolution around the sun in 365¼ days, the average distance it moves each day is 360 ÷ 365.25 deg., or a little less than 1 deg. This average is equal to nearly 1,600,000 miles a day, allowing for an increase of velocity at perihelion in January; and a diminution at aphelion in July. The earth's rotation on its axis is absolutely uniform; i. e., the length of the sidereal day does not vary a fraction of a second; but its velocity in its orbit is continually changing. The earth's position is plotted for every fourth day at Greenwich noon; and the date is attached for every eighth day. Intermediate positions, which are omitted in the plot, may easily be interpolated by subdivisions.

MERCURY.

The inclination of the plane of Mercury's orbit and its eccentricity are greater than those of any of the planets except the asteroids or minor planets. The plane is inclined to that of the ecliptic at an angle of 7 deg. The distance from the sun to *b*, the center of the orbit, is nearly 7½ million miles; that is, when the planet is making the perihelion passage, *P*, at a velocity of 35 miles a second, its distance from the sun is nearly 15 million miles less than at aphelion, when the velocity is reduced to 23 miles a second. Mercury performs his revolution around the sun at a mean distance of 36 million miles in very nearly 88 days (= 87.97). Owing to the very rapid changes in the planet's velocity, its position is shown at intervals of two days; and the increased velocity at perihelion as compared with that at aphelion is apparent in the plot. The date is attached for every eighth day; and since Mercury makes more than four revolutions during the year, there are four dates for each position.



PLOT 1.—SHOWING POSITIONS OF TERRESTRIAL PLANETS FOR 1909.

VENUS.

The plane of Venus's orbit is inclined at an angle of 3.4 deg. The distance from the center of the orbit to the sun is about half a million miles, which is barely recognizable in a plot of these dimensions. The planet's mean distance from the sun is 67.2 million miles. This distance is diminished by a half million miles at perihelion (*P*), and increased by the same distance at aphelion. Venus revolves around the sun in 224.7 days, and her position is shown in the plot for every fourth day. On August 13th the planet will reach a position which will nearly coincide with that of January 1st. The distance between the two positions is that traversed in seven-tenths of a day. The dates given without the orbit, are those which belong to the more advanced positions of the first revolution of the planet; those within the orbit apply to the second revolution. Since the eccentricity of the orbit is very small, Venus moves at a velocity which does not vary much from 22 miles a second.

MARS.

With an eccentricity less than that of Mercury's orbit, the plane of Mars's orbit is inclined at an angle of 1.85 deg. But owing to the increased diameter, the distance from the sun to *c*, the center of the orbit, is over 13 million miles. The length of the major axis is 283 million miles; i. e., the mean distance from the sun is 141.5 million miles, which is diminished by 13 million at perihelion (*P*), and increased by the same distance at aphelion. The mean velocity of the planet is 15 miles a second. That part of the orbit which is above the plane of the ecliptic is represented by a full line; and the part below that plane, by a dotted line.

The point where the planet passes from the space below the plane of the ecliptic to that above is the ascending node *N*; and the point where it passes from the space above to that below is the descending node *N'*. The line joining these points is the intersection of the plane of the orbit with that of the ecliptic. This line is not fully shown in the plot except in the case of Mercury's orbit.

THE MAJOR PLANETS.

The diameter of Neptune's orbit is thirty times that of the earth; therefore it is obviously impossible to include the orbits of all of the planets advantageously in one plot within the limits of this page. In Plot 2 the orbits of Jupiter, Saturn, Uranus, and Neptune are shown on a very much reduced scale. The earth's orbit is included, and its axis produced, to establish the relation between the two plots; and also to show the continuity of the solar system. The position of each planet is plotted for January 3rd and December 29th. In Plot 1 the larger scale makes it possible to exhibit the positions as seen from the sun at shorter intervals of time. Jupiter's positions in the heavens are indicated by arrows at regular intervals of 20 days; Saturn's, 60 days; Uranus's, 120 days; and Neptune's, 180 days. Intermediate positions and dates are easily interpolated by subdivisions.

Jupiter's velocity at a mean distance of 483.3 million miles from the sun is a little over 8 miles a second. His orbit is inclined at an angle of 1.3 deg. The distance from the sun to the center of the orbit is more than 23 million miles.

Saturn's orbit is inclined at an angle of 2.5 deg., and the planet's velocity is 6 miles a second at a mean distance of 886 million miles. The distance from the sun to the center of the orbit is nearly 50 million miles.

The velocity of Uranus is nearly 4¼ miles a second at a distance of 1,782 million miles; and the distance from the center of the orbit to the sun is 82.5 million miles. The orbit is inclined at an angle of a little over ¾ deg.

Neptune, the outermost planet, has a velocity of 3.4 miles per second; and an orbit which is inclined at 1.78 deg. The distance from the sun is 2,791.6 million miles; and the center of the orbit is only 25 million miles from the center of our system.

Plot 1 is the fourth of a series showing the positions of the terrestrial planets for the years 1906, 1907, and 1908; published in the SCIENTIFIC AMERICAN on March 17th, February 9th, and February 15th of those years. During this period of four years Mercury makes 16⅔ revolutions around the sun; Venus, 46⅓ revolutions; Mars, nearly 2⅛; Jupiter, nearly 1/3; Saturn, between 1/7 and 1/8; Uranus, less than 1/20; and Neptune, 1/40 of a revolution.

As previously explained in articles on this subject, the morning and evening stars for any day in the year may be ascertained by holding the page in a position when the earth in Plot 1 at the assigned date is between the reader and the sun. The date attached to each of the terrestrial planets may then be read without turning the head; and the planet's position will indicate whether it rises before or sets after the sun, i. e., whether it is morning or evening star. For example, the page should be turned about one-fourth of the way around until the earth is between the reader and the sun on January 6th, the date of the opposition of Neptune. Since the earth rotates in the direction of the arrow (see January 1st) Mercury, which was not far from superior conjunction, evidently set very soon after the sun; and was therefore an evening star. On the same day Venus and Mars rose before the sun, and were morning stars. Neptune was above the horizon before and after midnight; and was both morning and evening star.

The page should now be turned round for the date February 28th, when Jupiter came to opposition, and was both morning and evening star. On this day Mercury, Venus, and Mars were morning stars. The date of the opposition of Uranus will be July 11th, when the planet will be both morning and evening star. On this day Mercury will be morning star; and Venus evening star. On September 23rd Mars will be at opposition, and Mercury and Venus will be evening stars. Saturn will come to opposition on October 13th. Mercury will be very near inferior conjunction, and will be morning star. Venus will be evening star. Prior to conjunction a major planet is evening star; and after conjunction it is morning star. Conjunctions occur in the following order: Uranus on January 7th, Saturn on April 3rd, Neptune July 9th, and Jupiter September 18th. When a planet is near conjunction, while it is either morning or evening star, it is too near the sun for observation, because it is lost in the sun's rays. The directions in which the major planets are seen at the dates of opposition are shown by arrows which are longer than those to which the dates are attached.

THE RECENT SUBSIDENCE OF NIAGARA FALLS.

BY ORRIN E. DUNLAP.

On February 14th, 15th and 16th, 1909, an east wind blew up Lake Erie and drove the water far back up the lake, greatly reducing the amount which it was possible for the lake to discharge into the Niagara River channel. This condition lasted for a longer period than ever before known; and the failure of Lake Erie to discharge its accustomed flow into the river channel, combined with great fields of ice previously carried down toward the Falls and left to settle on bars and rocks, resulted in Niagara's experiencing what will long be recalled as a truly remarkable spectacle. The ice above Goat Island on the New York side of the river shut off the water supply of the American channel between Goat Island and the New York mainland. This rendered the channel, usually the scene of a frightful battling and tossing of chaotic waters, practically dry. As little or no water passed through the channel, the American Fa'' with its precipice face 1,000 feet wide was also left dry.

Except for a few struggling rivulets here and there, none were of sufficient quantity to prevent men from walking across the channel from the mainland to Goat Island in rubber boots. Others crossed the channel above the Goat Island bridge, and from Goat Island to the mainland, making their way upstream toward the power intakes. The Horseshoe Fall resembled anything but the robust flood so much admired. Its quantity was reduced by half, and this when it was catching all the water diverted from the American channel. Down in the gorge below the Falls, rocks were bared which had never appeared above the surface before. The Whirlpool rapids and Whirlpool suffered from the holdback of the lake flow, so that all the way from Lake Erie to Lake Ontario the people stood amazed at the strange scene developed by robbing the river of a portion of its flow.

In 1848, on March 29th of that year, it is recorded that a somewhat similar condition existed at Niagara, but words afford the only comparison, for no pictures were handed down from that time. On March 22nd, 1903, crowds hurried to the river to see the American channel dry, while the American Fall was in very similar condition to what it was during the few days in February this year.

For practically half a week the unusual conditions prevailed, and during that time Niagara was only half herself. A change in the wind drove the water back down Lake Erie, and the overflow to the river was increased. This overflow grew in quantity, but the restoration was not immediate, for days went by before the American Fall was anything like its former self.

The power companies on both sides of the river were hampered by the dry spell.

Death of Carroll D. Wright.

Dr. Carroll D. Wright, well known to political economists as a statistician, died February 20th at Worcester, Mass., at the age of sixty-nine.

Dr. Wright began his career with the Massachusetts Bureau of Statistics of Labor in 1873. In 1885 he investigated the public records of towns, parishes, counties, and courts, and was appointed United States Commissioner of Labor. That office he held for twenty years, filling it ably. In addition to his duties as Commissioner of Labor, Dr. Wright took an active interest in the eleventh census, of which he had charge. His economic knowledge proved of service to his country when he acted as chairman of the United States commission which investigated the Chicago strike difficulties in 1894. Political economists regarded as authoritative his works "The Factory System of the United States," "Relation of Political Economy to the Labor Question," "History of Wages and Prices in Massachusetts," "The Industrial Evolution of the United States," "Outline of Practical Sociology," and "Battles of Labor." He wrote many special reports for the United States Department of Labor, as well as pamphlets and monographs on commercial and economical topics.

UNITED STATES LIFE-SAVING STEAMER "SNOHOMISH."

The discovery of the mineral wealth of Alaska led immediately to a large development of the coastwise trade along the northwestern seaboard of the United States, and particularly in Puget Sound. Navigators are familiar with the unusual hazards of wind, currents, and fog encountered in this locality. The entrance to Puget Sound through the Straits of Juan de Fuca is for six months of the year obscured by fogs and haze which, combined with the erratic and but-little-understood currents, render these waters particularly difficult of navigation. Deep-water soundings extend close inshore, so that the lead cannot be depended upon to indicate a near approach to land; yet it is a fact that this is the most important entrance on the Pacific coast, the amount of shipping that passes through it annually being reckoned at six million tons. During the past fifty years, nearly 700 lives and many millions of dollars' worth of property have been lost in the Straits and in their immediate vicinity. The greatest disaster of all occurred in a dense fog on the night of January 22nd, 1906, when the coastwise passenger steamer "Valencia" overran her distance, failed to pick up the lights at the entrance to the Straits, and went on the rocks at the foot of the high cliffs of Vancouver Island. Although the ship did not go to pieces for a day and a half after she struck, 136 lives were lost, there being no life-saving station within reach and vessels being unable to approach her because of the heavy sea that was running. Immediately after this disaster, President Roosevelt appointed a commission to investigate the circumstances of the wreck and recommend some means whereby passengers might be saved under similar difficult conditions. After mature consideration the Board, in addition to suggesting the provision of additional lightships, coastwise telegraph and telephone lines, fog signals, wireless telegraph, etc., recommended that "a first-class ocean-going life-saving steamer, or tug, be constructed and stationed at Neah Bay, the only available harbor within five miles of the entrance to the Straits, and that the steamer be equipped with the best possible appliances of surf boats and lifeboats, and with a wireless telegraph apparatus." Congress appropriated $200,000 and provided that the life-saving tug should be constructed and operated by the revenue cutter service. In the design of the boat the following conditions were fulfilled:

1. The vessel must be sufficiently large to be seaworthy under all conditions of weather.

2. An ample coal supply must be furnished to enable the vessel to keep the sea for a number of days, as it is presumed that she will be quite often called upon to search for missing vessels.

3. Every known provision must be fitted to equip her for life-saving in the open sea, and for rescuing persons from wrecks on the shore.

The new life-saving vessel, which is enrolled in the revenue cutter service, and has been named the "Snohomish," was built by the Pusey & Jones Company, of Wilmington, Del. In her general design she resembles the numerous first-class tugs which are to be found on both the Atlantic and Pacific coasts; and as Neah Bay, the headquarters of the new craft, is a most dreary and unattractive place, considerable attention was given to providing as comfortable living quarters for the officers and crew as could be fitted in the limited space available.

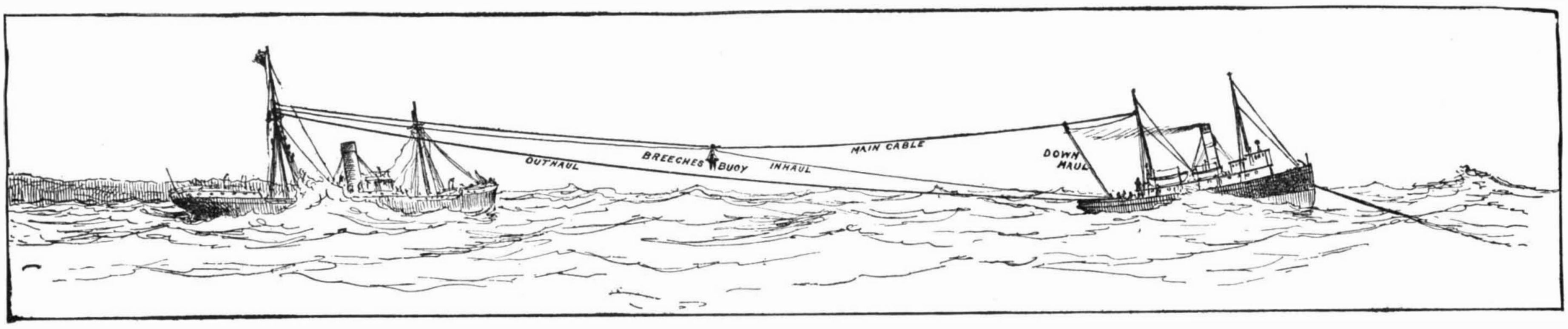
The "Snohomish" is 152 feet in length over all, 29 feet in breadth, and her displacement on a mean draft of 12 feet 4¼ inches with 125 tons of coal and 11,000 gallons of water on board is 795 tons. She is built of mild steel, with an inner bottom extending the length of the boiler space; the scantlings are heavy throughout, and the hull is divided into several watertight compartments.

She is driven by 1,200-horse-power engines at a speed of between 13 and 14 knots, and her coal capacity will enable her to steam for 3,000 miles at a speed of 12 knots. She carries a crew of sixteen men. The vessel has two self-baling and self-righting lifeboats and a life-raft, besides her regular boats. She is equipped with wireless telegraphy, with the Ardois system of night signaling, and with two searchlights. She also carries wrecking apparatus for pumping out vessels, and a fire-fighting outfit.

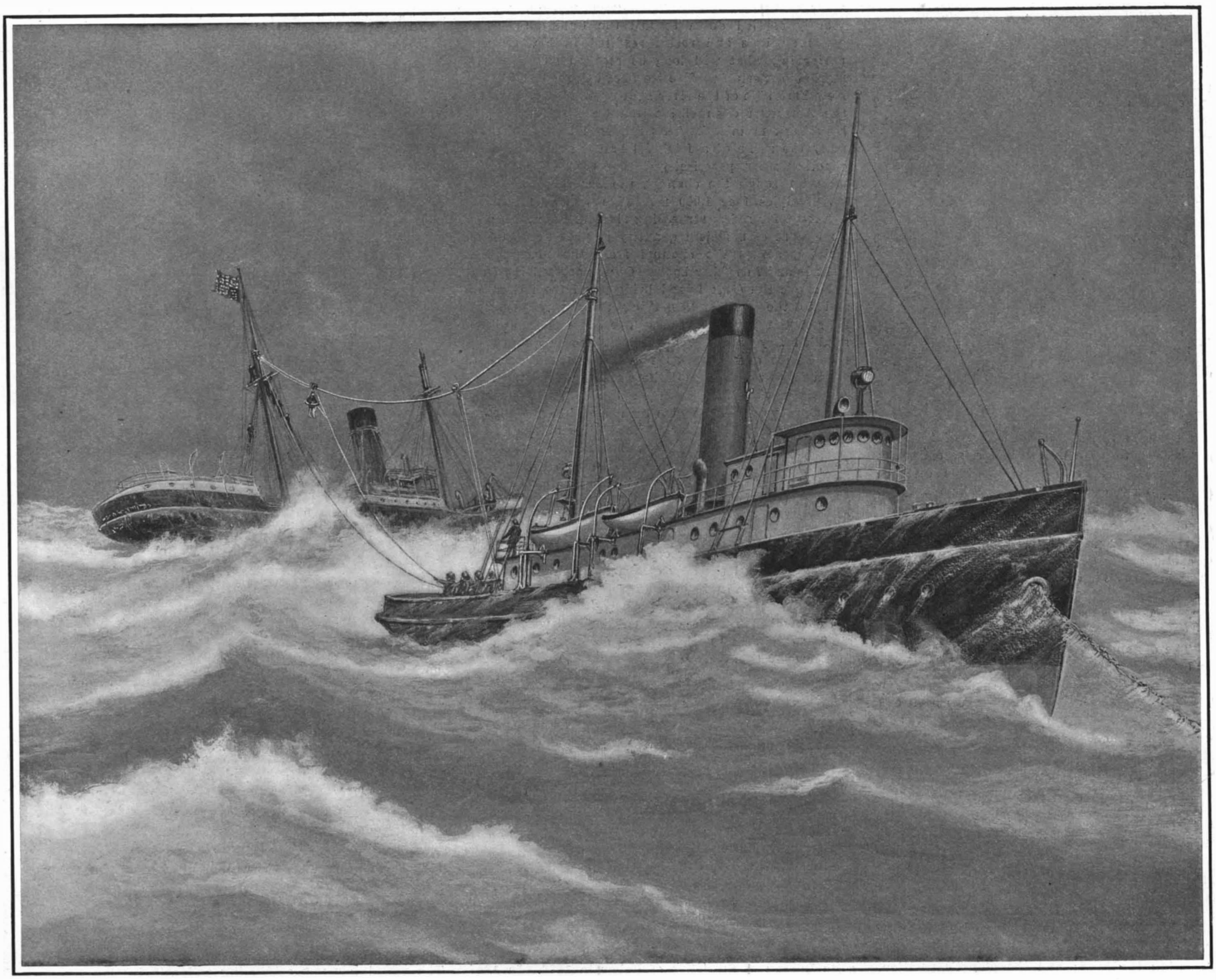
The most interesting and novel equipment of the "Snohomish" is the special marine cableway designed for taking passengers and crew from a wrecked ship which it is impossible to approach by lifeboats. It will be seen from the description and from the accompanying illustrations that the apparatus, which was designed by the Lidgerwood Manufacturing Company, is nothing more nor less than the breeches buoy apparatus modified to meet the special conditions of its use between two ships in a seaway.

The "Snohomish" will steam to within life-line distance of the wrecked vessel and fire a line across the wreck. By means of this line a stout cable will be hauled aboard and made fast to one of the masts of the doomed ship. On this cable the breeches buoy will travel in the usual way. The chief point of difference between the apparatus as used by a life-saving crew on shore and by the life-saving crew on the "Snohomish" consists in the means taken to provide for the movements of the "Snohomish" in a seaway, and keep the overhead cable at all times taut between the two ships. This is accomplished by leading the main cable through a sheave near the masthead of the "Snohomish," and then down through and around to it. To insure that a passenger shall land on the deck of the cutter, a haul-down block is secured on the main cable, a short distance from the mast, as shown in our drawing, and the cable is drawn down to the deck by men on the cutter, who haul down the block and tackle. By this means the passenger is kept well clear of the sea until he reaches the "Snohomish." Had the "Snohomish" been in existence and on duty at the time of the wreck of the "Valencia," it is probable that every one of the 136 people that perished on board would have been saved.

The "Snohomish" left Hampton Roads on December



Sketch showing method of rigging and operating breeches buoy at sea.



GOVERNMENT LIFE-SAVING TUG "SNOHOMISH" TAKING PASSENGERS FROM A DISABLED SHIP THAT COULD NOT BE REACHED FROM SHORE.

what is known as the automatic reel, which maintains a constant tension on the cable, allowing it to run out, if the "Snohomish" surges away, and taking up the slack if she should swing in toward the wreck. The reel will automatically wind in the cable, if need be, at a speed of 1,000 feet per minute. Its operation is so quick and sure that the variation in distance between the two vessels may be rapidly reduced to 300 feet, or increased to 1,200 feet, without in anywise interfering with the passage of passengers from the wreck to the cutter.

When a passenger has been placed in the breeches buoy at the wrecked ship, men on the cutter will haul the buoy by pulling on a manila line attached

10th and should reach her destination early in the present month.

The Current Supplement.

Among the more important articles in the current Supplement, No. 1731, may be mentioned "Dropping Projectiles from Balloons," "Measuring the Efficiency of Aeroplane Propellers," "The Rotaplane, an Astronomical Demonstration Apparatus," "Sherard Cowper-Coles's New Process of Galvanizing," "The Aniline Dyes and Their Application to Home Use," "An Internally-fired Helical Furnace," in which wholesale annealing and hardening are done almost automatically, "Earthquake Forecasts," "Uranium Mining and the Production of Radium," "The Dynamics of the Phenomena of Life," and Hudson Maxim's "Warfare of the Future."

Typhoid Fever and Fishes.

Remlinger and Norris have reported to the French Biological Society the result of their investigation of the possibility of the dissemination of typhoid fever and cholera by fishes. Their experiments, which were made with golden carp, prove that the internal organs, and particularly the alimentary tract, of fishes living in water contaminated with Eberth's bacillus and cholera vibriones (for example) may harbor those germs of disease. This fact, however, is of no hygienic importance, for it was proved that even when a fish is cooked whole and without being opened, the interior of the body attains a temperature sufficiently high to kill all microbes. In connection with the spread of epidemics, however, the possible presence of germs of typhoid and cholera in the alimentary canals of fishes is not without interest. It appears not unlikely that fishes may carry disease germs in this manner from a contaminated stream to its unpolluted tributaries and thus aid in spreading disease. The observed cases of epidemics following the course of streams upward are thus explained.

THE ISNA BARRAGE ACROSS THE NILE.

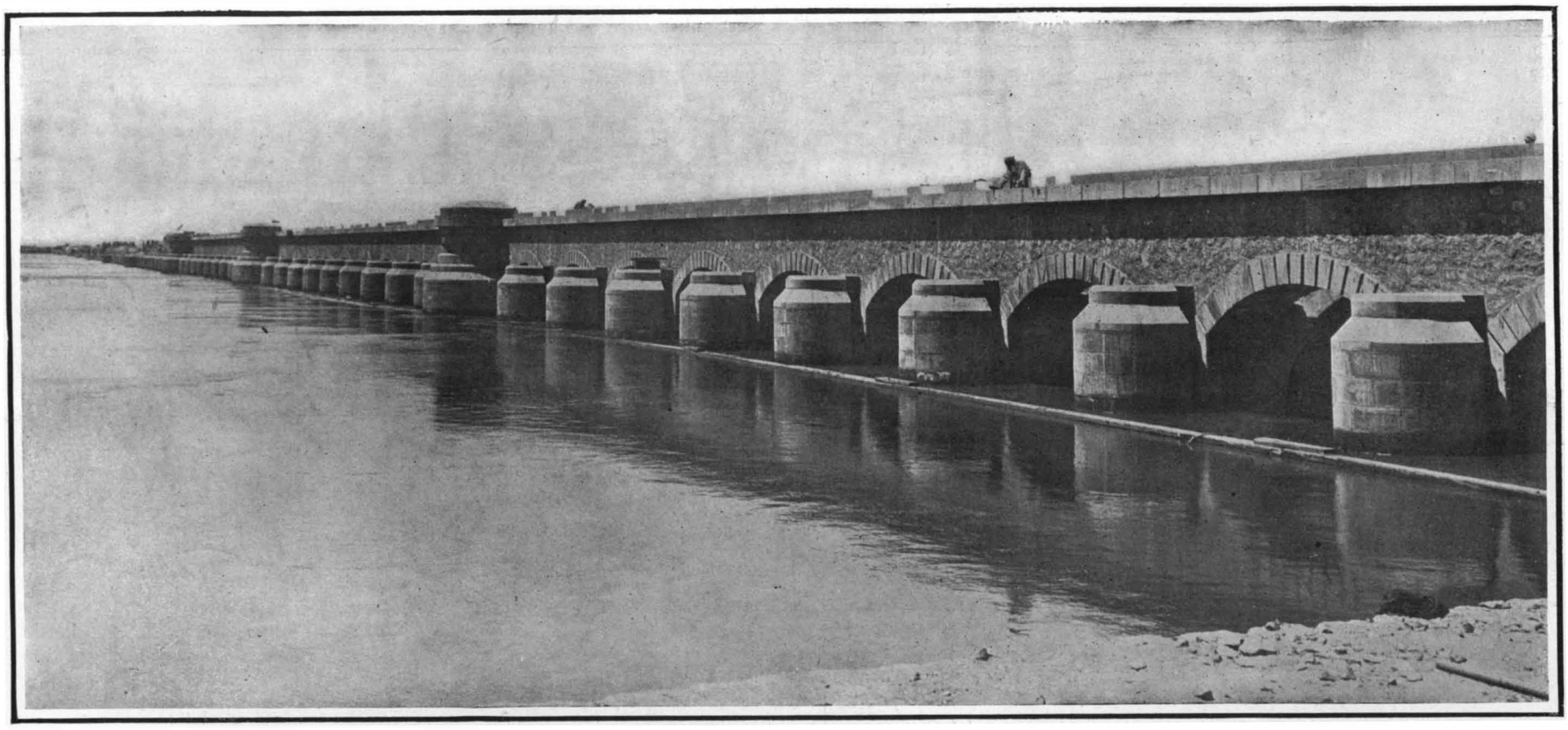
Upon the completion of the two barrages across the Nile at Aswan and Asyut, experience soon demonstrated the fact that in years of bad Nile flood, such as have prevailed since the completion of these undertakings, there was yet a very large district which was inadequately irrigated, accompanied by a marked deterioration of a considerable area of basin land. This was particularly the case in the Keneh province. In order to remove the disadvantages affecting the above province, which were very marked, the government at once decided upon the execution of another noteworthy piece of work—the throwing of a third barrage across the river at Isna, about 100 miles above the great dam at Aswan. The population of Esneh is about 25,000; and as may be gathered, the erection of this work has restored the confidence of the natives in the affected area. This barrage is primarily intended to regulate the flood levels, and will insure in seasons of bad flood, such as have prevailed in Egypt for so many years past, the adequate irrigation of something like 250,000 acres.

Some time ago we described and illustrated in the SCIENTIFIC AMERICAN SUPPLEMENT the task of commencing this important work, which in character ranks with those already completed at Aswan and Asyut. The accompanying illustrations convey a further idea of its comprehensive character and completion, which was accomplished well within the stipulated contract time of three years by Sir John Aird & Co. of London, who carried out the previous works of this character, and to whom we are indebted for permission to reproduce these illustrations.

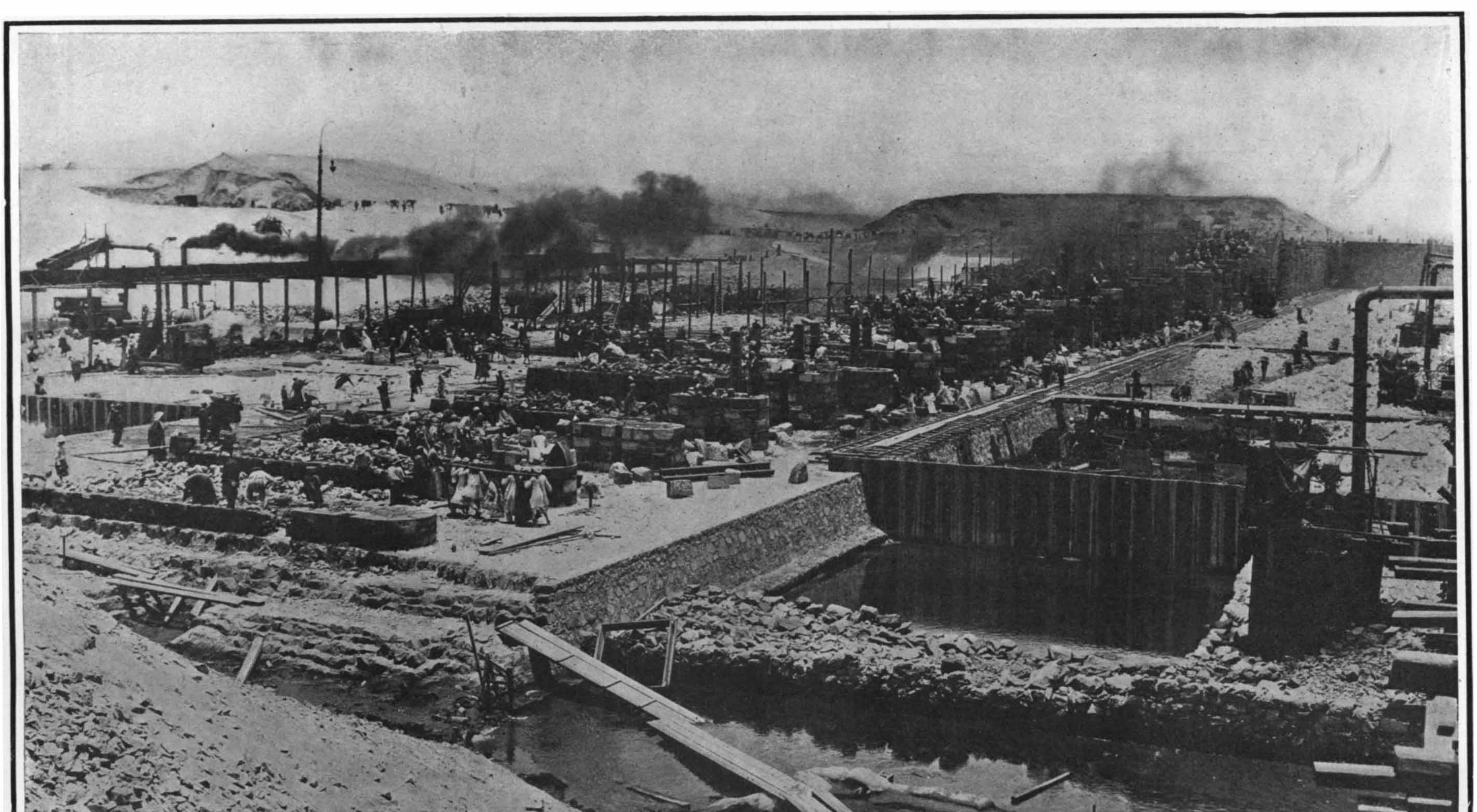
In addition to the barrage, the works carried out comprise two small canal-head regulators. The dam is erected about half a mile to the north of the town. Its total length from bank to bank is approximately 2,900 feet, and it is pierced by 120 openings or sluices, each being 16 feet 5 inches wide. The barrage is of sufficient width at top level to carry a roadway 19 feet 8 inches wide, with accommodation for a surface railroad of 2 feet gage. There are in all eleven large abutment piers, 37 feet 8¾ inches in height by 13 feet thick, and 108 smaller piers of 6 feet 6 inches thickness. The arches of the sluice openings are of concrete, 20 inches thick, faced with sandstone ashlar on both stream faces, while the piers are rounded to half their radius on the upstream side to form cutwaters, with battered square ends on the downstream side. On the deck level are three parapets, two on the upstream side, in the space between which are provided the facilities for opening and closing the sluice gates. Each opening has two gates of 9 feet 10 inches depth, working vertically in cast-iron grooves built in the piers.

When the work was commenced, the preliminary operations proved a huge task. Owing to the enormous demands for masonry, quarries had to be opened by the contractors, and an extensive fleet of vessels secured for its transportation in sufficient quantities and in such a manner that work once commenced should not be arrested for lack of material. The sandstone had to be quarried at a point 57 miles up the river toward Aswan, while on the other hand the limestone was brought from a point 15 miles distant in the opposite direction. Temporary roads and railroads had to be laid down, the length of the latter aggregating at one time 24 miles, and every type of craft was pressed into service for the transportation of the constructional material.

These preliminary operations occupied several months, but work on the site of the dam was com-



Isna Barrage; view from east abutment, upstream.



The east bank, looking east.

THE ISNA BARRAGE ACROSS THE NILE.

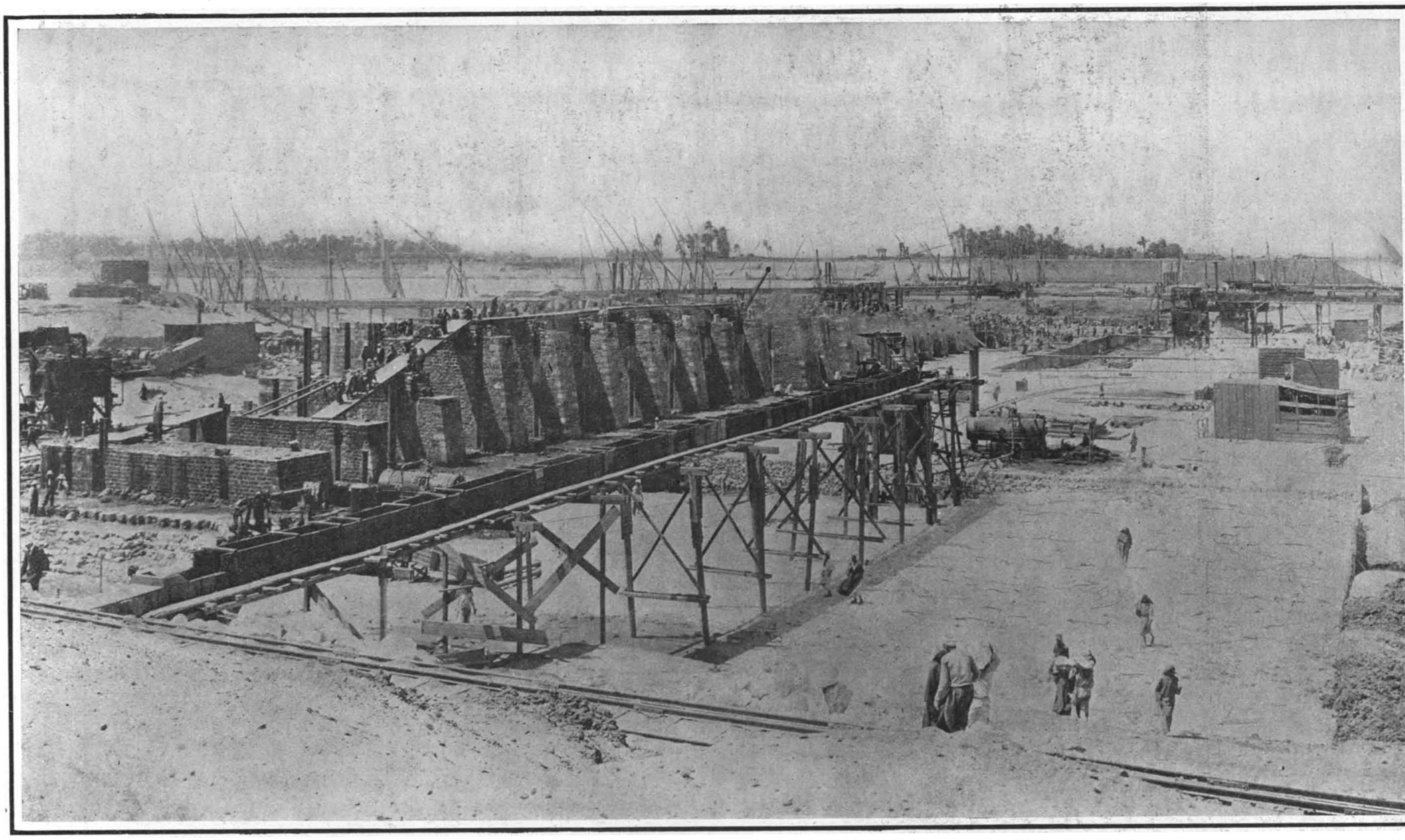
menced in November, 1906. Actual foundation work was first commenced on the east bank, but at the same time the necessary excavations and sudding of the river on the opposite bank were commenced. The conditions were fortunately such that the bank sections could be carried out in such a manner that upon the arrival of the ensuing flood season work was not stopped, since it had been carried to a point to enable it to be continued during the period of high Nile. A large sandbank had formed adjacent to the east bank, and this facilitated considerably the requisite excavation for the erection of nearly forty piers, while on the opposite side of the river it was arranged to sudd sufficiently to enable foundation work to be carried out in regard to the navigation lock and twenty-six piers, the river traffic being maintained meanwhile in midstream.

In this work the experience gained by the contractors in the carrying out of the former works served them to conspicuous advantage. They were able to calculate very closely the time that would be occupied in accomplishing certain sections of the work, and this factor appreciably assisted them in the rapid execution of the undertaking. The result was that both sides were carried out to adequate height before the arrival of the flood season, to enable them to continue operations thereon without any delay. The sudding works were built up of hard black soil cored grouting the joints a ¾-inch pipe was placed in the latter, and all sand blown out under a water jet having a pressure of 40 pounds per square inch, the cement grouting being run down these same pipes after cleaning had been completed to the base of the piles, the pipe being slowly withdrawn while grouting was in progress, so as to secure a perfect joint. Above foundation level the joint was calked with oakum and made completely water-tight from top to bottom. Each pile, it may be mentioned, weighed 2,184 pounds. To prevent possibility of scouring under the foundations of the first season's work, piles were driven across the scar ends to serve as a cutoff, followed by a pitching on both stream faces to a point about 80 feet back from the extremities of the foundations.

When the river fell the following season, it was found that the sandbank still existed on the eastern side, and operations were soon resumed. At this point there remained 1,280 feet of space between the two projecting ends of the work. But the strength of flow of the river rendered extreme caution to be observed in the progress from the eastern sections. An area 830 feet in length of the line of the barrage toward mid-river was successfully sudded off and pumped dry. This construction of the river imposed a heavy water strain upon the farthest sudd, but by throwing down many thousand sacks to protect the but it was a task that had to be accomplished with extreme care. When the sudds were finished time was pressing, and only twelve weeks were left in which to carry out the remainder of the foundation work and proceed with the superstructure to a height above flood level to enable work to be continued without cessation. It was anticipated that as the area within was cleared of water, the outward pressure upon the sudds might cause some slipping; but, as this developed, boatloads of sacks standing by for such emergencies were cast overboard, and in this manner the task was successfully achieved.

The area clear, it was imperative that all possible labor should be crowded upon the works. At one time over 4,000 men were at work upon the narrow stretch of 450 feet linking up the two progressive arms. To the contractors it was the most anxious period of the whole work. There was a pressure of 17 feet depth of water upon the sudds outside, while the diverting of the river had developed a flow of six miles per hour velocity. "Blows" occurred frequently in the sudds, but the arrangements provided for dealing with them were such that no floodings of the workings arose.

At last the foundations of the two sections were connected, and the masonry was pushed forward so as to get above water level by the arrival of the flood. As the superstructure proceeded, the pumping



View looking west from downstream.

THE ISNA BARRAGE ACROSS THE NILE.

with bags of sand. As the presence of the sandbank naturally gave rise to the conclusion that water would percolate through to the dam foundations, a battery of 12-inch pumps was erected on the river bank, to keep the foundations dry between the piles. The entire foundations of the barrage are inclosed by two lines of cast-iron sheet piling placed 69 feet 9 inches apart, and stretching in two parallel lines right across the river.

By pushing the work at full speed—the number of men engaged fluctuated between 8,000 and 10,000—it was found possible to get the works well advanced in height by the time that the water pressure upon the sudds gave warning that the flood season was approaching; and the haste which was exercised in this connection, and the fineness with which the work was gaged, may be realized from the fact that when the sudd was cut, the water was allowed to flow over the flooring, which had only been completed a few days previously.

As the foundations were found to be on wet running sand, extreme care was observed in connection with the protective iron piling. The piles are so driven as to inclose completely the area within, with joints grouted, thereby forming a complete cutoff. They were driven to over 14 feet into the river bed, about 20 inches of the heads projecting above the latter, and tied into the superimposed concrete with bolts 3 feet long on the downstream side. Before toe of the outside slopes the difficulty was overcome. Work then on the foundations proceeded so rapidly that the distance between the ends of the two outwardly-reaching sections from either bank was reduced to 450 feet by the time the river began to rise again, and foundation work had to cease.

This was the critical point of the whole task. It was realized that as the river had been so narrowed, if the sudds on either arm could be joined up, the work could be considerably facilitated. Mr. Webb, the Secretary of State for Irrigation and who had designed the barrage, visited the works at this juncture, and it was decided to make the attempt. It was a difficult operation, since it entailed diverting the river from its normal midstream path, and this procedure naturally increased the velocity of river flow. The lock being by this time completed, it was opened to allow the passage of the water. It was an anxious task. Bundles of sacks roped together had to be thrown overboard from boats at those points in midriver where the stream ran strongest, from a point 150 feet upstream, where temporary piles were driven for the purpose. Finally success attended the efforts, and the river was diverted, leaving the remaining central space sudded off. The sudds were then strengthened by boatloads of earth being brought down and dumped on their outer surface, and a substantial temporary embankment thus erected. This accomplished, pumping had to be hurried forward, operations were gradually suspended, so as to allow the water within the sudded area to rise slowly. Thus by the time the river rose the superstructure was well advanced, and carried to completion without any delay.

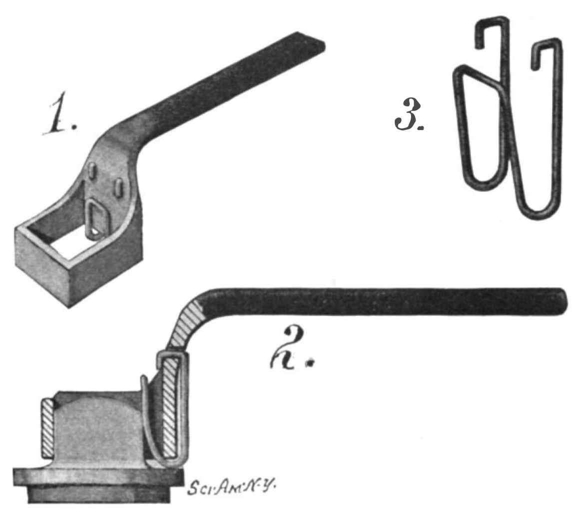
It is noteworthy to record that owing to the energy displayed by the contractors the work, despite its magnitude, was completed no less than eighteen months within the contracted time, so that the inhabitants of the province will be reaping the benefits of irrigation a year in advance of the date promised. The whole task was finished within twenty-two months from the commencement of the foundation work, which is a record in an undertaking of this caliber.

To gather some idea of the extent of the task, it may be pointed out that the excavations entailed the removal of 1,200,000 cubic yards of material; the erection of the temporary sudds required the use of 550,000 cubic yards of earth and sand, while 1,000,000 sacks were used in their construction. There were 3,950 tons of piling used, 42,000 cubic yards of concrete, 80,000 cubic yards of sandstone rubble in the superstructure, 400,000 cubic yards of ashlar, and 166,000 cubic yards of limestone pitching in the diversion.

The whole of the ironwork was supplied by the Ipswich engineering firm of Ransomes & Rapier, who carried out all the similar work in connection with the other barrages. The navigation lock on the western bank is 262½ feet long between sills by 52½ feet wide, fitted with gates 40 feet deep and a swing bridge. On the upstream side the foundations comprise puddle clay topped with limestone pitching 65 feet 7 inches wide; while on the downstream side, to avoid the severe socuring of the water pouring through the sluices, there is a protective apron composed of limestone pitching carried to a distance of 131¼ feet from the toe of the dam. The floor is built up of concrete, 3 feet 3 inches thick, with a superimposed layer of granite rubble masonry 6 feet 6 inches thick. The total cost of the barrage has been approximately $5,000,000 and it was formally opened by the Khedive on February 9th. The provision of this dam will insure a plentiful supply of water for irrigation through a great tract of fertile land, even in the lowest floods, and will remove all apprehensions regarding the safety of the crops within its area for all time. The chief engineer responsible for the works was Mr. Murdoch Macdonald, the Director General of Reservoirs for the Egyptian government.

IMPROVED VEHICLE WRENCH.

Pictured in the accompanying engraving is a wrench particularly adapted for unscrewing the nuts of carriage and wagon axles. The wrench differs from the ordinary in that it securely holds the nut

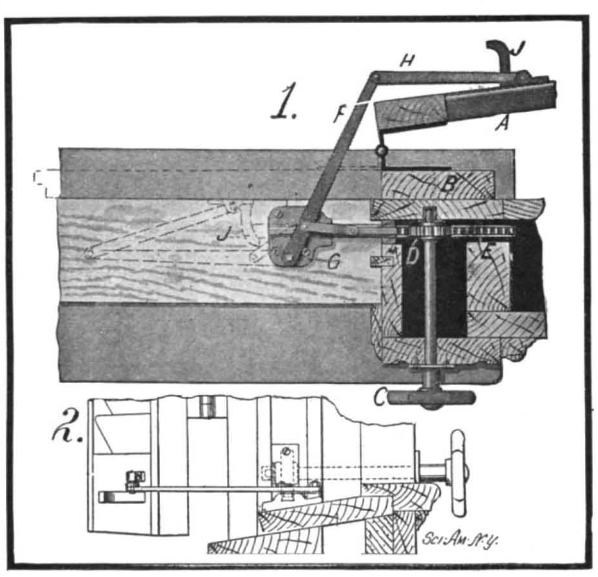


IMPROVED VEHICLE WRENCH.

in place, permitting of conveniently starting the nut when screwing it on the axle, and preventing it from falling and being lost when it is removed from the axle. The general form of the wrench is similar to the ordinary, consisting of the usual square socket with an extension at one side which serves as a handle. Fitted in the socket is a spring, the general form of which is indicated in Fig. 3. It will be observed that the spring is bent at its center, and then doubled, so as to provide a portion which extends into the socket and another portion which passes along the outside. The outer portion terminates in a pair of hooks which pass through openings in the wrench just below the handle, and serve to hold the spring firmly in place. When using a wrench of this sort the operator may keep his hands clean, for he does not have to touch the nut. The wrench clings to the nut after it has been removed, and there is no danger of its becoming soiled by falling to the ground. The inventor of this improved vehicle wrench is Mr. Carroll J. Atkins, Cando, N. D.

DEVICE FOR OPERATING WINDOW SHUTTER.

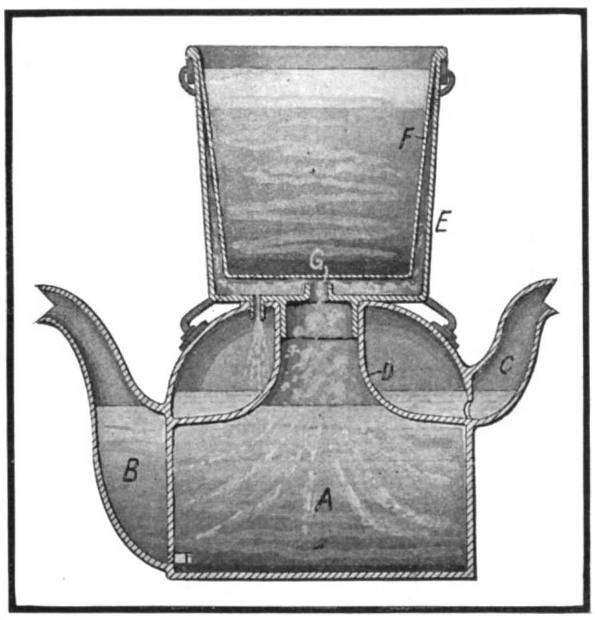
In cold weather, or when a rain storm suddenly comes up and it is desirable to close the window shutters, it is rather unpleasant to have to expose oneself to the elements by opening the window and reaching out for the shutter arm or catch. The accompanying illustration shows one method of overcoming this objectionable task by operating the shutter from within the room. A sectional view, in plan, of the mechanism used is shown in Fig. 1. The shutter *A* is hinged to the outer frame *B* of the window. Projecting through the inner side of the frame is a hand wheel *C*, mounted on a shaft which carries a pinion *D*. The latter engages a rack *E*, adapted to slide through the stile of the window frame. At its outer end this rack bar is connected by a link to a lever arm *F*. The lever arm is pivoted at one end to a plate *G* secured to the window sill, while at its opposite end it is connected by a link *H* to the shutter *A*. When the hand wheel *C* is turned in clockwise direction, the rack bar *E* is fed toward the left, causing the lever arm *F* to swing on its pivot, closing the shutter *A*. The end of the rack bar which slides in a track formed in the plate *G* engages a hook *J*, carried by the shutter *A* when the latter is closed, as shown by dotted lines in Fig. 1. This serves to lock the shutter in closed position. The inventor of this shutter-operating mechanism is Mr. August Weber, of Long Branch, N. J.



DEVICE FOR OPERATING WINDOW SHUTTER.

KETTLE STILL.

A simple apparatus for distilling water is illustrated herewith, which should prove quite valuable in districts where the water is so impure that it must be filtered and boiled before it can be used. The apparatus is in the form of a kettle, and, in fact, may be used as a kettle when it is not desired to use it as a still. The body of the kettle, which is indicated by the letter *A* in the engraving, is provided with a main spout *B* at one side, and a smaller spout *C* at the opposite side. The interior of the kettle is divided into two compartments by means of a partition *D*, and the spout *C* communicates with the upper compartment. The partition *D* is formed with a central tubular por-

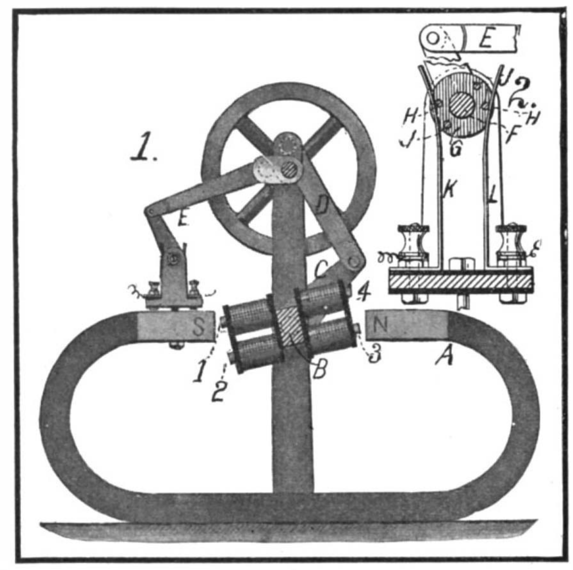


KETTLE STILL.

tion, opening through the top of the kettle to permit of pouring water into the lower compartment. A bucket *E* is used with the kettle and is provided with a flanged portion at the bottom adapted to fit into the tubular portion of the partition *D*. Communication between the interior of the bucket *E* and the lower compartment of the kettle is had through an opening *G* surrounded by an upwardly-extending flange. Adapted to fit into the bucket *E*, or formed integrally therewith, is a second bucket *F* which is of such dimensions as to provide a narrow chamber between the two buckets. In use, the lower compartment of the kettle is filled with the water to be distilled, and as this water is brought to a boiling point over a fire, the steam generated passes into the bucket *E* and is condensed by coming into contact with the bucket *F*. The latter is filled with cold water so as to keep it cool and insure proper condensation of the steam. The condensed steam cannot flow back into the chamber *A*, owing to the flange surrounding the opening *G*, but it flows through a small pipe into the upper chamber of the kettle. Thence it may be poured out through the spout *C* when desired. It will be observed that the spout *B* is almost entirely cut off from communication with the body of the kettle *A*, except for a small aperture at the bottom, the object of this being to prevent the steam from escaping through the spout *B*. Mr. A. W. Blunden, of Sebastopol, Cal., has recently secured a patent on this kettle still.

A NOVEL ELECTRIC MOTOR.

Pictured in the accompanying engraving is an electric motor which is operated by an oscillating armature. The motor is formed with a C-shaped permanent magnet *A*. The oscillating armature is supported on a shaft *B* between the poles of the permanent magnet. The armature consists of four electromagnets numbered 1 to 4 in the illustration, and the polarity of magnets 1 and 3 is of the same sign, but opposite to that of the magnets 2 and 4. By alternately changing the polarity of these electromagnets, a rocking motion of the armature is produced, owing to the action of its poles on those of the permanent magnet. The armature shaft *B* is formed with an arm *C*, connected by a pitman *D* to the revolving power shaft of the motor. The latter carries a flywheel at each end. Connected to the power shaft by means of a crank and link *E*, is a crank arm formed on the rock shaft *F*. The latter carries four disks *G* of insulating material, which are connected by means of rods *H* and *J*. Bearing against these rods are the contact springs *K* and *L*, and the

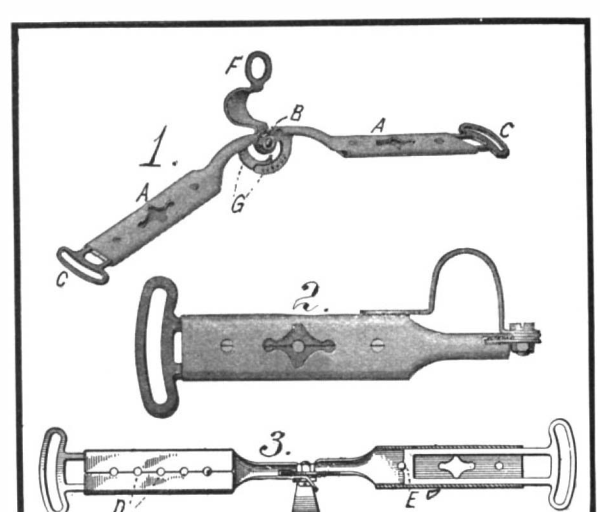


A NOVEL ELECTRIC MOTOR.

circuits are so arranged that as the shaft *F* is rocked back and forth by the rotation of the power shaft the current is alternated, thus alternating the polarity of the electromagnets. When starting the motor, it is merely necessary to rock the armature out of the neutral position, after which it will continue to rock and acting through arm *C* and pitman *D*, keep the power shaft in motion. Mr. Gustaf Seidel, of Saunderstown, R. I., is the inventor of this electric motor.

IMPROVED GARMENT HANGER.

One of the objections to the ordinary garment hanger is the fact that the arms are set at a fixed position which cannot be altered to suit different styles of garments, and the length of the arms cannot be adjusted to meet various requirements. The garment hanger which is illustrated herewith is designed to overcome these faults. The two arms *A* are formed of sheet metal and are reduced at one end where they are joined by a bolt or pivot *B*. The body of each arm is folded over, forming a flat sleeve adapted to receive an extension member *C*. The outer end of each member *C* is shaped to support the shoulder of the garment. At the under side of each arm *A* are a number of openings *D*, adapted to receive a projection *E* on the inner end of the extension member *C*. Thus, when the extension member is drawn out to the desired degree it will be held in place by engagement of the projection *E* with one of the apertures *D*. Each arm *A*, at the pivot end, is provided with an arcuate extension *G*. One of these arcs is provided with a number of projecting teeth which are adapted to be engaged by a single tooth on the other arc, to hold the two arms at the angle at which they are set. The hanger *F*, which is secured to the pivot bolt, is offset so that when the two arms are folded together it may be turned down against their edges (Fig. 2). The inventor of this garment hanger is Mr. Reginald C. Thomas, of 337 State Street, Brooklyn, N. Y.



IMPROVED GARMENT HANGER.

RECENTLY PATENTED INVENTIONS.

Of Interest to Farmers.

HEAT-REGULATOR.—C. F. Rukes, Springfield, Mo. In this case when the temperature in the burner exceeds a predetermined value, the bars will expand, bowing further outward, thus extending the lazytongs which will move the valve lever, decreasing the supply of fuel. Should the incubator become too cool, the bars will contract, thus shortening the lazytongs and move the lever in the opposite direction, to increase the supply of fuel.

STALK-CUTTER.—F. P. Chapa, Eva, Texas. In operation the machine is driven through the field between adjacent rows of stalks which are severed by the engagement of the sharp edge of the blade therewith. The rear end of each of the blades is curved outwardly, so that should a stalk be pushed outwardly by the inclined portion of the blade, it will be engaged by the outwardly bent portion. Means permit the side members of the frame to yield inwardly, should they or the blades engage unyielding objects. The arrangement of blades also permits their easy removal for sharpening or inserting new blades.

FERTILIZER-DISTRIBUTER.—J. K. Gourdin, Pineville, S. C. In this case the invention pertains particularly to an improved arrangement of means for discharging fertilizer from the hopper, and to improved means for effecting the broadcast distribution of the fertilizer after discharge from the hopper. Means provide for adapting the machine for distributing fine, coarse, or lumpy, and also for distributing cotton seed.

Of General Interest.

ATTACHMENT FOR TOBACCO-PIPES.—W. E. Frazee, Perham, Minn. The object of the invention is to provide a device inexpensive to manufacture, which will cause the tobacco in the pipe to burn slowly and evenly in the wind, and which will obviate the danger of burning ashes being blown back into the face of the smoker.

ATTACHMENT FOR ANIMAL-TRAPS.—M. Gravatt, Port Royal, Va. This invention has reference to attachments for use in animal traps, and more particularly such as are adapted to be used as securing means for holding saplings or the like, to which traps have been attached, in bent positions until released by the struggles of the animals caught in the traps.

COMBINED RACK AND HOLDER.—O. M. Harding, Winona, Miss. The purpose here is to provide a construction which affords a compact, neat filing cabinet which is portable, that may be placed upon a desk or table for convenient service, which affords separate receptacles for letters, stationery materials and other desk furniture, and provides separate supports for rubber stamps that may be a part of the desk equipment.

SIGN.—J. Igelstroem, Massillon, Ohio. The sign is of pyramidal form and adapted to be supported upon the counter or in the show window of a store, or suspended from a chandelier or other fixture, the object being to produce a sign that may be shipped or transported flat and occupy the minimum space, but which may be readily folded to present advertising matter to persons viewing the sign from any direction.

GUN-SIGHT.—G. M. Wanee, Red Bluff, Cal. The invention relates more particularly to covered or tubular sights. An object is to provide a sight which will not only permit the operator to see the entire object at which he is shooting, but will also permit him to take a fine sight of any special part thereof. It can be readily taken apart for cleaning or reversing of the partition.

Prime Movers and Their Accessories.

PACKING-RING EXPANDER.—W. H. Richardson, Brunswick, Ga. This practical device will afford convenient and easily operated means, that may be readily engaged with a split resilient packing ring, and by adjustment thereof quickly and evenly expand the engaged ring, so that it may be slipped upon the periphery of a piston, and when in place be released for its sliding introduction into the channel it is to be seated in.

Railways and Their Accessories.

RAILROAD-CROSSING.—G. P. Keith, Rochester, Ind. The crossing can be quickly and conveniently adapted for use in connection with an adjacent railroad crossing, without one interfering with the other, since the rails of one crossing are elevated above the rails of the other, an opening of sufficient width being provided in the upper track to enable trains to pass upon the lower track.

Pertaining to Vehicles.

SPEED-RECORDER.—G. A. Lee, New York, N. Y. This recorder is more especially designed for use on automobiles and other vehicles, and is arranged to graphically produce and display to the occupant of the vehicle, the speed at the time, and to form a permanent record of the speed of the vehicle while the latter is running, the record showing the time, mileage, and speed per hour.

BOLSTER AND STANDARD FOR WAGONS.—C. M. Shotwell, Fossil, Wyo. The invention is an improvement in bolsters, and the object is to provide adjustable standards which may be arranged to fit different widths of beds or of articles carried on the bolster or which may be inclined with respect to the bolster for supporting hopper shaped beds and the like.

TIRE-PROTECTOR.—G. C. Hoskin, Le Mars, Iowa. An object in this invention is to provide a flexible tire protector constructed to obviate any danger of the tires becoming punctured by sharp stones, nails, glass, or the like. Further, to provide a protector that eliminates all danger of skidding on slippery roads or pavements, and which increases the tractive efficiency of the driving wheels.

Note.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending February 23, 1909,

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

Acid, converting catechin into a catechu tannic, Osborne & Schupp.... 913,426
Advertising device, J. W. Phelps.... 913,048
Aerial vessel, C. J. Lake.... 913,517
Air conduit, hot, W. W. Hanold.... 913,284
Air, gas, etc., device for drying, O. Touzimsky.... 913,325
Amusement apparatus, M. R. C. Sonntag... 913,243
Amusement device, I. Kiralfy.... 913,511
Anchor, T. Downie.... 913,367
Anchor, ship's, Hingley & Fletcher.... 913,292
Animal marker, I. O. Olsen.... 913,042
Ankle support and protector, H. J. Collis.. 913,263
Antislipping device, C. J. Marius.... 913,411
Armature coils, device for use in making, J. F. Card.... 913,103
Assaying, J. C. Hames.... 913,129
Attaching and releasing device, D. B. Russell.... 913,673
Automobile driving mechanism support, E. W. M. Bailey.... 913,250
Automobile rear axle transmission mechanism, M. L. Williams.... 913,084
Automobile steering device, J. Carter.... 913,198
Automobile wheel, E. S. Lea.... 913,522
Awning operating device, W. Nehring.... 913,424
Bag holding appliance, W. F. Twombly.... 913,586
Bail ear, F. Westerbeck.... 913,335
Basin and trap, catch, J. R. Williams.... 913,338
Bath or basin waste, H. M. Weaver.... 913,077
Bath-tub supply and waste, D. C. Charmois 912,990
Batteries, method and apparatus for revivifying dry cell, H. B. Ramey.... 913,563
Bearing, antifriction, G. Matta.... 913,529
Beet blocker, C. Canutson.... 912,987
Belt fastener, P. A. Hudson.... 913,386
Belt, fireman's, J. E. Smith.... 913,171
Binder, loose leaf, A. B. Underwood.... 913,073
Binder, loose leaf, C. H. Mann.... 913,527
Blast apparatus, E. L. Thompson.... 913,322
Block signal system, G. S. Pflasterer.... 913,557
Boat propeller, E. Daniel.... 913,624
Boiler check valve clean-out, J. R. Martin. 913,023
Boiler compound, H. R. Young.... 913,606
Boiler installation, Germeau & Bouton.... 913,638
Boilers, apparatus for producing circulation in steam, V. Andrioli.... 913,347
Bolt blank threading and turning machine, C. K. Lassiter.... 913,520
Bolt extractor, G. D. Morrison.... 913,226
Boring, turning, and facing machine, E. B. Sellew.... 913,312
Bottle capping machine, Adriance & Calleson 913,182
Bottle draining and box cleaning device, combined, Noethig & Bourgo.... 913,544
Bowl, flush, B. G. Butler.... 913,355
Bowl, separator, G. Webster.... 913,079
Box, R. A. Robbins.... 913,054
Box cover press, H. Vial.... 913,178
Box lid holder, T. F. Manley.... 913,021
Brace. See Post brace.
Brass polishing device, C. E. Merrill.... 913,414
Breast drill, Smith & McGregor.... 913,172
Bridle winker strap, T. J. Steen.... 913,577
Brush, C. Petersen.... 913,304
Brush making machine, J. E. Snevely.... 913,314
Brush, tooth, C. L. Alexander.... 913,184
Brush trimming and cleaning machine, H. J. Lebherz.... 913,523
Bucket, minnow, A. W. Hart.... 913,379
Bucket, scoop gaging, G. L. Stuebner.... 913,319
Bucket, wheelbarrow hoisting, A. Smith.... 913,241
Buckle, N. Koster.... 913,645
Bull rings, manufacturing, C. P. Showell... 913,651
Bung, W. H. Gerald.... 913,637
Buoy, ring, H. F. Busch.... 913,617
Burglar alarm, C. G. Munsell.... 913,669
Burner vaporizer, C. Heinrichsdorff.... 913,288
Cable conveyer hoist, B. C. Riblet.... 913,564
Cable terminal, F. B. Cook.... 913,264
Calculating appliance, G. W. Evans-Cross... 913,483
Camera, foldable reflex, E. Brauburger.... 913,353
Can closing machine blank feed mechanism, O. Dempewolf.... 913,628
Can soldering machine soldering device, G. Smith.... 913,065
Can stoppers, implement for applying and removing, F. Westerbeck.... 913,336
Capsules with liquefied gas, appliance for charging, P. Giron.... 913,656
Car axle box lid, H. C. Gamage.... 913,371
Car bolster reinforcing construction, F. L. Irwin.... 913,143
Car construction box, Irwin & Tesseyman... 913,142
Car coupling, J. Kelso.... 913,213
Car coupling, McConway & Kelso...913,229, 913,230
Car, dump, A. Campbell....913,357, 913,358
Car rack, W. B. McCarthy.... 913,228
Car releasing device, log, E. Beaudin.... 913,094
Car roof, J. Masker.... 913,412
Car wheel, motor, J. H. Symonds.... 913,580
Cars and other vehicles, pedal guard for motor, A. J. Last.... 913,406
Carbid, manufacture of silicon, F. J. Tone.. 913,324
Carbureter, W. Eckert....912,998, 912,999
Carbureter, Bertrand & Goubillon.... 913,456
Carbureter for explosive motors, G. W. Slaughter, Jr.... 913,313
Card, sample, Cohen & Walsh.... 913,262
Carline reinforcing construction, F. L. Irwin 913,141
Carpet and linoleum stretcher, Nordgren & Jones.... 913,545
Carriage and cradle, convertible, H. Wilchinsky.... 913,082
Carriage, baby, C. F. Thayer.... 912,071
Carriage body, J. C. Moon.... 913,534
Carriage body, S. A. Moore.... 913,537
Carriage, collapsible or folding, R. Fleischmann.... 913,487
Carriage, folding, A. J. Adams.... 913,345
Cash register and indicator, J. F. Parker... 913,551
Cash register, indicator, and recorder, J. F. Parker....913,549, 913,550
Cement mixer, A. G. Olsen.... 913,425
Cereal food, M. C. Jackson.... 913,011
Cereal products, reducing disk machine for the manufacture of, H. D. Perky.... 913,671
Chain, drive, W. M. Butler.... 913,618
Chair, J. J. Sherman, Jr.... 913,062
Chair and stand, combined drying, L. Schreiber.... 913,310
Chart, tailor's cutting, M. F. MaLoney.... 913,408
Check-marking apparatus, Marston & Cummings.... 913,299
Chopper. See Cotton chopper.
Chuck, E. S. Savage.... 913,059
Churn, W. J. Snow.... 913,573
Churn, F. W. Cooper.... 913,621
Circuit controller, S. Holland.... 913,383
Circuit controlling instrument, G. M. Willis. 913,086
Clip file, C. Spiro.... 913,315
Clothes line holder, P. L. Schmidt.... 913,436
Clothes line prop and tightener, O. R. Olson. 913,548
Clothes rack, A. D. Daniel.... 913,106
Clutch, P. A. Geary.... 913,279
Clutch, Freeman & Neuteboom.... 913,370
Coal and other carbonaceous substances, retort for the distillation of, T. Parker.. 913,552
Coal tipple, J. S. Pates.... 913,555
Cock, angle, Heiniger & Vallance.... 913,287
Coffee mill, W. W. Dryden.... 913,475
Coin controlled mechanism, J. C. Fredell... 913,278
Coin repository, B. vom Eigen....913,629, 913,630
Collar supporter, J. W. Schloss.... 913,435
Combination table and lounge, T. McGaw... 913,032
Composite pipe, J. T. Langford.... 913,662
Composition of matter, R. Rumbel.... 913,565
Concrete block molding mold, A. Evenstad.. 913,116
Concrete construction, reinforced, E. F. Wilcox.... 913,083
Concrete or other plastic material, apparatus for use in building structures of, D. Morgan.... 913,538
Concrete wall construction mold, G. Taubert 913,441
Concrete work, reinforcing bar for, E. C. Woodward.... 913,603
Condiment holder, J. W. Meaker....913,028, 913,029
Conduit, metal, W. M. Caswell.... 913,359
Cone shaper, edible, L. L. Westling.... 913,597
Cooking utensil, R. M. Austin.... 913,450
Coop, poultry, H. W. Burgett.... 913,101
Core making apparatus, J. R. Davies.... 913,270
Cork compound and making same, J. J. C. & M. Smith.... 913,572
Corn husking apparatus, W. B. Havens.... 913,130
Corset, apparel, D. Kops.... 913,404
Cotton chopper, T. H. Ellis.... 913,115
Cotton chopper, J. W. Garrett.... 913,373
Cotton chopper, D. H. Callahan.... 913,468
Cotton chopper, Hogan & Knetsch.... 913,659
Counter measure, computing, F. I. Goodenow 913,124
Cow milker, F. M. Devore.... 913,108
Crane jibs, etc., which move in a vertical plane, mechanism for raising, Heym & Kimmel.... 913,289
Crane, traveling, W. H. Morgan.... 913,031
Cream separator, W. C. Hartmann.... 913,006
Cream whipper, J. M. Kier.... 913,398
Creasing machine, J. F. Cleary.... 913,361
Crop handling machine, J. B. Schuman.... 913,438
Cultivator, E. Biss.... 913,461
Current indicator, electric, F. N. Conant... 913,105
Current apparatus, undulating, F. Cedergen. 913,104
Curtain and shade holder, window, A. Logsdon.... 913,019
Curtain pole, F. Wukmanic.... 913,344
Cutlery, A. Grah.... 913,207
Cutter and shredder, J. J. Farquer.... 913,485
Cycle ammonia power or refrigerating apparatus, continuous, J. Robson.... 913,165
Cycle, etc., driving and braking mechanism, R. Walker.... 913,332
Cycle saddle, motor, F. Mesinger.... 913,300
Cycle stand, H. T. Adams.... 913,446
Densimeter, A. Muntzing.... 913,420
Detachable coupling, F. G. Fairall.... 913,484
Detinning, Fernberger & Murray.... 913,275
Digging implement, J. R. Baylis.... 913,350
Distance finder, J. G. R. Lilliendahl.... 913,526
Distributer, W. H. Sanders.... 913,169
Door, L. C. Dalhousie.... 913,269
Door closing and checking device, A. H. Sulser.... 913,320
Door, fire escape, J. B. Bernier.... 913,610
Door hanger, J. W. McQueen.... 913,150
Door hanger, G. Lane.... 913,518
Door hanger, sliding, W. W. Clark.... 913,261
Door hanger, sliding, A. Jenson.... 913,660
Door, etc., latch and lock, F. G. Marbach.. 913,409
Door securer, W. Minderlein.... 913,223
Doors, gates, etc., engaging mechanism for, F. G. Marbach.... 913,410
Dough mixing and kneading machine, G. J. Hicks.... 913,133
Drain tile trimmer, A. Connor.... 913,620
Drier, F. A. Hetherington.... 913,497
Drilling and reaming device, templet, Berger & Beazell.... 913,455
Dust collecting and absorbing substance, J. A. Duffy.... 913,476
Dye, red, W. Konig....913,513, 913,514
Dyeing machine, W. Erler.... 913,274
Dynamo and motor brush spring, J. H. Poole 913,562
Electric broiler, G. E. Stevens.... 913,579
Electric controller or switch contact, A. White.... 913,081
Electric cord retriever, W. O. Rew.... 913,432
Electric installation tubes, adjustable coupling for, W. H. Vibber.... 913,588
Electric machine, dynamo, B. G. Lamme... 913,017
Electric machine, dynamo, L. Lyndon.... 913,666
Electric metal working apparatus, A. E. Buchenberg.... 913,616
Electric motor control system, W. Cooper... 913,995
Electric motor for high tension currents, N. Myschkin.... 913,541
Electric time switch, W. E. Richter.... 913,052
Electric trap, G. S. Riggs.... 913,053
Electrical and other fixture clamp, W. M. Meacham.... 913,024
Electrical apparatus, O. Schaumberg.... 913,060
Electrical apparatus synchronizing means, A. C. Crehore.... 913,363
Electrical connection, G. H. Pride.... 913,160
Electrical fuse spitter, Sauve & Bernardi... 913,566
Electrical receptacle door hinge, W. W. Jones.... 913,504
Electromotor automatic starter, continuous current, Schoeller & Sundhausen.... 913,437
Elevator door, A. J. Zitzmann.... 913,181
Engine and volatile fluid engine plant, gas, J. Robson.... 913,166
Engine carbureter, hydrocarbon, G. Breeze.. 913,354
Engine valve operating mechanism, explosive, H. Steingassner.... 913,578
Engines, means for cooling the cylinders of explosive, D. B. Whitehill.... 913,599
Envelop, J. R. Huff.... 913,387
Envelop, J. Draemel.... 913,473
Envelop, J. C. Brown.... 913,612
Envelop for air-proof material, A. T. Saunders.... 913,058
Extensible bracket, O. H. Pieper.... 913.049
Extension table, G. B. Dickson.... 913,204
Eyeglasses, nose clip or guard for, J. H. Ostrander.... 913,647
Eyeglasses, nose guard for, J. H. Ostrander. 913,154
Feed box and manger, combined, J. E. Thompson.... 913,175
Feed mixer, J. S. Kilpatrick.... 913,399
Feeding mechanism, O. C. Hill.... 913,134
Fence, portable baby, R. H. Villard.... 913,075
Fence post and wire fastener, J. H. Knickerbocker.... 913,402
Fence stretcher clamp, woven wire, W. Hopper.... 913,385
Fence stretcher, wire, W. Hopper.... 913,384
Ferrule, plumber's, J. R. Donnelly.... 913,366
File, paper, C. Spiro.... 913,316
Films, device for repairing moving picture, C. R. Uebelmesser.... 913,326
Fire alarm, automatic, O. B. Johnson.... 913,146
Fire escape, K. G. Feyma.... 913,117
Fire protection signal system, Nolen & Shepherd.... 913,041
Fireproof building construction, C. Collins, reissue.... 12,922
Fireproof covering, A. O. Brigance.... 913,464
Fireproof partition, W. Orr.... 913,152
Fish artificial bait, B. F. Burke.... 913,102
Fishing hook, gang, S. R. Sutton.... 913,440
Flaking machine, E. M. Lawrence.... 913,018
Flier, F. H. Martin.... 913,646
Floor, P. Langguth.... 913,519
Flue cleaner, E. B. Barnhill.... 913,675
Fluid cushioned bearing, A. Ponten..913,232, 913,233
Foot or leg attachment for use in swimming, C. W. Hill.... 913,382
Form, dress, C. A. Ufford.... 913,329
Fruit stoning machine, J. H. Smith.... 913,571
Frying device, J. Renner.... 913,431
Furnace, J. D. Reekie.... 913,236
Furnace, P. B. & L. J. Heckler.... 913,496
Furnace charging apparatus, open hearth, B. W. Head.... 913,658
Furnace regulator, F. D. Kees.... 913,507
Fuse, impact, A. Wratzke.... 913,343
Gage, multiple, G. O. Hammer.... 913,641
Garbage receptacle, P. W. Nicola.... 913,040
Gas burner, J. Du Ross.... 913,477
Gas burner baffle, J. Schirra.... 913,567
Gas element electrode, E. W. Jungner.... 913,390
Gas engine, J. E. Patterson.... 913,156
Gas engine, rotary, J. E. Friend.... 913,635
Gas producer, J. A. Waldburger.... 913,591
Gases into liquids, apparatus for introducing, S. P. A. Wenstrom.... 913,596
Gaseous fluid under pressure, device for delivering, C. A. Claflin.... 913,260
Gate, W. A. Ford.... 913,120
Gate, P. H. Wilson.... 913,444
Gate, W. P. Sowers.... 913,574
Gate, H. K. Tabler.... 913,581
Gate stop, water, G. E. Kellar.... 913,147
Gear, reversing, A. N. Woods.... 913,445
Gear, transmission, Howald & McGeorge.... 913,503
Gear, variable speed, G. J. Dallison.... 913,623
Gearing, R. Milne.... 913,417
Gearing, T. J. Winans.... 913,652
Glass-blowing apparatus, A. J. Bates.... 913,190
Graphophone attachment, H. C. Kelly.... 913,508
Grate, J. S. Wood.... 913,341
Greenhouse construction, E. F. Kurowski... 913,217
Grinding machine, H. B. Nichols.... 913,543
Gun action slide lock, take down, F. D. Peltier.... 913,047
Gun, barrel recoil, Koch & Hayn.... 913,403
Gun turret alarm device, J. L. Hall.... 913,493
Hair cutting device, A. Lancellotte.... 913,005
Hair pin, L. P. Shaw.... 913,061
Hair roll and comb, combined, H. Feder.... 913,369
Harrow, F. Germon.... 913,639
Harrow, cultivating, J. Bradford.... 913,256
Harvester, C. M. McCormick....913,421, 913,422
Hat pin, J. C. Steele.... 913,067
Hat pin, ornamental safety, S. J. Jacobsen. 913,643
Heater, E. B. Raymond.... 913,672
Heating and illuminating device, S. S. St. Hoor.... 913,068
Heating apparatus, electric, F. Conrad.... 912,994
Heating device, electric, C. Aalborg.... 912,985
Heating system, hot water, A. E. Crowhurst.... 913,364
Heating system regulator, hot water, J. M. McKeown.... 913,033
Hog waterer, automatic, C. Pelmulder.... 913,158
Hoisting apparatus, F. W. Lovell.... 913.020
Horse feeding device, E. M. Rand.... 913,305
Hose coupling, C. H. Chapman.... 913,259
Hose coupling, detachable, Beraud & Achee. 913,351
Hose supporter, F. F. Knothe.... 913,294
Hydrocarbon burner, J. Du Ross.... 913,478
Index guide, etc., J. H. Rand.... 913,162
Indicator lock, Andrus & Rause.... 913,448
Insect destroyer, A. O. Ellithorp.... 913,205
Insulator, disk, L. Steinberger.... 913.439
Insulator mold, C. C. Johnson.... 913,212
Internal combustion engine, J. C. & W. C. Strickler.... 913,070
Iodin compounds of fats, manufacture of new stable, B. R. Seifert.... 913,311
Iron, extracting, C. G. P. de Laval.... 913,405
Iron or steel, solution for treatment of, A. Hayes.... 913,657
Ironing press, F. Krapp.... 913,296
Jack, wire stretcher, and post puller, lifting, L. T. & T. H. Goolsby.... 913,281
Jar closure, J. L. Kivlan.... 913,214
Journal box, railway, E. G. Caughey.... 913,360
Journal box waste supporting attachment, R. A. Billingham.... 913,458
Jury and jury frame for facilitating orthopedic treatment, G. W. Haas.... 913,127
Knife handle, Putnam & Livingston.... 913,161
Lace fastener, W. H. Schweitzer.... 913,568
Ladders, steps, trestles, etc., adjustable foot for, G. Bartlett.... 913,452
Lamp, arc, C. A. B. Halvorson, Jr.... 913,209
Lamp burner, R. A. Sommerville.... 913,173
Lamp, electric, I. Ladoff.... 913,016
Lamp, electric arc, W. R. Ridings.... 913,308
Lamp, incandescent gas, H. E. Woods.... 913,088
Lamp socket keys, cam for, G. B. Thomas.. 913,584
Last, A. G. Fitz.... 913,118
Lathe driving center, B. Wehner.... 913,594
Lemon slice squeezing device, C. Doll.... 913,365
Lever mechanism, J. F. S. Goble.... 913,490
Line setting and casting machine, H. Degener.... 913,627
Linotype and other type casting machine, Albrecht & Muehleisen.... 913,447
Load lifting and releasing device, M. C. Myers.... 913,540
Lock, V. Bily.... 913,459
Lock pin, V. V. Pittman.... 913,560
Locomotive pilot, Justis & Littrell.... 913,391
Loom filling-detecting mechanism, R. Burgess.... 913,196
Loom pick finder mechanism, B. F. McGuiness.... 913,301
Loom selvage motion, J. Belavance.... 913,095
Loom shuttle mechanism, P. Martourey.... 913,667
Lubricator, W. E. Parr.... 913,553
Mail chute, L. Ehrlich.... 913,111, 913,114
Mail handling apparatus, D. E. Coughlin.... 912,996
Mail holder, M. Cooper.... 913,471
Mail pouch handling apparatus, W. A. Loomis.... 913,665
Marker, land, H. N. Randall.... 913,235
Massage apparatus, M. A. Haines.... 913,492
Match safe, M. B. Keller.... 913,394
Match serving box, J. Hermann.... 913,132
Measuring last tape, G. E. Belcher.... 913,454
Measuring roll, non-recount fabric, W. W. Birnstock.... 913,676
Mechanical movement, J. D. A. Johnson.... 913,145
Mechanic's case, W. F. Shrum.... 913,569
Medical apparatus for injecting purposes, K. Krautschneider.... 913,297
Metal bars by twisting, machine for cutting, H. H. Jensen.... 913,013
Metals electrolytically, precipitating, A. Ramen.... 913,430
Metallic structure, P. M. Wege.... 913,334
Metallurgical process, G. Moore.... 913,535
Milk cooler, W. Mitcham.... 913,418
Milk, Pasteurizing, J. Willmann.... 913,600
Mine, submarine, M. Klauber.... 913,401
Mine, submarine, K. O. Leon.... 913,524
Mines, removing loose materials, dust, and gases from, F. T. Byers, reissue.... 12,923
Mold, J. L. Sackett.... 912,057
Molding apparatus, S. Griffith.... 913,126
Molding machine, J. T. Brent, second.... 913,194
Mop and brush fabric making machine, L. Stocker.... 913.318
Motor starting device, electric, C. D. Knight 913.512
Motor system control, E. Gruenfeldt.... 913,282
Motors, operating alternating current, R. D. Mershon.... 913,415
Mower, lawn, A. L. Le Vine.... 913,525
Needle, C. V. Reeder.... 913,648
Nitroglycerin, manufacturing, F. Aigner... 913,653
Nut lock, C. H. Stall.... 913,174
Nut lock, S. H. Coleman.... 913,201
Nut lock, W. H. Cottrell.... 913,266, 913,267
Nut lock, C. H. Ferguson.... 913,486

Nut lock, G. M. Holman 913,501
Oar lock, C. Bestman 913,457
Office and store furniture, fixtures, etc., fireproof covering for, L. Barg 913,091
Oil can for oilstone boxes, C. B. Cox...... 913,268
Oil separator, A. E. Embree 913,000
Ordnance recoil check, L. M. Fuller....... 913,488
Ore, cement, and general pulverizing mill, A. Tregoning 913,176
Ore separator, A. S. Campbell 913,258
Ores, smelting, J. T. Carrick.............. 913,655
Orienting mechanism, C. H. Pope.......... 913,051
Oven, collapsible, W. E. Sloan 913,570
Oven screen and mat, A. McNulty 913,148
Package binder, Miller & Painter.......... 913,030
Package fastener, W. M. Cleaveland 913,469
Packing, shaft, B. Ljungstrom 913,407
Paper board manufacturing apparatus, multiply, H. C. Herr 913,007
Paper can, sanitary waste, M. K. Miller... 913,532
Paper making machine, J. W. Packer...... 913,670
Paper making machine reel belt tightener, J. W. Packer 913,231
Paranitranilin red, etc., obtaining, E. A. Fourneaux 913,633, 913,634
Paste applying mechanism, H. C. Herr.... 913,008
Pastuerizing apparatus, A. A. Pindstofte... 913,559
Percolator, J. R. Holley.................. 913,293
Piano actuating mechanism, autopneumatics, R. H. Fischer 913,002
Piano automatic music playing attachment, I. B. Smith 913.242
Piano, automatic playing, A. G. Gulbransen 913,378
Piano tune sheet attachment, automatic, A. J. Hobart 913,009
Pianos, means for preventing interference in assembling self-playing, E. C. Hiscock.. 913,137
Picture hanger, F. Greene................ 913,125
Picture machine reel, moving, C. R. Uebelmesser 913,328
Pipe. See Composite pipe.
Pipe bending machine, C. Gordon......... 913,004
Pipe connection, B. D. Coppage 913,265
Pipe coupling and connection, sewer, M. Nelson 913,036
Pipe or hose coupling, detachable, G. James, et al 913,144
Pipe threading machine, V. E. Ankarlo.... 913,089
Planter, check row, O. Brown............ 913,466
Planter, corn, H. N. Randall 913,234
Planter marker attachment, A. F. Buck.... 913,098
Plastic materials, machine for forming articles of, Lippold & Lord................ 913,664
Plate and hot dish lifter, J. A. Kennedy... 913,015
Plow soil pulverizing attachment, E. M. Kramer 913,216
Poke, F. A. Kime 913,510
Pole sleeve, W. D. Gherky 913,376
Post and pole protecting sleeve, G. G. Ette 913.482
Post brace, D. Houdyshell 913,502
Pot for making coffee, etc., A. Perlich..... 913,303
Power blower, water, J. L. Ware.......... 913,592
Preserving can, vacuum, S. G. Wiffin 913,337
Pressure gage, gas, W. Thomas 913.321
Printing machine sheet delivery apparatus, G. P. Fenner 913,631
Printing plate holder, W. Neasham 913,035
Printing plates, producing, B. Gisevius ... 913,280
Printing press automatic throw-off mechanism, J. E. Tucker 913,177
Projecting apparatus, V. E. Mellre 913,530
Proof roller, self-inking, F. A. Bary...... 913,189
Pruning implement, E. N. Higley.......... 913,290
Pump, J. J. Wernette 913,179
Pump, bucket, W. L. Deming............. 913.203
Pump, centrifugal, S. A. Huntley.......... 913,140
Pump, double acting deep well, J. Gleason.. 913.123
Pump governor, J. F. Senter.............. 913,650
Purifying materials, recovering, H. Hirzel. 913,500
Puzzle, W. D. Taylor 913,582
Railway grass line trimmer, C. Bartel..... 913,348
Railway, pleasure, J. S. Paul............. 913,046
Railway road bed grading apparatus, H. B. Earling 913,109
Railway signal safety stop signal attachment, Moore & Kamp 913,536
Railway tie, F. M. Weaver................ 913,246

Railway tie and chair combined, S. A. Ross 913,238
Razor, safety, J. M. Wallace.............. 913,076
Razor, safety, F. H. Arnold.............. 913,186
Refrigerator, A. Finch 913,276
Revolver loader, M. J. Kellogg............ 913,393
Ringing key, K. Weman 913,080
Rock drill, L. H. Jenkins 913.389
Roll holder, E. O. Balman 913,099
Rotary engine, S. W. Balch 913,255
Rotary engine, G. L. Webster 913,443
Rubber, reclaiming devulcanized, E. E. A. G. Meyer 913,218
Rubber ring cutting machine, L. J. Pianarosa 913,558
Rug clamp, Petrie & Rebholz.............. 913,159
Safe, provision, H. Miller................. 913,222
Salt shaker, J. W. Meaker........913,026, 913,027
Sash fastener, V. A. Kemper 913,395
Sash, etc., hinge, storm, J. G. Ralph..... 913,429
Sash lock, Schweida & Kleinheinz......... 913,239
Sash lock, adjustable ventilating, Hillyard & Booth 913,291
Sash lock, gravity, F. Bogenberger........ 913,096
Sash weight, C. M. Conklin.............. 913,470
Saw, crosscut, E. J. Barnes.............. 913,092
Saw handle, F. L. Blomquist 913,462
Saw leveling and stretching machine, N. L. Botten 913,463
Sawing device, J. Weber 913,078
Sawmill nigger, J. A. Gillard 913,640
Scale, G. W. Cope 913,202
Scale, automatic weighing, Linden & Rockwell 913,298
Screw slotting machine, F. N. Tilton...... 913,585
Seam dampening machine, T. Tothill, Sr.. 913,245
Seats, tufting button for cushion, L. A. Young 913,248
Sectional boiler, R. Glogner 913,489
Seed box, A. G. Yates 913,605
Sewers, etc., system for ventilating and purifying, E. F. Head 913,131
Sewing machine, J. P. White 913,598
Shade holding device, C. L. Hopkins...... 93,138
Shaft detacher, C. Murphy 913,5 9
Shaft reversing mechanism, rotating, W. H. Brown 913,195
Shaft work detachable hook, C. O. Vowell.. 913,589
Shaving cup, J. Hasselbring 913,380
Shears, G. W. Thorsell 912,072
Shears tension device, C. W. Sprague...... 913,575
Sheep shearing machine, W. Silver......... 912,064
Shock absorber, J. Krejci 913,392
Shock loader, E. Pitcher 913,428
Shoe fastener, M. E. Jackson 913,012
Shoe lace holding device, W. F. Shults..... 912,063
Shoe or socket for loggers' falling boards, A. McNulty 913,423
Sign, G. A. Marsh 913,022
Sign, electric, B. E. Salisbury............ 913,309
Signaling system, R. H. Marriott.......... 913,528
Skirt marker, M. Ryan 913,433
Skylight and ventilator, combination, M. W. Pehl 913,556
Sled, J. D. Bohanan 913,193
Sleigh, bob, R. Pintsch 912,050
Sole, shoe, R. C. Ross 913,167
Sound box, G. Osten 913,153
Sound vibrations, means for signaling or effecting operations by means of, J. Gardner 913,372
Spark plug, H. F. Parker 913,045
Spark plug, C. Bateholts 913,453
Spark plug, F. H. Weinhauer............. 913,595
Spindle appurtenance, I. E. Palmer........ 913,044
Spinning and twisting machine, rotary ring, C. T. Atherton 913,654
Spinning apparatus, yarn, A. E. Rhoades.. 913,164
Spooling or winding machine attachment, G. A. Metcalf 913,416
Spring. See Vehicle spring.
Stairway, fireproof, F. A. Winslow........ 913,087
Stand, S. S. Eccleston 913,110
Staple driver, K. G. Kafer 913,014
Station indicator, T. R. Clark 912,992
Steam engine, J. F. Chuse 912,991
Steam generator, T. G. Aldrich........... 913,249
Steam generator, F. N. Tilton............ 913.442
Steam superheater, E. H. Foster 913,277

Classified Advertisements

Advertising in this column is 75 cents a line. No less than four nor more than ten lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

MUNN & CO.

BUSINESS OPPORTUNITIES.

WE WANT TO ATTRACT THE ATTENTION of a successful man, capable of business management and unlimited executive ability, with knowledge for directing sales department and willing and able to grasp the fundamental principles of the mechanical rubber business. The rubber industry is developing faster than men are being developed for it, and you know what this means and its value to you. This company is one of the largest and most progressive in the United States. All communications strictly confidential. Address Rubber, Box 773, New York.

Inquiry No. 8868.—Wanted to buy nickeloid for buttons.

MAKE $250 TO $500 PER MONTH.—I will teach you the Real Estate Business by mail and appoint you my Special Representative. I handle real estate on the co-operative plan and need you, no matter where you are located or what business you are in. A splendid opportunity for men without capital to become independent. Let me send you my free book. For further particulars address Herbert Hurd, President Gray Realty Co., 175 Reliance Building, Kansas City, Mo.

Inquiry No. 8877.—For manufacturers of convex glass for pictures.

$5.75 PAID FOR CERTAIN 1853 QUARTERS.—Keep all money coined before 1875 and send 10 cents at once for a set of two coin and stamp value books, size 4x7. It may mean your fortune. C. Z. Clarke & Co., Le Roy, N.Y.

Inquiry No. 8885.—For manufacturers of the "Mysterious Ball" like that of Mr. Lepere's—a man in a ball.

PATENTS FOR SALE.

CANADIAN PATENT FOR SALE, No. 116,059.—Hand power wood saw machine (double cut 20 to 30 rick a day). Easy work for boy or man. Address T. Kimura, P. O. Box 9, Port Blakley, Wash.

Inquiry No. 8889.—Wanted to buy a machine which breaks and divides apricot stones.

PARTNERS WANTED.

PARTNER WANTED.—Who can furnish money to construct an airship as per my patent No. 909,681. For particulars address William Rumble, 1802 Crotona Avenue, New York.

Inquiry No. 8894.—For manufacturers of an automatic camera for making photographs on pin trays, etc.

HELP WANTED.

MEN WANTED QUICKLY by big Chicago mail order house to distribute catalogues, advertise, etc. $25 a week. $60 expense allowance first month. No experience required. Manager, Dept. 73, 385 Wabash Ave., Chicago

Inquiry No. 8897.—For the manufacturers of the "Lid on" can opener.

WANTED BY COTTON MACHINE BUILDERS.—Energetic, reliable, practical man, who understands cotton spinning and manufacturing. One preferred with good technical education who has had experience as master mechanic, and thoroughly understands power plants and electricity. Address Cotton, Box 773, N. Y.

Inquiry No. 8903.—For firms dealing in motor cars to suit Indian climate.

STAMPS AND COINS.

WE BUY U. S. and foreign coins many dates and denominations; premiums up to $5,800. Also every kind of used stamps. Particulars free. May be worth many dollars, perhaps fortune to you. Money and Stamp Brokerage Co., 150 Nassau St., E 23, New York.

Inquiry No. 8904.—Wanted to buy new or second hand machinery for making "bow type," mouse and rat trap springs and wire parts, single machine or full outfit.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8908.—For a dealer in tapes and cords for Venetian blinds.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price $15.00. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8909.—For a machine to paint shade or blind rollers.

MISCELLANEOUS.

UNITARIAN LITERATURE, including sermons and weekly publications, sent free, on application to Miss Peck, 106 George Street, Providence, R. I.

Inquiry No. 8911.—Wanted to buy steamfitter's tools and screw-cutting lathes.

Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Catalytic Sparking Plug."

Inquiry No. 8920.—For a still for extracting alcohol from saw dust.

Inquiry No. 8921.—For the manufacturers of gilt paper.

Inquiry No. 8922.—Wanted the address of Worthington Boiler Co.

Inquiry No. 8926.—Wanted to buy a tree digger of steel plates which are forced down beside the tree and locked in position.

Inquiry No. 8927.—Wanted to buy an apparatus for sterilizing water at the tap by an ozonizer.

Inquiry No. 8928.—For the manufacturers of a steam rotary excavator as described in the Scientific American of December 12, 1908, page 347.

Inquiry No. 8929.—For makers of automatic gates that can be opened without the driver of a vehicle getting out.

Inquiry No. 8931.—For parties who manufacture the Western Stump Borer for boring stumps.

Inquiry No. 8934.—Wanted to buy seal and book of blank stock certificate.

Inquiry No. 8936.—Wanted machinery used to spin or wrap paper pencils in the manner that paper pencils are made.

Inquiry No. 8940.—Wanted to buy machine or bender for rounding angle iron, flat iron and round end oblong tanks.

Inquiry No. 8941.—For manufacturers of machinery for making fly screens.

Inquiry No. 8942.—Wanted to buy apparatus to enable anyone with rheumatism or other causes to hold a penholder.

Inquiry No. 8943.—Wanted a portable hand machine for breaking stones for installing road surface. To be worked by two or three men.

Inquiry No. 8944.—For the address of the manufacturers of the king or lever collar button.

Inquiry No. 8947.—For the manufacturers of a machine to compel deep breathing called "Pneumaxeter."

Inquiry No. 8948.—For manufacturers of gearing, noiseless or otherwise, suitable for speed of 3,000 to 4,000 r. p. m. for wheels 5 inches diameter.

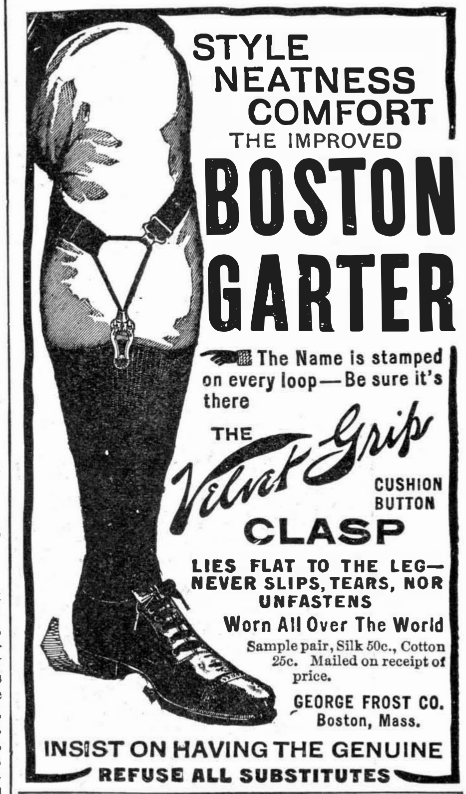
Inquiry No. 8949.—For manufacturers of a suction or vacuum street sweeper.

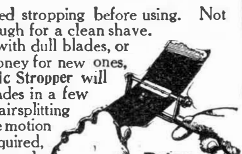
Inquiry No. 8950.—For manufacturers of machinery for the production of Coquito, Palm, Babosa, and Mame seed or nuts.

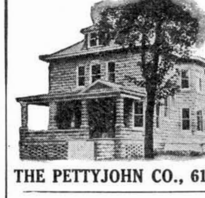
Inquiry No. 8951.—For manufacturers of machinery for making milk bottle sanitary fiber caps.

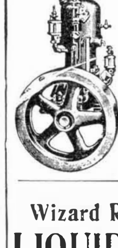
Inquiry No. 8952.—For firms making apparatus for using oil for fuel under a steam boiler instead of coal.

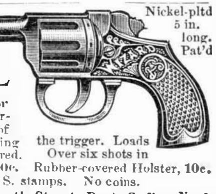
Steam trap, G. M. Hilger	913,498
Steam trap, J. J. & J. W. Kelly	913,509
Steam utilizing system, exhaust, Y. Wadagaki	913,330
Stove, A. McNulty	913,149
Stove antirust compound, C. F. Green	913,208
Stove damper, gas and gasolene, G. E. Davis	913,626
Stove grate, J. Jefferson	913,211
Stove hood, A. Brouillet	913,465
Stove, vapor, Savage & Chapman	913,649
Strapping machine, W. M. Kidney	913,397
Street sweeper, F. A. Bishop	913,460
Strip serving apparatus, E. L. Brownson	913,614
Surveyor's target, G. T. Stephenson	912,069
Swing, scoot, E. K. Hood	913,642
Switch, B. F. Nickerson	913,037
Switch and stand for pressing irons, automatic, F. E. Emery	913,480
Switch and stand for pressing irons, automatic electromagnetic, F. E. Emery	913,481
Switch mechanism and actuating means therefor, J. C. Phillips	913,427
Switch stand, Reinoehl & Long	913,163
Switch stand, F. C. Anderson	913,185
Swivel, H. M. Rounds	913,056
Table lock, pedestal extension, W. Dickinson	913,271
Tapping die, G. Ermold	913,001
Target, H. M. Stern	913,317
Tea strainer, C. S. Rollins	913,055
Telegraph transmitting machine, J. C. J. Alderson	913,183
Telephone call mechanism, W. E. Zabst	913,607
Telephone exchange details, call distributing, S. H. Browne	913,613
Telephone exchange system, G. Babcock	913,451
Telephony, multiplex, M. C. A. Latour	913,521
Tellurian, L. H. Van Syckle	913,074
Temperature annunciator, N. D. Wyman	913,180
Threshing machine level attachment, A. Ferguson	913,206
Throw out mechanism, A. J. Ford	913,119
Ticket, transportation, E. A. Denham	913,107
Tie and rail fastener, Eells & Anderson	913,368
Tilting gate, F. Sample	913,434
Tire, T. Midgley	913,220
Tire detachable securing means, J. Baker	913,251 to 913,254
Tire grip tread, pneumatic, W. P. Shattuck	913,674
Tire repairer, rubber, J. M. Padgett	913,043
Tire, vehicle, W. A. Koneman	913,295
Tongs, clinker, W. W. Church	913,619
Tool, combination, B. F. Bird	913,191
Tool handle, G. E. Wood	913,339
Tool, percussively operated hand, G. E. Wood	913,340
Tool, smoothening, C. R. Uebelmesser	913,327
Tooth, artificial, M. F. Henle	913,210
Torch burner, blow, E. Beyer	913,611
Toy, P. S. Hay	913,381
Trace carrier, S. Wold	913,601
Traction wheel, D. L. Brownfield	913,257
Transmission and chain adjustment mechanism, combined, J. M. Michaelson	913,531
Trap, G. O. Miller	913,221
Tree or staff holder, C. Dreibuss	913,474
Trolley pole wheel, street car, S. Bryan	913,615
Trolley retriever, Gabel & Facrett	913,122
Trolley, roller bearing, W. H. Sheesby	913,240
Trolley safety device, H. Nanneuhorn	913,542
Trolley wire connection, G. S. Pannebaker	913,155
Trolley wire hanger, insulating, L. W. Moran	913,419
Trolley wire turnbuckle, H. S. Olson	913,547
Truck frame, reinforced, L. G. Woods	913,602
Truck, lateral motion car, E. C. Washburn	913,333
Truck, locomotive tender, W. L. Austin	913,609
Truck, railway, S. E. Hitt	913,136
Truck wheel fender, car, H. W. Bodendieck	913,192
Truing gage, Waldrip & Pope	913,331
Tube drying apparatus, J. R. Harbeck	913,285
Tumbler lock, L. F. Dahl	913,622
Turbine blade, P. Emden	913,273
Turbine governing apparatus, steam, H. F. Fullagar	913,003
Turn table, Hunter, Akeley & Holt	913,388
Type bar and bearing therefor, A. W. Chamberlain	913,199, 913,200
Type casting machine, Nuernberger & Rettig	913,546
Type setting and distributing machine, E. Mirus	913,224
Typewriter stop device, E. B. Cram	913,362
Typewriting machine, C. S. Nickerson, 913,038,	913,039
Typewriting machine, W. J. Barron	913,093
Typewriting machine, M. Klaczko	913,215
Typewriting machine, F. C. Ursbruck	913,587
Typographic machine key mechanism, F. H. Richards	913,306, 913,307
Umbrella holder lock, J. C. Backus	913,188
Vacuum gage, mercury, A. B. Hohmann	913,010
Valve, M. R. Greenlee	913,491
Valve, C. H. Foster	913,632
Valve, automatic tank, W. H. Parton	913,554
Valve, blow-off, H. Kieren	913,644
Valve control, L. A. Frayer	913,121
Valve, flushing, G. A. Brown	913,097
Valve for grain separators, C. J. H. Grant	913,377
Valve for paper pulp conduits, G. W. Kimball	913,400
Valve for water closets, supply, A. C. Einstein	913,479
Valve, mixing and regulating, C. J. Lake	913,516
Valve, motorman's, W. H. Terwilliger	913,583
Valve, stop, P. Cachin	913,356
Valve, tide, J. A. Morrison	913,227
Valves, etc., machine for facing, T. B. Williams	913,085
Vault, burial, P. F. Dohr	912,997
Vegetable grater, H. Arnstein	913,187
Vehicle attachment, C. A. Zachow	913,608
Vehicle axle spindle, L. Burg	913,100
Vehicle cushioning device, Carpenter & Kisselle	912,989
Vehicle electrical control system, motor, E. Gruenfeldt	913,283
Vehicle safety strap and bracket, motor, R. Huff	913,139
Vehicle shaft holder, automatic, A. Wetzel	913,247
Vehicle shock absorber, C. M. Kontzinger	913,396
Vehicle spring, Carpenter & Kisselle	912,988
Vehicle spring, R. Mulholland	913,668
Vehicle starter, O. David	913,625
Vehicle steering mechanism, motor, E. R. Halsey	913,494
Vehicle suspension, Batault & Gardy	913,349
Vehicle wheel, T. Midgley	913,219
Vending apparatus, N. J. Matthews	913,413
Vending apparatus, E. W. Lindgren	913,663
Vending machine, N. N. Neher	913,151
Ventilator, Sturtz & Igel	913,244
Ventilator, M. Ashcroft	913,449
Vessel, double walled, A. Aschenbrenner	912,986
Vessel, fluid propelled, C. J. Lake	913,515
Wagon box, W. F. Rodebaugh	913,237
Wagon brake, automatic, J. C. Dunham	913,272
Wagon brake, automatic, W. E. Woods	913,342
Wagon, dump, Hill & Wright	913,135
Wagon hoister and dumper, S. M. Smart	913,170
Wall mold, concrete, L. Barg	913,090
Warp twisting-in machine, G. Hiller	913,499
Washbowl, sanitary, C. F. Tollzien	913,323











Washing device, A. B. Moon	913,533
Washing machine, T. C. Josselyn	913,506
Water filter, C. L. Gardiner	913,636
Water heater, B. Gerdelman	913,375
Water into the cylinders of compressors, means for injecting, A. E. Jones	913,661
Water purification and clarification, W. McMurtrie	913,034
Wave motor, C. A. Burrows	913,467
Wave motor, J. J. Pompa	913,561
Wax gathering device, rod, D. L. Heeter	913,286
Weed puller and tree trimmer, A. N. Moline	913,225
Wheel, J. Soss	913,066
Wheel scraper, C. W. Stark	913,576
Wheel shield, trolley, A. A. Roth	913,168
Winding machine, multiple, W. E., F. W., & J. T. Wright	913,604
Window, fireproof, R. E. Byrne	913,197
Window fixture, N. M. Haney	913,495
Wing sweep, H. P. Jordan	913,505
Wire lock, Pedersen & Hansen	913,157
Wire reel, A. H. Doyle	913,472
Wire tightener, W. E. Waller	913,590
Wood, apparatus for impregnation of, B. F. Watkins	913,593
Wood, coloring, W. A. Hall	913,128
Wrapping machine web cutting attachment, J. H. Brady	913,352
Wrench, D. G. Connell	912,993
Wrench, E. Ohlsson	913,302
Wrench, M. G. Albanaki	913,346
Wrench, J. S. George	913,374

DESIGNS.

Badge, F. Hughes	39,833
Bottle, R. B. Annis	39,840
Chair, L. Killian	39,845
Crumb scraper, A. N. Lattin	39,839
Electrolier, street, R. Chartrey	39,841
Forks, spoons, and similar articles, handle for, T. B. Lashar	39,835
Spoon, fork, or similar article, H. Hillborn	39,836
Spoon, fork, or similar article, H. L. Wallace	39,837
Spoon, fork, or similar article, S. Stohr	39,838
Spoons, forks, or similar articles, handle for, J. H. Harmstone	39,834
Talking machine cabinet, J. C. English	39,842, 39,844
Trimming, W. Helbig	39,846, 39,847

TRADE MARKS.

Beer, Yale Brewing Co	72,814
Belting, hose, and machinery packings, Revere Rubber Co	72,809
Blood purifier, H. H. Hyams	72,819
Bug and roach destroyer, C. Fiebert	72,793
Calcium carbid, American Carbolite Co	72,782
Canned and dried fruits and canned vegetables, Griffin & Skelley Co	72,795
Canned salmon and oysters, A. Booth & Co.	72,778
Card, block, and picture games, Rice & Hutchins	72,824
Chemicals and medicines, certain, Drs. Hoag & Turbin Remedy Co	72,817
Chocolate, H. O. Wilbur & Sons	72,813
Cigars, Garcia & Vega	72,818
Cigars, Patterson & Hoffman	72,820
Coffee, Geiger-Tinney Co	72,794
Coffee, Johnson Bros.	72,798
Coffee, blend, Dayton Spice Mills Co	72,791
Complexion cream, Piso Co	72,822
Corsets, American Lady Corset Co	72,783, 72,784
Cotton damask, Rosemary Manufacturing Co	72,826, 72,827
Cotton napkins, Rosemary Manufacturing Co	72,825, 72,828
Cough drops, E. Ellsworth	72,792
Dish washing machines, Z. S. & C. L. Randleman	72,823
Enamel coatings, G. H. Baker	72,815
Filing cases, letter and document, Stephen Greene Co	72,829
Flour and cornmeal, wheat, Allen & Wheeler Co	72,780
Flour, wheat, Philip H. Postel Milling Co.	72,803, 72,805
Hats and caps of cloth, wool, felt, fur, and straw, Sarnoff Bros.	72,811
Insulating material containing cork, Armstrong Cork Co	72,785
Logs, lumber, staves, and headings, Lucas E. Moore Stave Co	72,799
Mantles, incandescent gas, Block Light Co.	72,786
Mezzani and spaghetti, S. Blum	72,787
Milk sugar, powdered, Milk By-Products Co.	72,802
Oil, Italian olive, H. Polinsky	72,806
Overalls, I. Sacks	72,810
Photographic magazine published yearly, American Annual of Photography	72,781
Pianos, organs, guitars, mandolins, and banjos, Thos. Goggan & Bros	72,812
Razor strops, Alegretti Manufacturing Co	72,779
Remedy for piles, R. M. Hill Co	72,797
Ribbons, Carson Pirie Scott & Co	72,816
Rubber rings and gaskets for jar caps, Carr Manufacturing Co	72,789, 72,790
Rye bread, M. & F. Herbst	72,796
Stove and range fire brick, March-Brownback Stove Co	72,800
Stoves and ranges and parts thereof, heating, March-Brownbnack Stove Co	72,801
Sweeping preparation, F. F. Prusz	72,807
Tea, C. F. Blanke Tea & Coffee Co	72,788
Textiles, certain, Remy, Schmidt & Pleissner	72,808
Tulles, muslins, crapes, and silks, Perret, Gros & Million	72,821

LABELS.

"Banner Varnishes," for varnishes, Banner Varnish Co	14,674
"Charcoalets," for a throat ease, Messer Gum Co	14,670
"Crest," for flour, W. M. Farless	14,666
"Earl's Antol," for a remedy for alcoholism, J. E. Earl	14,667
"Glendair," for teas, E. C. Mathewson	14,664
"Golden Bath Salve," for a salve, I. Jardczewski	14,671
"Josh Giddings," for cigars, Moehle Lithographic Co	14,661
"Kraftwrap," for wrapping paper, Union Paper & Twine Co	14,677
"Nertona," for a non-intoxicating beverage, L. G. Volkmar	14,663
"Perfection Bed Cover," for bed covers or spreads, C. L. Christman	14,676
"Pinola Oil," for a liniment, A. J. Barber	14,672
"Pioneer Cigar Stogies," for stogies, A. Hurwitz	14,662
"Sun-Flower Medicine," for a medicine, G. Larcieri	14,669
"The Chester," for cigars, Chester Cigar Co.	14,660
"The Green Carton," for Hawaiian pineapple in slices, J. M. Chapman	14,665
"Vassar Violet," for perfumery, J. D. Sauter	14,673
"Vigor Ferina," for a medicinal preparation, Tirico Pharmacal Co	14,668
"Wanamaker Water-Spot Proof Silks," for piece silk goods, J. Wanamaker	14,675

PRINTS.

"Jack-The-Giant Killer," for wheat breakfast food, Cream of Wheat Co	2,427
"School Days," for wheat breakfast food, Cream of Wheat Co	2,428
"The American Lady," for corsets, American Lady Corset Co	2,429

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.