Expedition to the Sahara.

Mr. Edward Dodson, a British explorer, has succeeded in traversing the Hinterland of Tripoli, which has hitherto been forbidden country. His expedition was sent out by the Natural History Museum of Edinburgh. Although little enough was gathered that was of any interest from the standpoint of the natural scientist, Mr. Dodson nevertheless succeeded in gaining valuable knowledge of this unknown land and in mapping out parts that have been hitherto but ill-defined on our charts. The journey was accomplished not without hardship. Eight camels, three horses and nine Arab servants entered the great desert eight days after leaving the city of Tripoli. Heat and blinding sandstorms, as well as a lack of water, were but a few of the troubles experienced. Water could be obtained only at intervals of from ten to twelve hours. Two weeks after leaving Tripoli, the town of Sofejin was reached, about 120 miles to the southeast. A detour was made in order to reach an old Roman reservoir where it was expected that a supply of water might be found. Mr. Dodson found this reservoir a most wonderful piece of masonry. The cement had not been in the least impaired, and the reservoir was still perfectly water-tight. On the journey to the reservoir dried beds of torrential streams containing great beds of brilliantly colored flowers were discovered. An examination of these flowery patches showed that the plants were of the "everlasting flower" kind. They had been completely dried by the heat and drought.

After their water bottles had been replenished from the old Roman reservoir, the men struck out for the Bonjem oasis, on the desert road to Sokna. Mr. Dodson had hoped to acquire fresh supplies of food at the oasis. He was disappointed. Those who lived in the oasis were almost starving and were compelled to depend on snails and date-palm juice for their sustenance The miserable huts built by modern Arabs stood out in strong contrast to the splendid buildings erected during the Roman occupation. Like the old reservoir these Roman buildings were in an excellent state of preservation. One of them covered an area of 3,600 square yards and had a gateway 12 feet thick. After four days' intense suffering, the party reached Sokna. For a day and a night they had traveled through an uninhabited desert without water. From Sokna the journey was continued to Murzuk, about 300 miles from the Sahara. On this part of the journey, the Jibil Soda, or Black Mountains, were crossed and the great petrified forest traversed. The Black Mountains were found to consist of large slabs of perfectly black stone. In traversing the petrified forest ten hours were consumed. The fallen trees varied in circumference from 2 inches to 7 feet. That the region was at one time submerged by the sea, was proven by the finding of marine shells. Returning from Murzuk the expedition again passed through Sokna and finally returned to the coast.

A New Type of Steamer.

A working model of a new and novel type of steamship, the invention of Herr J. Brohan, an engineer of Hamburg, has been on view in the Hall of Civil Engineers, Rue Blanche, Paris. The principal feature of this craft is that it is equipped with four propellers, one forward, another just before the rudder, and two at the stern. The vessel is flat-bottomed, but there is a short keel in the center and two false keels forward, to keep the hull off the bottom in case of grounding, and between which the forward screw revolves. The inventor estimates that with a steamer 300 feet long, built according to his design, he could make the passage from Havre to New York in four days.

DECK RIVETER IN POSITION.

PNEUMATIC TOOLS IN SHIP YARDS.

BY WALDON FAWCETT.

Within the past half decade a system of power riveting has been developed in American ship yards to a point beyond that previously attained anywhere in the world. The attempt was first made to use pneumatic compression riveters similar to those used in many bridge shops, but a limited experience sufficed to show that their great weight for the large gaps which are necessary in shipbuilding made it impossible to handle them in a ship on the stocks with either facility or economy.

RIVETER AT WORK ON SIDE FRAMING.

However, the possibilities of a pneumatic hammer consisting of a piston rapidly reciprocating inside of a cylinder and striking the end of a chisel were well known as far as its usefulness for chipping and calking were concerned, and consequently there were inaugurated at the plant of a shipbuilding firm of South Chicago, a series of experiments designed to test its capabilities for driving rivets. This effort was crowned with complete success, and was continued until it was made possible to drive every rivet in a ship with machines which are very light, short enough to go between frames and of small diameter, rendering them portable in the highest degree.

The shell rivets, which, prior to the introduction of these machines, had never been successfully driven by power, are now closed up with the greatest ease and facility, and the work is done both better and cheaper than would be possible by hand. This is a particularly advantageous advance for the reason that the increase in size of ships has rendered the plating so heavy, that to draw it up requires a rivet too large to be properly driven by hand. As indicative of the economy of time secured by the use of these devices, it may be noted that in deck and tank topwork three men and a heater boy will drive from eight hundred to one thousand rivets in a day. The whole operation of driving a rivet is completed much more quickly than by hand and before the rivet has lost its heat, the resulting contraction as the rivet gets cold drawing everything firmly together.

From careful computations made at the principal ship yards on the Great Lakes, and extending over a considerable period of time, it would appear that the economy of machine riveting, adding the cost of air, repairs, etc., effects a saving of from one to two cents per rivet over piecework prices for hand riveting, the degree of economy depending upon the location in the ship and averaging about 1¼ cents. In an ordinary lake steamer of 4000 tons the saving is from $4000 to $5000 over hand work. A record of 450 ⅞-inch rivets driven in a single day by one yoke machine is nothing unusual. At the regular rate for hand riveting, the placing of this number of rivets would cost $15.75, whereas with the machine the cost is $5 for the operatives and 50 cents for power.

Almost all the various kinds of pneumatic machines for ship yard use are characterized by great simplicity of design. Take, for instance, the yoke riveter as applied to bottom work. It consists of a pneumatic hammer mounted in gimbals on the end of a piece of pipe about eight or nine feet long, which pipe is hung by its center to a trolley running inside of another piece of pipe which is bolted to the bottom of the ship. This allows the hammer to be brought to any point in a considerable space of the ship's bottom without shifting. The mounting of the hammer in gimbals allows it to be swung in any direction, so as to get at the rivet from all sides exactly as in hand riveting. A small cylinder connected with the air pipe is provided to hold the machine steady when required, the piston rod being jammed up against the bottom of the ship, and carrying a piece of rubber on its top end to prevent slipping. There is also a radial frame or carriage to facilitate bilge work.

An important class of pneumatic tools is that comprising the chipping, calking and bending hammers. These machines range in weight from 7 to 11 pounds; have a stroke of from 1 to 4 inches at speeds varying from 3400 to 2200 strokes a minute, according to the size. All hammers of this kind require an air pressure of from 70 to 80 pounds, and must be supplied with 20 feet of free air per minute. The heavy chipping hammers weigh 15 pounds and make a 7-inch stroke at a speed of 1200 strokes a minute. Of all the various kinds of pneumatic hammers now in use in ship yards, it is claimed that the 9-inch stroke riveting hammer, weighing 20 pounds and having a speed of 900 strokes a minute, is the most powerful. In many yards a pneumatic holder-on is used instead of the ordinary bar for holding up the head of the rivet. It can be readily put into position, and presses the rivet against the sheet with a force of 1200 pounds with an air pressure of 100 pounds.

Of the air drills, a fairly representative type, such as is in general use in ship yards, is of 35 pounds weight and will drill in cast iron up to 2 inches, or in steel up to 1⅝ inches, the limit for reaming and tapping being 1½ inches. These drills require about 25 feet of free air per minute at 80 pounds pressure. The pneumatic painting machines of the 10-gallon size are now being extensively used in marine work; and sidelight cutters, deck-boring machines and other appliances all have a place in the complete shipbuilding equipment. Every tool has afforded economic advantages in greater or less degree. Often this is intensified by the variety of uses to which the pneumatic tools may be put. For instance, the flat piston type of drill now in use at the Chicago ship yard, which is capable of drilling 3-inch holes in a solid sternpost, can also drill the side of the ship, ream on deck and drill and ream ship plates.

At each of the larger American ship yards several hundred pneumatic tools are now in use. At the plant of a shipbuilding company, whose yards are located in Camden, N. J., there are now in use about four hundred portable riveters, calkers, drills, etc. An air pressure of 110 pounds is carried, supplied by an air compressor capable of delivering 5000 cubic feet of air a minute.

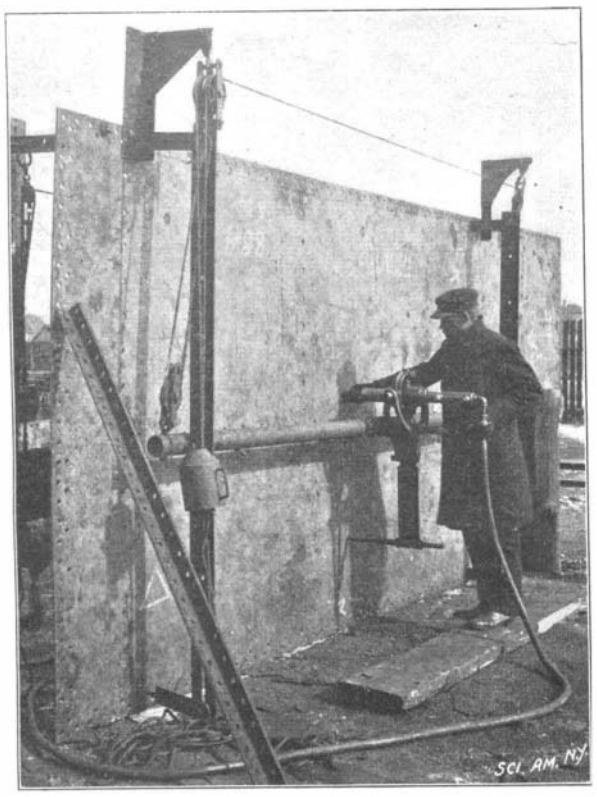
Last Wire of the New East River Bridge Cable Strung.

Shortly before 11 A. M. on Friday, June 27, the last wire of the new East River Bridge was unreeled and carried across the river. It has taken over six months to string the wires, the work having been begun in December last. Each cable is composed of 7696 wires of No. 6 gage. The next step in the formation of the cable will be the process of squeezing the wires into a solid mass of about 18¾ inches diameter, when they will be banded and encased. Each wire is about 3000 feet in length and has an estimated strength of 200,000 pounds per square inch.

SHELL RIVETER WORKING ON THE BOTTOM.

An Ingenious Weapon for Destroying Submarine Boats.

Now that the submarine boat has fully justified its existence as a potential fighting factor, which will exert a far-reaching influence upon naval battles of the future, efficacious destroyers are being sought, for the purpose of nullifying its power and operations. The British Admiralty has been experimenting with a heavy explosive charge, attached to the outer extremity of a boom, and detonated when the submarine comes sufficiently near. Owing to the heavy nature of the explosive charge, a tremendous concussion results, and



SIDE SHELL RIVETING.

experiments have proved that such an explosion would seriously cripple a submarine boat, even if it did not destroy it outright.

But a far more destructive machine for this purpose has been contrived by an English inventor, Mr. Gardner, of London, which when fully developed promises to be a powerful means for fighting the submarine. The basis of Mr. Gardner's apparatus is an application of the transmission of ether waves. The machine is somewhat complex at present, owing to its being in the experimental stage, but in course of the trials which are shortly forthcoming, the inventor anticipates simplifying its mechanism to a great extent.

The greatest difficulty in fighting against the submarine is in connection with the location of the craft, though the difficulty is somewhat mitigated by the necessity of the submarine being equipped with the périscope, to enable it to steer in the requisite direction. But the submarine cannot be destroyed except by such a weapon as a torpedo coming into contact with it and then exploding, but the uncertainty of the torpedo does not render it a very reliable means of destruction.

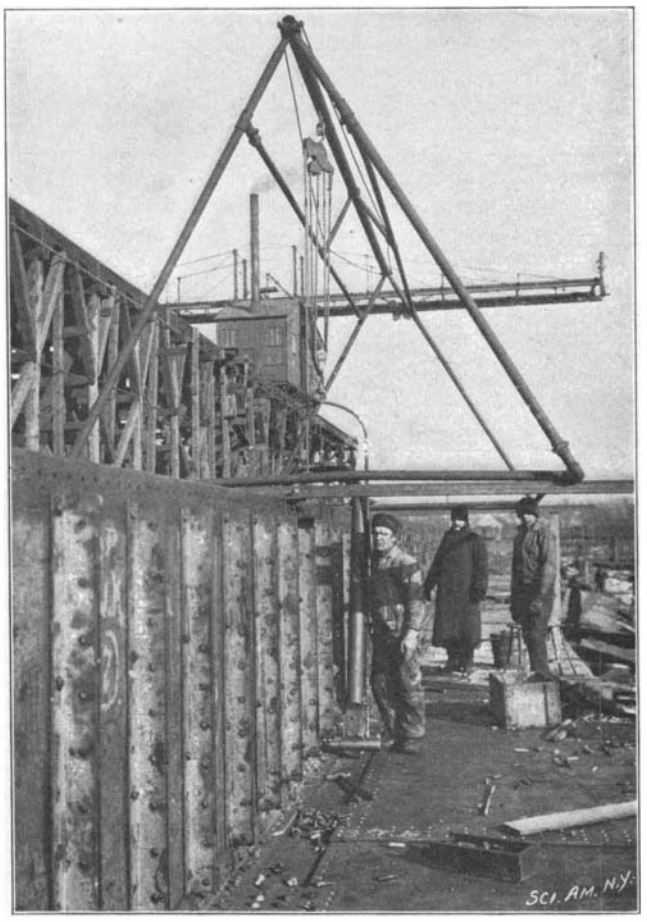
What Mr. Gardner has contrived is, in short, a small submarine carrying no screw, and whose movements are controlled by wireless telegraphy from a fixed point, such as the deck of a battleship. When the key of the transmitter is set in action, the ether waves are arrested by a receiver upon the weapon, and conveyed to a small electric motor, which is thus set in motion. It must be explained, however, that the energy for propelling the motor is not transmitted through the air, but the etheric waves control the action of the energy upon the little craft. The motor in turn drives a centrifugal governor. This contrivance is best explained by saying that it resembles a short rod with a pair of open compasses on each side of it. One leg of each pair of compasses is fixed to the rod, which the motor causes to rotate. The other leg terminates in a heavy metal ball. As the speed of the peripheries of the governors is increased, the balls exert a stronger tendency to pull outward, and the force so generated is communicated to a series of switches, each of which represents an action to be controlled. For example, if the governor is revolving at a particular velocity, a certain switch is opened; but if the rotatory motion be either increased or decreased, then other switches are opened. So perfectly is the mechanism fitted together that the speed communicated to the governor can be graduated with the greatest precision. For instance, if depressed for two seconds, then raised for six, the governor rotates at a certain speed, and a particular switch is opened. If the key is depressed and raised alternately for equal periods of time, another switch is opened, and so on. The relative proportion of the time the key is depressed and released enables the operator to determine exactly which switches are to be opened and closed respectively.

When the weapon is launched, the propelling machinery is set in motion when the object of attack is observed; and by means of a chart the operator is guided in his manipulations of the transmitting key, in order to deviate his weapon from the straight course either to the right or left, as the case may be, to the correct point. By this means it is possible to follow the course of the submarine with facility, and as the weapon travels at a far greater speed than the submarine, the latter is soon overtaken. Directly the pursuing boat comes within sufficiently close range, the operator opens a switch, and the 200 pounds of guncotton which the small crewless submarine carries, is detonated. The force of such a concussion a short distance from a submarine boat would crush in the sides of the craft—the only efficacious means of destroying it.

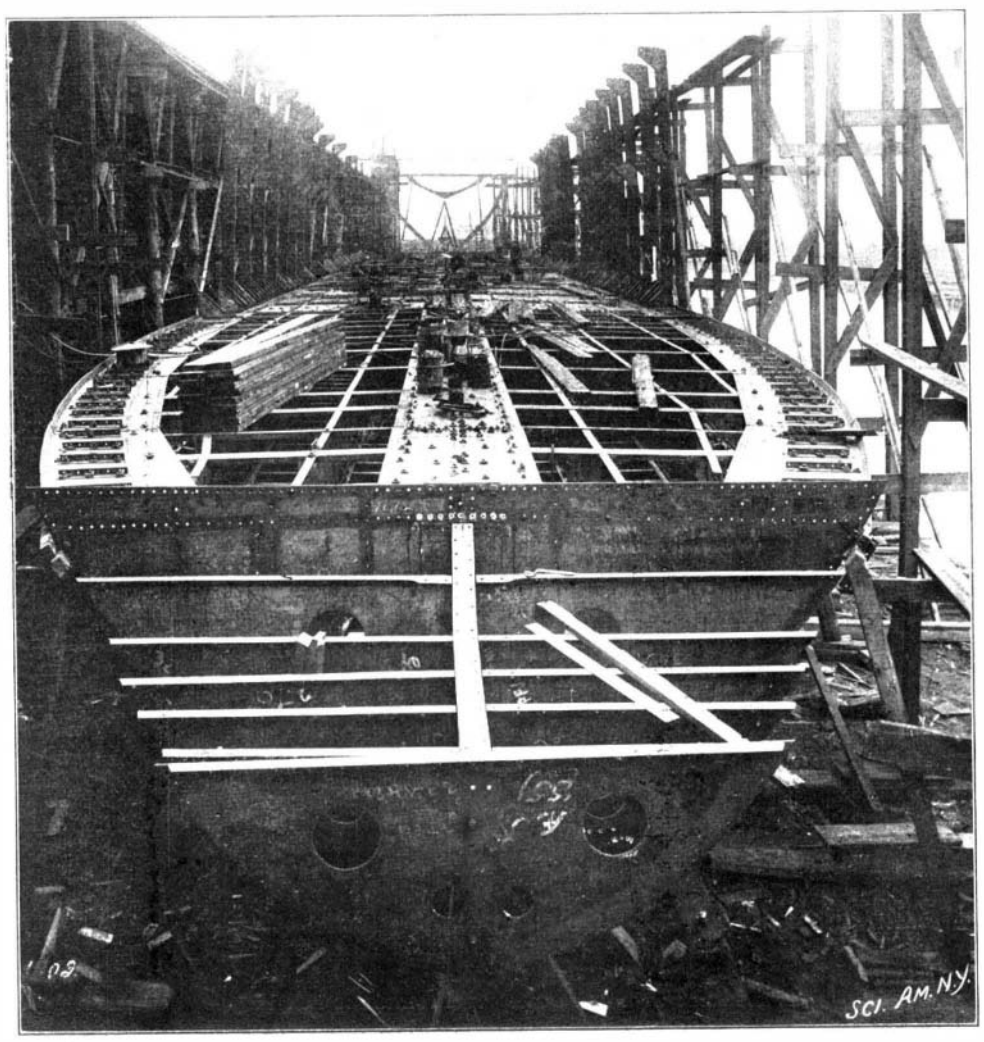
The inventor has completed an experimental weapon, and the British Admiralty propose to submit it to severe trials to ascertain its full value, as the discovery of a satisfactory antidote to the submarine is engaging the earnest attention of the English navy.

The Government Report on the Vibration of the London Electric Railway.

The report of Lord Rayleigh, Sir John Wolfe Barry and Prof. Ewing, who were appointed by the Board of Trade a few months ago to be a committee to investigate and report to what extent the working of the traffic on the Central London Railway produces vibration in the adjacent buildings, and what alterations in the conditions of such working or in structure can be devised to remedy the same, has just been issued. As a first step, the committee satisfied themselves by personal observation that vibration sufficient to cause serious annoyance was actually felt in many of the houses situated along the route of the railway. A very little experience further showed that the disturbances due to successive trains were very unequal. The results analyzed by Mr. A. Mallock, who was employed by the committee for the purpose of conducting the details of the investigation, showed (a) that it was a matter of chance whether a given train caused a slight or a severe vibration; (b) that trains causing a severe vibration in one house were as likely as not to cause only slight vibration in the others; (c) that different rooms in the same house were not similarly affected by the same train. One of the most distinct indications from Mr. Mallock's records, was the responsibility of the locomotives, as distinguished from the carriages, for the worst part of the disturbances, and the attention of the committee was called at an early stage to the excessively large load, unrelieved by springs, carried on each axle of the locomotives. The unspring-borne load carried on each of the four axles of the locomotive is 8 tons, making 32 tons in all. This construction was adopted in order to obviate the necessity for gearing, and the committee could not but connect the difficulty with the magnitude of this unspring-borne load. From measurements made by Mr. Mallock there was reason to believe that the principal source of disturbance lay in the unevenness of the surface of the rails. The irregular impulses given by uneven rail surfaces had the effect of establishing and maintaining an oscillation of the rails and roadbed, the whole being regarded as an elastic support loaded with those masses which are not carried with springs. The new locomotives were ready for trial in August last, and were of two types. In one, the locomotive was, as before, distinct from the passenger cars, but gearing was introduced so that the electric machinery was no longer mounted directly upon the driving axles. The unspring-borne load was correspondingly reduced, and amounted to 2½ tons on each axle of the old locomotives. This type, of which there were three specimens, was described as the "geared locomotive." In the other, the "multiple unit" or motor-car system, the locomotive was not distinct, but motors were carried at one end of two or more passenger cars. In this case the unspring-borne load on each axle of the truck under the motor car was 1¾ tons. Observations in the tunnels made by Mr. Mallock for the committee showed, as had been expected, a great improvement. The vibrations in the ground decreased in proportion to the reduction of the unspring-borne load; for the geared locomotive they were less than one-third, and for the motor car train less than one-fifth, of what were caused by the ordinary locomotives. In view of these results the committee recommend the adoption of a type of locomotive or motor in which the load not carried on springs is reduced as far as



PNEUMATIC YOKE RIVETER, WORKING ON CENTER KEELSON.



PNEUMATIC RIVETING—WORK ON THE DOUBLE BOTTOM.

possible. This might be arrived at by using gearing as in the geared locomotives or motor carriages, or by using a gearless locomotive in which an elastic connection is employed between the driving axle and the motor; but the committee had no opportunity of experimenting with a locomotive of this type. In the trials carried out the motor cars were found to have an advantage in freedom from vibration over the geared locomotive. So far as the Central London Railway is concerned, the committee are confident that by adopting motor cars in place of the original locomotives the vibration produced by the running of trains can be reduced so as to cause no serious annoyance, although it is possible that the sound of the trains may still be detected, especially in the night. They are able to speak positively as to the motor cars, but they entertain little doubt that any method of driving in which the unspring-borne load on each axle is reduced to a similarly small quantity might also be used with impunity. On the question of the best form of rail and sleeper the committee had no decisive evidence. They were disposed to prefer a stiffer rail than that in use on the Central London Railway, and advise in new undertakings that sufficient room shall be allowed for the introduction of a deeper rail.

Prize for Method of Drying Potatoes.

The German association of alcohol manufacturers and the association of agriculturists have jointly offered a prize of 30,000 marks ($7143) for the best method of drying potatoes for feed for cattle, etc.

German agriculture has been increasing its potato crop very largely. The technical progress made in cultivating potatoes and the choice of certain kinds yielding a larger crop have made it apparent that Germany will continue to have a surplus of this vegetable.

Already, 40 per cent of the total crop is used as fodder; but as potatoes deteriorate after six or seven months, they must be fed within that time. Transportation also, is expensive, on account of the large percentage of water they contain. Three and one-half tons of fresh potatoes yield a ton of dried ones. It is predicted that a good method of drying potatoes will greatly benefit German agriculture, and it is intended to use the process on a large scale.

Particulars for this prize contest can be had by applying to the "Institut für Gährungsgewerbe," Berlin, N. 65 Seestrasse.

The Current Supplement.

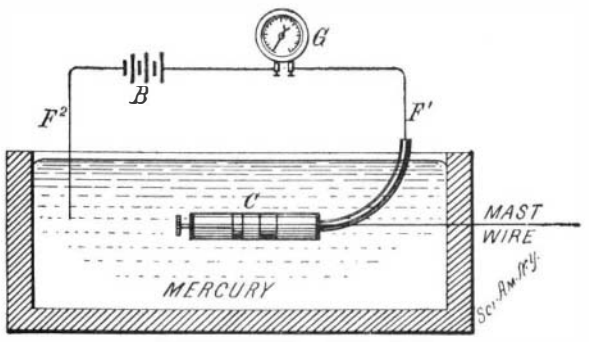
An important article on the Braun-Siemens-Halske wireless telegraphic system which is so strong a rival of the Slaby-Arco system in Germany opens the current SUPPLEMENT. The article is illustrated not only by clear diagrams, but by handsome half-tone illustrations. Havelock Ellis, who is well known as one of the foremost living biologists and psychologists, tells us something of the mysterious plant mescal and of the peculiar visions which it calls forth when taken into the system. An article on volcanoes is of timely interest. Archæologists will be pleased to learn something of the excavations in Crete and of the work done by the German Archæological expedition at Babylon. Prof. S. P. Langley, in a thoughtful lecture, discusses the laws of nature. "Sleep-Producers" is the title of an essay by Dr. Kellogg. The recent paper read by Bion J. Arnold at the convention of the American Institute of Electrical Engineering on the practicability of using electric power for traction on the New York Central Railroad within the limits of New York city, is published in full. The Consular Reports and Selected Formulæ are given as usual.

Shot by an Esquimo Hunter.

Wild geese and brants are known to travel, during the migratory season, very far south. Recently a large wild goose was killed not far from Spokane City, Wash., which had evidently winged its way from the remote Eskimo lands. When the hunter picked up the bird he was surprised to observe a slender piece of ivory protruding from its breast just below one of its wings. With much difficulty he succeeded in pulling out the piece, for the flesh had grown tightly around it. It proved to be an arrowhead, about eight inches long, which had some queer carvings on the stem where it had been fastened to the shaft. The carvings were delicate, though quite distinct. On a careful inspection by some Klondike miners the carvings were pronounced to be of Eskimo origin. No arrowpoint of that kind was ever known to have been used by the Indians of Washington or British Columbia. The head was of fine ivory, no doubt carved from a walrus tusk. Evidently the goose had been shot by an Eskimo hunter in the Arctic regions, the wound had healed, the flesh had grown around the weapon, and in its long flight the bird had no doubt broken off the arrowshaft. J. MAYNE BALTIMORE.

EXPERIMENTS WITH ELECTRO-MAGNETIC WAVES ON MONT BLANC.

M. Charles Nordmann, in a paper read before the Académie des Sciences, gives an account of some experiments which he made at the Mont Blanc observatory in order to determine whether waves of an electro-magnetic nature are given off by the sun. It seemed possible that a source of luminous and calorific energy should emit electro-magnetic waves, as these are now recognized to be of the same nature. M. Nordmann chose an elevated point for carrying out the researches in order to eliminate as much as possible the absorbing action of the atmosphere, and especially that of water vapor, and installed an experimental post at the Grands-Mulets, a point at 9570 feet altitude. To receive the waves he used a horizontal mast wire 550 feet long which was laid along the Bossons glacier upon wood insulating supports so that the sun's rays would fall directly upon it. The choice of the glacier for the support was of considerable importance. The ice can be considered as a reasonably good insulator; M. Janssen has shown this in his recent experiments on Mont Blanc. Ice is transparent to the electro-magnetic waves. The ice in this case was 80 feet thick and the sun's rays (at the autumnal equinox) were inclined from the vertical, thus avoiding a possible error arising from interference. Nordmann used a coherer which was placed in a vessel of mercury which formed an opaque medium for outside disturbances. The coherer, C, has one pole in contact with the mercury and the other, F_1, insulated from it and passing above to a galvanometer and battery circuit, with a return wire, F_2, to the mercury. The wire, F_1, is surrounded by a metallic sheath which acts as a screen. The mast-wire is uninsulated and passes through the mercury to the coherer. Thus the coherer was carefully sheltered from any external disturbance. It was then regulated while still under the mercury by a regulating screw and the galvanometer brought to zero. The mercury was then allowed to run out by a tap and the coherer left free. Under these conditions the experiment was repeated several times on the 19th of September during fine



NORDMANN'S APPARATUS.

weather, but all the results were negative and no deflection of the galvanometer could be obtained. This seems to prove that the sun does not emit such electro-magnetic waves as can be propagated along a wire and act upon a coherer; or in the contrary case such waves must be absorbed by the sun's atmosphere or the upper atmosphere of the earth. It is well known that rarefied gases have a powerful absorbing action upon such waves, but the object of the experiment was to see whether a part of the waves did not escape this absorbing action and penetrate to the surface of the earth.

Periodic Comets of 1902.

Astronomers expect the appearance of two periodic comets during the present year. The first of these was discovered by Temple at Marseilles on the 27th of November, 1869, and returns every 5.5 years. Its period was only known, however, after the rediscovery of the comet on the 11th of August, 1880, by L. Swift, for in 1875 it was not favorably placed for observation, and the same on its return in 1886 and 1897. In 1891 it was but feeble, and was observed for the first time on its return by Barnard on the 27th of September, with the Lick telescope. It will be in a better position for observation in the first part of December next, when it is expected. The second of the periodic comets has an interesting history. It was discovered by Swift on the 20th of August, 1895, and calculation assigns it a period of about seven years. It is remarkable that this comet seems to be identical with the one discovered on the 14th of June, 1770, at Paris by Messier, who was called the "ferret of comets," because he had observed a greater number than any astronomer of his time. Lexell had calculated its orbit and supposed that as its period was 5.5 years it would come back at the end of 1775; but he did not find it, in spite of all his searches. Schulhof is of the opinion that the comet in passing near the planet Jupiter, whose mass is considerable, has undergone great modifications in its movement, and that the comet described by Swift is the same as the so-called "lost comet" of Lexell. Its return is expected in November, when it will be near the sun and in a good position for observation.

Correspondence.

Cheap X-Ray Tubes.

To the Editor of the SCIENTIFIC AMERICAN:

It may be of interest to some of your readers to know that experimental X-ray tubes can be made out of ordinary lamp globes. The two electrodes are made of sheet aluminium, and are about ⅞ inch in diameter. The aluminium may be got for these from any dentist's supply house. About No. 20 gage is best, and should be soft. They are hammered out until they very nearly fit the tube. Then they are shellacked onto the outside of the tube at as nearly opposite points as possible, and held in that position by weights until they are dry. After it is perfectly dry, the tube should be run until the shellac is melted, and then allowed to cool, while the electrodes are pressed tightly against the tube. After the shellac has solidified, the tube may be run for short intervals until it is working properly and generating X-rays.

These tubes work best on a high-frequency coil, although they may be run on an induction coil. When run with the latter, the anode should be a little larger in diameter than the cathode. The connection to the coil is best made by means of stiff wires held by binding posts. An ordinary socket will serve as a support for the tube while it is being used. With a tube made from a 32 C. P. globe (it would make no difference if it is burnt out) the bones of the arm and hand may be plainly seen. M. EASTHAM.

Oregon City, Ore., June 9, 1902.

Lord Kelvin on the Molten Earth.

To the Editor of the SCIENTIFIC AMERICAN:

I have doubted if many of us have recognized the deep significance of Lord Kelvin's contention that, "when the earth was in a molten state, it was surrounded by an atmosphere of nitrogen and carbonic acid gases, but *with no free oxygen*." I for one am happy to take this learned man's word on this problem, for he seems to have unlocked the gateway into a marvelous field for the scientific adventurer.

If the earth had no free oxygen during the igneous era, we stand face to face with the time and place of *primitive oil-making* Assuming that the earth's immeasurable fund of carbon and hydrogen, which it now has in store, was in that great world-furnace then, how are we to avoid the conclusion that it was the one grand opportunity for the formation of a world's hydrocarbon such as we find in the earth's crust to-day?

The less oxygen our furnaces and coke ovens get, the greater the deposit of sooty, oily carbon matter in our smokestacks, which as miniature oil and fuel depositories, take fire and burn. From this it is but a scientific step to the conclusion that a vast amount of the carbon and hydrogen of a world, made hot by the implacable heat of chemical and mechanical processes, went, through mineral fire-mist, to the terrestrial heavens as an *unburnt* hydrocarbon fuel. Even with free oxygen present it could hardly have prevented the molten earth from posing as a *smoking world*, which means oily carbons sent to the skies.

Now we find an almost limitless fund of unconsumed allotropic carbon among the aqueous formed strata, and I presume Lord Kelvin knows this as well as anyone, but the great problem was, and is, how to account for the existence of these igneous distillations so far above the igneous beds. If we can leave old paths long enough to see all these and other fiery exhalations sent to the skies and formed into a Saturn-like *annular system*, as a revolving earth appendage, where they lingered till the earth grew cold and then came back in grand installments as the ages rolled on, the first decade of this twentieth century may see a happy solution of this tantalizing problem. As annular world-deposits they are philosophically in place to harmonize with Kelvin's matchless deductions.

In the strictest sense this is not a secession from the current school of geologic thought. It is simply a hesitation longer to follow the empiricism which makes the organism the only source of the hydrocarbons, discarding the basic fact that millions of years before a fish or mollusk lived in the seas, there was an all-competent oil-making furnace, as far ahead of the secondary organic source as the energies of a molten earth surpass the puny efforts of the decaying organism. The contest is between Lord Kelvin and the organic school. ISAAC N. VAIL.

Pasadena, Cal., May 26, 1902.

The Western Automobile Endurance Test.

The Automobile Club of Chicago will conduct a 100-mile endurance test open to all kinds of self-propelled vehicles on July 12. The course will be along the shore of Lake Michigan to Waukegan and return. The endurance run will be the first to be held in that section of the country, and it should offer excellent opportunities to the many new Western automobile firms to demonstrate the good qualities of their machines in an actual test on the road.