

quency, in dots and dashes. An ordinary Morse operator can learn to read with the new apparatus with a few days' practice. The sending requires no special knack other than a firm touch, with dashes clean cut.

Although, as the illustration shows, the operator reads from the head telephone, a relay or recording device can be substituted therefor; only there is always this condition, that, inasmuch as the responder, unlike the coherer, is a quantitative device and the telephone and ear the most sensitive signaling device known, at the extreme range messages can be clearly read which are altogether too weak to operate any relay. Thus, through the extreme sensitiveness of the responder, an operator with head telephone can receive messages many miles further than a coherer (all other arrangements at transmitter and receiver being the same) can record them. In proof of this it is interesting to cite the test of February 22, when signals from the "Etruria" were heard at the Jersey City station, from a mast but thirty feet above the roof, when the steamer was fully ninety miles distant. This was without any "jigger" or transforming device whatever at the receiving end, and represents an astonishing degree of sensitiveness in this new "responder."

By virtue of the automatic quality of the receiver, whereby the sound impulses as heard are identical in frequency with that of the transmitter spark, the relay or "call" in use employs a reed attuned to a certain frequency per second. Thus only when the calling station uses a frequency of spark in tune with this reed will the "call" respond and summon the listening operator. The opportunity this feature gives to the system for a mechanical or acoustic syntony, in distinction from and in addition to the electrical syntony is highly significant.

During the last month a regular station and school for operators has been opened by the De Forest Company on the roof of the Cheeseborough Building, 17 State Street, New York. Here, as shown in the illustration, is a house built of glass over an iron frame, and fully equipped with sending and receiving apparatus. The antenna here is sixty feet in height. The companion station is located at Hotel Castleton, Staten Island, the first hotel in the world, by the way, to be equipped with a wireless plant.

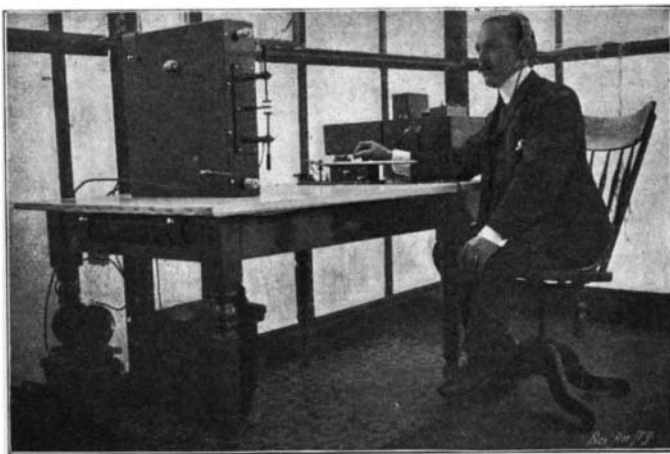
The most important land station yet established by the De Forest Company is that at Steeplechase Park, Coney Island. This enjoys the distinction of having the tallest mast in America, a fine stick of four pieces, standing 210 feet high. This station is supplied with 60-cycle alternating current, at 110 volts, from the Edison mains. This is stepped up in two transformations to 25,000 or 50,000 volts, as desired, and applied direct to the spark terminals. These latter are of special construction and connected with the condensers give a spark of exceptional clearness and power.

On June 14, the first day the Coney Island station was operated, the first communication with a vessel equipped with the De Forest system was also established. On the Ward Liner "Morro Castle," bound for Havana, a moderately high (60-foot) antenna had been rigged, and transmitter and receiver installed, and messages to and from ship and shore were exchanged, until the vessel was fifty miles from port. The Staten Island station kept up a lively exchange of messages until the boat reached the Narrows, when she called off, and the Coney Island station picked her up.

The De Forest Company has secured desirable land near the government light-house at Montauk Point, and proposes erecting a station there at once, as well as others at important points along the coast.

During the last week two operators of the De Forest Wireless Telegraph Company accomplished a feat which, while new in the annals of wireless telegraphy, is only significant of the possibilities before the "responder" or automatic receiver in combination with the telephone.

At the 17 State Street station, this city, two messages were received and read simultaneously by the two operators, listening in on two separate telephone



INTERIOR OF A NEW YORK CITY DE FOREST STATION.



THE DE FOREST RECEIVER

receivers, attached to one and the same responder, and without any special attuning or syntoning device in circuit. One message was from the Staten Island station and was sent quite rapidly, thirty words per minute, with a high-frequency spark (120 per second). The other was from some foreign station, probably a Marconi installation. The speed was about ten words per minute, sent with a low-frequency interrupter.



MASKS FROM BRITISH COLUMBIA. THE RIGHT-HAND MASK IS DECORATED WITH PORCUPINE SPINES.



MASKS WORN BY THE COAST INDIANS OF BRITISH COLUMBIA.

Mr. Horton concentrated his attention upon the Staten Island message, while Mr. Barnhart was able to pick out by their peculiar drumming sound the signals from the other station.

The result is no more remarkable than the fact that two conversations can be carried on simultaneously over the same telephone wire, if the two voices differ considerably in pitch and timbre. But the fact that without any tuning device this can be accomplished with one and the same responder certainly demonstrates the advantage of the telephone receiver over any sounder or tape-recording device, and the greater immunity of such a system from atmospheric and foreign disturbances.

#### Osier Culture.

BY GREY E. MITCHELL.

On many farms where there is some water front, land otherwise waste can be profitably used for osier culture. While willows will grow almost anywhere, they should be planted for greatest profit in a deep sandy loam, well drained and thoroughly prepared. The ground should be level and moist, but there should be drainage. However, willows will grow in a comparatively dry soil, but the whips will be smaller, though tougher and more durable than when grown in a rich, moist soil. The growth under moist conditions is naturally more vigorous and much more rapid. According to Dr. B. E. Fernow, Professor of Forestry at Cornell, the best situation for free and rapid growth is along the banks of rivers and brooks which pass through a level country and on the small islands which frequently occur in the midst of streams. Hollows or swales, the soil of which is composed of rich, soft, earthy particles, and which can be laid dry, furnish eligible situations for conversion into osieries; if water can occasionally be diverted onto such lands during the dry summer months, the situation may be considered as perfect. There are at present thousands of acres of marshy lands in the country, Mr. Fernow states, not paying 2 per cent per annum, which, if drained at a small outlay and planted with willows, would yield an immense return, paying as high as 20 or 30 per cent profit. The willow reaches its greatest production in the third year, and with proper care and good cultivation it will continue to yield good results for a long run of years.

Willow baskets, hampers, chairs, etc., are a class of articles for which there is to-day an enormous demand. The manufacture in this country is increasing rapidly, but not sufficiently to meet this demand. Five cents a pound for dry willows is the price generally paid. At even a much less price there is a large profit in growing willows and an occupation is furnished for the winter months.

#### A GROUP OF INDIAN MASKS.

BY FRANK YEIGH.

The fondness of the American Indian for masks or false faces goes to prove that secret societies exist among the red men as among the whites. According to Iroquois belief, certain spirits, whose entity is comprehended in ugly visages, have the power to inflict bodily ailments and to cause diseases to afflict their people. To counteract their evil designs, the Society of the False Faces is maintained among the pagan Iroquois, in order to appease the evil spirits from whom they take their name, as well as to effect a charm against disease and to cure others. When a candidate is initiated into this strange society, the chief False Face thus addresses him: "Brothers, listen! Now you must know that we did not make this custom. The beginning is from Niyoh, our Creator, who is above the false faces. A member of the False Faces must go about among the people in the spring and fall to keep them from sickness, and must visit sick people at all

times when called upon. This is all I have to say." Whereupon the new member replies: "I will act according to the ancient customs as advised by the leader of your Society, of which I am now a member."

In a report made to the New York University in 1852 Lewis H. Morgan thus describes the workings of this curious order: When any one was sick with a complaint

within the range of their healing powers, and dreamed that he saw a False Face, this signified that he would be cured. A feast was then prepared, the False Faces appeared and, led by a female leader, marched in Indian file, each one wearing a mask and carrying a turtle shell rattle in the hand. On entering the house of the invalid, they first stirred the ashes upon the hearth and then sprinkled hot ashes over the patient until his head and hair were covered, followed by some manipulations over him ending with the sick person marching around the room with his queer visitors, so efficacious was the cure. The mysterious callers were then presented with food, which they took away and ate in secret, as they never unmasked themselves before the people. Among the simpler complaints which the False Faces claimed to cure were nose bleeding, toothache and sore eyes.

The accompanying picture of a hideous mask with a crooked mouth suggests the myth regarding it that for a long time, many centuries ago, there was no being of any kind on his continent but one False Face. One day the Creator appeared on the scene and told the solitary False Face that some other beings were soon to come into the world and it would be necessary for him to keep out of the way. The False Face objected to this, declaring that he had been in possession, and finally refused to be displaced. The Creator then told him that he must leave, and that a hard and fast line must be drawn between their territories, and ordered the False Face to turn himself away while this line was being marked out. The False Face, with exceeding bad grace, although looking in the opposite direction, yet gave sly glances sidewise, and at length turned almost around to inspect the drawing of the line, when he was detected by the Creator, who struck him such a blow on the cheek as to knock his mouth out of shape, and so it has remained until this very day, and the mask portrays the disfigured condition of the disobedient False Face!

The accompanying illustrations depict curious mask work by the Tghimpsean tribe of Indians, on the Pacific coast of British Columbia, on Dixon Inlet and the Skeena River. They were secured by a Methodist missionary—Rev. Dr. Crosby—who labored among them, and these False Faces are now to be seen in the museum of Victoria College in Toronto.

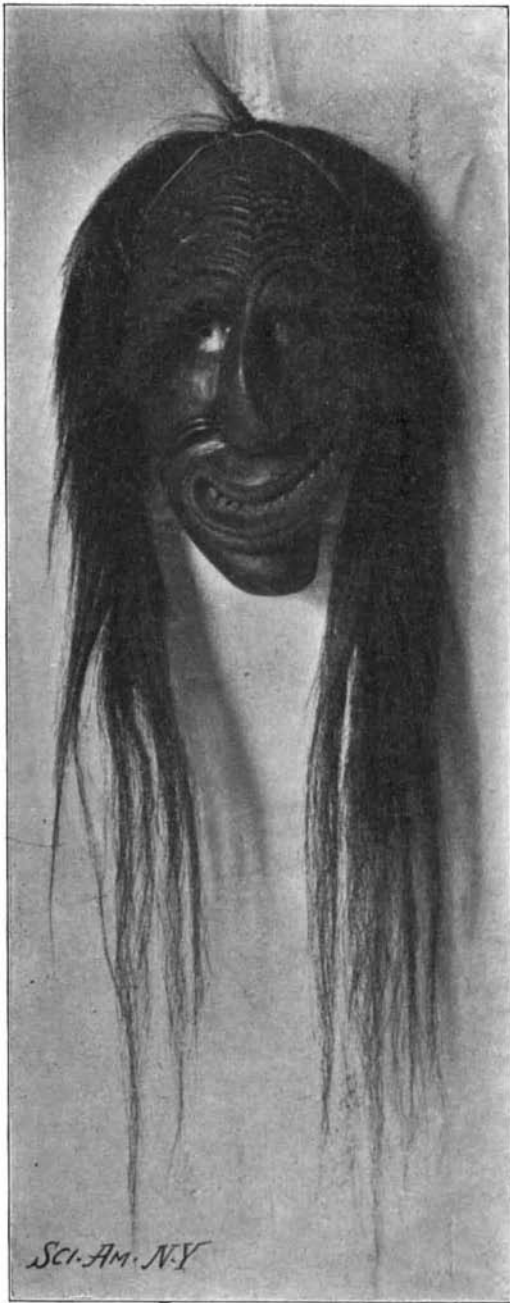
#### Recent Advances in Civil Engineering.

At the annual meeting of the Institute of Civil Engineers of Great Britain Mr. Charles Hawksley, the newly elected president, delivered an interesting retrospect of the advance made during the nineteenth century in the more prominent branches of civil engineering. First dealing with the subject of waterworks he stated that, though water taken directly from rivers has of late years been regarded with suspicion, it was not improbable that rivers as a source of supply would again grow in favor, especially when the conditions of pollution and the safeguarding of the water by careful and efficient filtration came to be better understood and recognized. Many matters connected with water supply, which were unheard of at the commencement of the last century, are now of everyday occurrence, such as the treatment of certain waters with lime to prevent their action on lead communication pipes, the softening of hard waters, the construction of large depositing tanks to facilitate the deposit of matters in suspension, as well as to enable flood waters to be passed by during the earlier stages of a flood, in cases where the water was taken directly from a river, service reservoirs (in many cases covered to protect the water from the action of light and heat, a precaution more especially needed with certain waters derived from wells or taken directly from rivers), and lastly, but not least, efficient filtration through sand filters, a mode of treatment first introduced by the late Mr. James Simpson in the year 1828. As there still existed much misconception in regard to the quantity of water required for domestic purposes with a constant service, unrestricted use, except in respect to misuse and waste, Mr. Hawksley stated that, having recently had occasion to collect statistics on the subject from sixteen of the principal towns in England, he found that the quantity of water distributed for domestic and other non-metered purposes was on the average of six towns supplied by companies, having a total of 1,185,000 persons, 19 gallons per head per diem, and in the case of ten towns supplied by public authorities, and having an aggregate population of 3,961,000 persons, 18¼ gallons per head per diem. The foregoing quantities provided a constant service for all domestic purposes, including unmetered trade supplies and such waste as cannot be prevented.

Passing to gasworks the president remarked that some idea of the development which had taken place in the size of gasworks might be formed from the fact that whereas in the year 1822 Sir William Congreve, the Government Inspector of Gasworks, reported that at one of the London gasworks several of the gas-holders were each "of the enormous size of 40,000 cubic feet," and the London gas companies now possessed gas-holders having capacities of from 8,000,000 cubic

feet to 12,000,000 cubic feet each. Coal gas was now used, not only as an illuminant, but also extensively for heating and motive power. Although for these latter purposes gas, as supplied to towns for illumination, was mostly employed for the sake of convenience, there were many instances in which, from considerations of economy, a specially-made gas of low illuminating power was used. The employment of gas of that nature was likely to become largely increased by the facilities and greater economy which doubtless would before long be afforded by the distribution of Mond gas, the manufacture and distribution of which had, during the present year, received the sanction of Parliament by the passing of the "South Staffordshire Mond Gas (Power and Heating) Company Act, 1901" having for its object the supply of gas (not to be used for illuminating purposes) in large quantities at a price of from 6 to 8 cents per 1,000 cubic feet.

It was at first anticipated by many persons that the competition of electricity would greatly reduce the value of, even if it did not entirely ruin, the coal-gas industry, but such had not proved to be the case, the effect of the introduction of electricity having been to reduce the rate expansion of gas undertakings. The competition of electricity had, moreover, proved



CROOKED-MOUTHED IROQUOIS MASK.

a stimulus to improvements in the modes of consuming gas, such as the incandescent burner, and had led to greater facilities being offered to the gas consumer, such as by the prepayment meter and the letting on hire of cooking stoves.

With regard to electricity the utilization of electric energy had opened out an entirely new field for the employment of civil engineers, and had established a new branch of the profession which has to deal with a subject of so varied, novel, and interesting a character as to have led to the formation, in the year 1871, of the institution of electrical engineers, which already numbered over 4,000 members of all grades, and which devoted its discussions entirely to electrical matters. The great advantages conferred on mankind by the development of electricity were accompanied by certain drawbacks. In the first place there was the undoubted disfigurement of British towns by overhead wires—a disfigurement which it is sought to justify on the score of economy, a plea which was not, in his opinion, a sufficient justification, and one which was not allowed to prevail in some other countries less wealthy than Great Britain. The placing of the wires underground would not only prevent that disfigure-

ment, but would also remove the danger—not perhaps a great one, having regard to the comparative scarcity of the accidents that occur—attending the use of overhead wires. There is a great opening in connection with electric tramways for a good underground conduit system which could be readily applied in this country. Unfortunately the heavy initial capital expenditure required for the present conduit system as compared with that required for the overhead system had prevented its adoption in all but a few isolated cases, but he was hopeful that British electrical engineers would turn their attention to this matter and evolve a conduit system which would greatly reduce the difference now existing between the cost of the conduit system and that of the overhead trolley system. It might be of interest to state that, although electricity was the youngest of the sciences, upward of \$650,000,000 of capital had already been invested in Great Britain alone in electrical undertakings.

Lastly Mr. Hawksley referred to the want among manufacturers of a system of standardization—a very important point. For some time past the Council of the Institution of Civil Engineers had realized the serious difficulties and disadvantages under which British manufacturers were placed by the lack in their country of some acknowledged standards. The Council of the Institution of Civil Engineers therefore approached the Institution of Mechanical Engineers, the Institution of Naval Architects, and the Iron and Steel Institute, with a view to taking up this subject, and a strong and influential committee, representing these four institutions, was formed. The evidence laid before the committee was interesting, as showing the various methods in which the different countries carried out their work. For instance, in this country, where the American Society of Civil Engineers has issued standard sections for rails and standard specifications, the rolling-mill makers would in most cases only roll to these sections. It transpired that from time to time various inquiries had been sent to America from Great Britain for tenders for large quantities of rails and of other materials that were needed by British companies, but in nearly every case the reply was that "unless you take our standards we regret we do not see our way to quote." On the other hand, some instructive instances of the waste of time and money that occurs in Great Britain for the want of standard sections were laid before the committee. One case in point was a section incorporated in a bridge for one of the British colonies. The average cost of the material was \$42 per ton, but one of the sections specified was of such an odd size and the quantity of this size was so small that the section had to be made by a blacksmith at a cost of from \$140 to \$150 per ton. It was, therefore, with a view to lessen the cost of and to expedite the carrying out of the works designed by engineers, as well as to enable the British manufacturers to meet the keen competition which is now threatening even the home markets, that the Institution of Civil Engineers had taken in hand this important matter.

#### Chicago a Great Inland Port.

That Chicago is a great shipping center almost everyone knows. But that it now ranks fourth among the ports of the world is not so well known. The latest figures relating to the matter of shipping are:

London, 16,529,095 tons; New York, 16,445,320; Hamburg, 14,198,817; Chicago, 14,186,100; Antwerp, 13,573,472; Liverpool, 11,818,000; and Marseilles, 9,629,114.

Chicago leads all United States ports except New York in tonnage, and the constant extension of lake traffic has added not only to the commerce of Chicago, but likewise very largely to the commerce of Cleveland, now a very important port of entry; Detroit, Buffalo, Milwaukee, Duluth, and Toledo.

The chief articles of commerce on the lakes are wheat, flour, coal, iron, and lumber. In 1871 the number of bushels of wheat passing through the Soo Canal was 1,376,705, while last year the number of bushels was 60,000,000, or more than forty times as much as in 1871.

#### Printing in Persia.

Printing from type in Persia is not regarded with popularity. This country is at the present day entirely dependent upon lithography for the native production of books and journals—which are very rare. A short time ago a press with movable types was set up, and upon which a certain number of books was printed. The effort, however, met with no encouragement, and had to be abandoned. The unpopularity of type-printing in Persia is due to two principal causes: First, the straightness of the lines offends a Persian's artistic sense, and, secondly, in printed books the character of the letters is entirely lost. The Persian reader prefers a well-written manuscript, and, failing this, he contents himself with a lithograph, which is usually the facsimile of the writing of some fairly good scribe.



Analysis of Volcanic Dust.

BY THEODORE G. STRAUB.

In a report given out by P. Carmody, F.I.C., F.C.S., government analyst at the island of Trinidad, is a series of analyses of volcanic dust of the recent fatal eruption at Martinique which are rather interesting to note.

The first sample was collected at sea off St. Vincent by Capt. Edwards, S. S. "Louisianian;" the second at Barbadoes, and the third at St. Pierre. As will be seen the results vary considerably, though the general composition is comparatively uniform.

	S.S. Louisianian	Barbados	St. Pierre
Soluble in water—	Per Cent.	Per Cent.	Per Cent.
Chlorine.....	0.05	0.09	0.05
Soda.....	0.05	0.09 (large)	0.05 (large)
Lime.....	0.05 (large)	0.09	0.05
Sulphates.....	0.05	0.09	Trace
Total.....	0.45	0.45	0.30
Soluble in acids (2 hrs.)			
Iron oxid as FeO.....	5.60	5.01	3.59
Silica, Alumina, etc.....	11.81	6.89	2.01
Lime.....	2.94	3.36	1.13
Magnesia.....	Trace	0.40	0.22
Potash.....		0.05	0.05
Soda.....		0.44	0.22
Sulphates.....	Trace	0.23	0.02
Phosphates.....		Trace	0.11
Total.....	20.35	16.38	7.35
Insoluble in acids—			
Silica and silicates.....	78.10	83.30	92.23
Loss on ignition.....	0.50	0.40	0.40
Total.....	99.40	100.53	100.28

From the above it will be seen that the dust can almost be called a silicate of iron and lime. All three samples show nearly the same amount soluble in water and volatile on heating, though the quantity soluble in acids varies considerably, the greatest being in the first in which there are only traces of the alkali metals and magnesia.

The specific gravity varies from 1.08 for the first to 1.28 for the third sample, the Barbadoes dust being nearly as heavy (1.23) as that which fell at St. Pierre. The latter is the coarsest of the three, 42 per cent of which were caught on a sieve 70 meshes to the inch, while for the "Louisianian" dust only 11 per cent, and for the Barbadoes only 9 per cent were caught on this mesh. In the same order 19 per cent more of the St. Pierre dust was caught on a 100-mesh sieve, 59 per cent more for the Barbadoes, and 63 per cent more for the "Louisianian" material.

In each of the three samples 3½ per cent of the dust was attracted by a magnet, which is rather remarkable. This iron that was attracted was not in the metallic state, but as an oxide.

As to appearance the "Louisianian" and Barbadoes dusts are similar, showing under the microscope light green crystals and black lustrous crystals, both probably silicates of iron. There were also present certain clear crystals. The St. Pierre dust contained reddish crystals not present in the other two.

As to the practical value of these ashes as a fertilizing agent it cannot be said to be very great, though locally their supposed value is greater than it really is. Their main advantage is that they serve to loosen and dry heavy clay soils to quite an extent. The local opinion that they are highly beneficial as a manure is due perhaps to the lime which generally has a good effect upon soils of a clayey nature. Otherwise not much can be said in their favor, since nitrogen is wholly absent and potash and phosphoric acid are present only in traces.

Franklin Webster, editor of the Insurance Press, has made a very interesting compilation of underwriting corporations that have retired from business in the United States during the last two or three decades. The summary is rather appalling, and shows how narrow is the margin of profit obtainable from the business to-day. Mr. Webster speaks thus of the exhibit: "The Insurance Press knows no better way to emphasize the magnitude of the problems confronting fire-underwriters, to demonstrate the unwisdom of legislative attacks on the insurance business, and to explode the fallacies concerning insurance 'profits,' than to ask the American people to gaze upon the list of joint-stock fire insurance corporations that have given up the struggle, and to reflect upon the causes of the failures. The object lesson is impressive. The Insurance Press has invited and received the co-operation of insurance departments in making up the record that follows, and has made use of other data, especially reports by the National Board of Fire-underwriters. During the past twenty-five years the fire loss in the United States has exceeded \$2,800,000,000. This year the value of property destroyed by fire will exceed \$170,000,000. Nearly 1,200 fire-insurance companies with paid-in cash capitals, mutual companies not included, have gone to the wall in the United States. Nearly all of these companies have been either burned to death or crushed out of existence by oppressive laws."

Automobile News.

The 100-mile endurance test of the Chicago Automobile Club was held over the rather poor and rough roads in the neighborhood of Chicago on the 12th inst. Of the twenty-nine starters, nine made a perfect run and were awarded blue ribbons; four averaged 99 per cent, obtaining red ribbons; one, 97 per cent; and two, 93 per cent. The best time for the course was made by Mr. F. X. Mudd, who, in a Winton touring car, covered the hundred miles in 7 hours 16 minutes. Another Winton was a close second. The average gasoline consumption was about 6 gallons, the carriage holding the record for lowest consumption being the Pierce motorette, which used 3¼ gallons. A number of the contestants were disqualified because they tried to make up time in the last controls. The arrangements were excellent and the timing was accurately accomplished. The test was one of the most successful which has been held this year.

The Kansas City, Mo., Automobile Club held a 100-mile endurance test recently over the macadamized roads in the environs of that place. Seven out of fourteen starters finished, a Haynes-Apperson machine coming in first within one minute of the 6 hour 9 minute limit. Several Pierce motorettes participated in the run, a part of which was made in a heavy rain.

The Automobile Club of America will hold a 500-mile reliability trial in October. The trial will be made over the New York-Boston route, via Springfield and Worcester, Mass. The start will be made from New York on October 9, and the arrival in Boston will occur on Saturday afternoon, October 11. Sunday will be spent in Boston and the return to New York will occupy the three days following. The run is open to all classes of automobiles of either home or foreign make. The club will supply an official observer for each machine entered.

The club is compiling a register of reliable mechanics and operators and it wishes the names of proficient chauffeurs who desire positions with club members.

Failure of the Baldwin-Ziegler Expedition.

All patriotic Americans are disappointed to learn of the failure of the Baldwin-Ziegler expedition to the North Pole. This expedition, it will be remembered, started out with a most complete equipment. Money was not spared in the purchase of the explorers' outfit, which comprised the very best of all that modern science could suggest. The cause of Mr. Baldwin's failure to reach the North Pole is ascribed to the ice which blocked all channels through Franz Josef Land, and prevented the establishment of depots by steamers last fall. The breaking up of the ice early in June compelled the use of reserve supplies, and hence it was necessary to leave Camp Ziegler on July 1. However, as Mr. Baldwin puts it, he has been "baffled, but not beaten," from which we are led to expect that a second attempt will be made next year, which it is hoped will meet with better success. The chances are very favorable for another "dash to the pole" because of the enormous depots of condensed food which were established by means of sledges at important localities this year.

American Agricultural Implements Wanted in India.

The United States Department of Agriculture has received a request from India for information in relation to American agricultural implements. The writer desires catalogues giving descriptions of reapers, corn binders, plows, and other agricultural implements, together with the cost of transportation to that country. He also asks if there is to be found a plowing machine worked with wheels, of simple construction and moderate price, which will turn up land 2½ or 3 inches deep and can be operated by one man or steam power.

The writer is willing to act as agent for the introduction of such implements. Manufacturers and dealers who may be interested in the matter should address Charu Caundra Basu, P. O. Mehurpur, District Nadia, Bengal, India.

The Current Supplement.

The current SUPPLEMENT opens with a handsomely illustrated article on the warships at Spithead for the Coronation Naval Review. It contains also a very complete and copiously illustrated article on wireless telegraphy and submarine cables. A subject of much interest deals with the forests of the Philippine Islands, which shows the great extent of the timber lands and the varieties of wood there found. The Development of Electro-Chemistry is fully treated in a comprehensive article by Mr. R. H. Johnston. Our readers will be interested in the paper by Mr. Graham Bott on Perfumes; Their Antiquity and Uses, with Formulæ. Meter-Gage Fairlie Engines for the Burma Railway Company is the title of an article which will prove of great interest to all connected with railroad affairs. The usual Trade Notes and Recipes are given together with Trade Suggestions from United States Consuls.

Science Notes.

A novel type of vessel has been inaugurated by Capt. W. M. Walters, of Liverpool, for reporting purposes in connection with the English mercantile marine. The first vessel is to be fitted with the Marconi wireless telegraphy system, and is to be moored near the Jones Bank, 66 miles west by south of the Bishop Rock, Scilly, to report between the ship and the mainland. The commercial value of the plan is that it will obviate the necessity and expense of a ship putting in at ports "calling for orders."

The British Admiralty have decided to build their destroyers much stronger in the future than those already in existence owing to their frequent breakdowns, due, according to the findings of the naval experts, to the general frailty of construction. Stability and strength have been sacrificed to too great an extent in order to obtain high speed. This latter desideratum has therefore greatly militated against the success of this type of boat, since recent events and prolonged inquiries have shown that it cannot withstand the heavy buffalings of the waves encountered in a rough sea. Strengthening of these boats will, however, result in a reduction of speed, so they will not be efficient for one particular purpose for which they are required—scouting. To supply this deficiency, however, the Admiralty are introducing a new type of warship described as the "Scout" class, and from this appellation the function for which it is intended may be realized. These new vessels are to be much longer and stronger than any destroyers hitherto built, and will be able to remain longer at sea than either torpedo boats or torpedo destroyers. They are to have a speed of 30 knots an hour. Four vessels for experimental purposes are to be laid down at once, for the construction of which \$147,175 has been allotted. The Admiralty do not intend to initiate the design of this type of boat, but the various private shipbuilders are to draw up plans, coinciding with the special requirements of the navy, so that the Admiralty may have the choice of a selection.

M. Henri Moissan has been making experiments with silicide of calcium in order to determine its properties and especially to find out whether it possesses any analogy with carbide of calcium in the formation of compounds like acetylene. Although the silicide of calcium has already been prepared in a more or less pure state its properties have been but little known. M. Moissan prepares it by heating in the electric furnace a mixture of calcium oxide and pure silicon. The mixture is heated in a carbon tube closed at one end, using a current of 600 amperes at 60 volts. The melted mass is not homogeneous, but is surrounded by an external layer of carbide of calcium and below are striæ of crystallized silicate of lime, while in the center is a brilliant mass of silicide of calcium, mixed with varying quantities of silicon. The reaction is thus represented:  $2\text{CaO} + 5\text{Si} = 2\text{CaSi}_2 + 2\text{SiO}_2$ . The silicide is then separated by an appropriate treatment; it is easily characterized under the microscope by the formation of yellow crystals of silicon on contact with weak hydrochloric acid. As to its physical properties, the mass of silicide may be pulverized in an agate mortar. It has a metallic appearance, and is made up of crystals of undetermined form. The crystals are of a grayish color and very brilliant. The density of this body is 2.5. It is insoluble in alcohol, ether, benzine or ammonia. It presents some chemical reactions of interest; it does not combine with hydrogen at redness, but takes fire when cold in fluorine gas, giving off fluoride of silicon and forming a fluoride of calcium which is partly melted by the heat. Chlorine does not attack it cold, but when heated in a current of the gas it becomes rapidly incandescent and produces chloride of calcium and silicon chloride. When heated in air or oxygen it is but slightly attacked, but under the oxyhydrogen blowpipe it burns with incandescence, forming lime and silica. When the silicide is heated in the electric furnace for 10 minutes in the presence of carbon, using a current of 800 amperes at 60 volts, it is completely transformed into carbide of calcium and silicide of carbon. Melted copper dissolves it but slightly, while, on the contrary, aluminium dissolves it readily but also decomposes it, forming silicide of aluminium. The latter body, when acted upon by hydrochloric acid, gives off hydrogen silicide gas which is spontaneously inflammable. Cast iron in fusion decomposes this body into silicide of iron and carborundum. The action of water upon the silicide has been especially observed, owing to its analogy with carbide of calcium. When reduced to powder and placed in water the decomposition is very slow and even requires several months. In this case it gives off hydrogen and does not form any products resembling acetylene. The acids act upon this substance to a greater or less degree; one of the most striking reactions is that of hydrofluoric acid upon its powder. In this case it becomes incandescent, giving off fumes of silicon fluoride and producing silicon of a yellow color.