Professor Sainte-Claire Deville.

The London *Chemical News* gives the following concise sketch of "one who, for the past thirty years, has had few equals and no superior in the fields of mineral chemistry and inorganic analysis." Etienne Henri Sainte-Claire Deville was born March 18, 1818, in the island of St. Thomas, in the West Indies. At an early age he manifested an ardent passion for the study of chemistry, which at that time found in France so many of its most distinguished professors. His abilities were manifested so early that at the age of twenty-six he was commissioned to organize the Faculty of Science, newly created in Franche Comté, and to preside over it as its dean. Here he undertook the analysis of the waters of the Doubs, and of the springs around the town of Besançon, and greatly improved the methods then known for water analysis. Shortly after, he succeeded in preparing nitric anhydride, which previously had been attempted in vain. Toluol was another of his discoveries. In his thirty-third year he succeeded Balard in the chemical chair at the Ecole Normale Supéricure, at Paris. Here his emoluments only reached the modest sum of 3,000 francs; chemistry in France, as well as in England, being supposed to be its own reward. His next researches related to the properties and the industrial preparation of aluminum—discoveries which attracted public attention throughout the world. He then turned his attention with signal success to the metallurgy of platinum, and its separation from its associated metals. His investigations on boron and silicon are also well worthy of notice, and his production of sodium at a cheap price has placed a powerful reagent in the hands of chemists, and has led the way to valuable results, both in the laboratory and in industrial establishments. His highest achievement, from a strictly scientific point of view, was the establishment of the laws of dissociation. Previously, decomposition was regarded as a simple phenomenon, effected and completed, in the case of every substance, at a fixed temperature. Deville showed that in some cases it is effected within certain limits of temperature, being arrested at a given heat by the equilibrium established between the decomposing body and the products of decomposition. A most admirable characteristic of the deceased *savant* was his strict accuracy—an attribute all the more deserving of honor in a man of his ardent and impetuous temperament. Among his pupils may be counted not a few of the most meritorious among the younger French chemists, such as Debray, Troost, Hautefeuille, Grandeau, Gernez, and others. M. Deville died on July 1st, at Boulogne-sur-Seine, and was buried on the 5th. His old friend, M. Pasteur, pronounced an eloquent and impressive *éloge* at the funeral. All honor to his memory, and may his experimental accuracy, which M. Pasteur calls the "probity of the chemist," find abundant imitators.

W. Milnor Roberts.

We are in receipt of the sad intelligence of the death by typhus fever, at Rio Janeiro, on the 14th of July, of Col. W. Milnor Roberts, past President of the American Society of Civil Engineers, and late Chief Engineer of Public Works of Brazil. We are indebted to *Engineering News* for the following:

Colonel Roberts was born in Philadelphia, February 12, 1810. His aptitude for mathematics early introduced him to the then new profession of civil engineering, and in the spring of 1825 he received his first appointment as a chainman of the Union Canal, of which Canvass White was chief engineer, and Sylvester Welch, locating engineer. At 18 years of age he was appointed engineer in charge of the most difficult division of the Lehigh Canal, from Mauch Chunk down, sixteen miles, and from that time forward he was always intimately connected with great canal and railway enterprises, principally in Pennsylvania and New York States, with intervals in Brazil and in the Western States. He held important offices under the United States Government, was Chief Engineer of the Northern Pacific Railway, Associate Chief Engineer of the St. Louis Bridge, and an active and important member of the Mississippi Jetty Commission. In 1879, shortly previous to his departure for Brazil, Colonel Roberts was elected President of the American Society of Civil Engineers, a society of which he was a very active and always interested member, and which will very keenly feel his loss. Though so far advanced in years, Colonel Roberts was an unusually active and energetic man, and some idea of the extent and difficulty of his labors in Brazil may be gathered from letters which have been published in this journal during the past two years. Colonel Roberts was possessed of a most genial and kindly disposition, and the news of his death will be received with feelings of great sorrow by the entire profession of which he was a member, as well as by a very large list of friends in this and other countries where he was known.

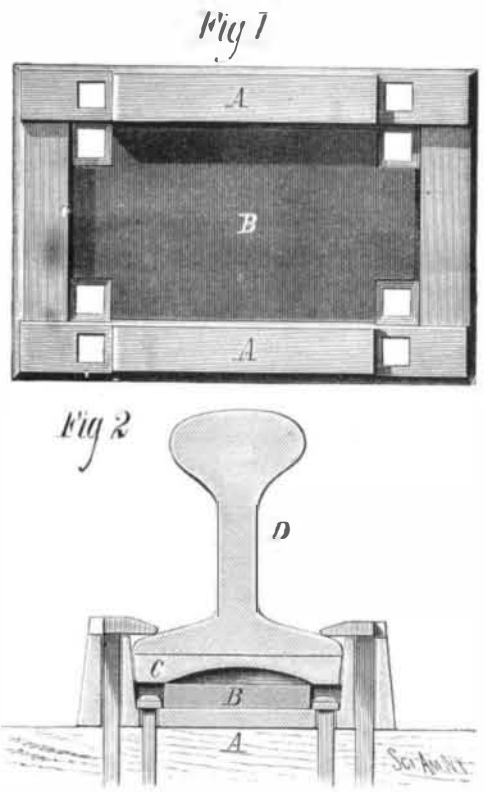
Improvement in the Paper Trade.

From statistics presented to the meeting of the American Papermakers' Association, which met at Saratoga on the 27th of July, 1881, it appears that 307 manufacturers had offered 897 tons for export without limit as to price. The increase, according to the report of the committee on export business, in the export of paper in 1880 over 1879 had been 16,500 tons. Statements were also made by prominent members to the effect that the out-put of the paper mills had been fully 25 per cent over that of the previous year, and paper is now sold as low in New York as in London

The total capacity of all the mills in the country is now 2,500 tons per day of all kinds of paper.

NEW RAIL FASTENING.

The engraving shows a new fastening for securing rails and chairs to the railway ties and sleepers recently patented by Mr. Isaac K. Bennett, of Moosup, Conn. Fig. 1 is a plan view of the chair and cushion, and Fig. 2 is a vertical transverse section of the chair, showing the rail in position. The chair, B, is secured to the tie or sleeper by square-headed spikes passing through holes in the bottom into the timbers. A rubber pad, B, is placed in the cavity of the



BENNETT'S RAIL FASTENING.

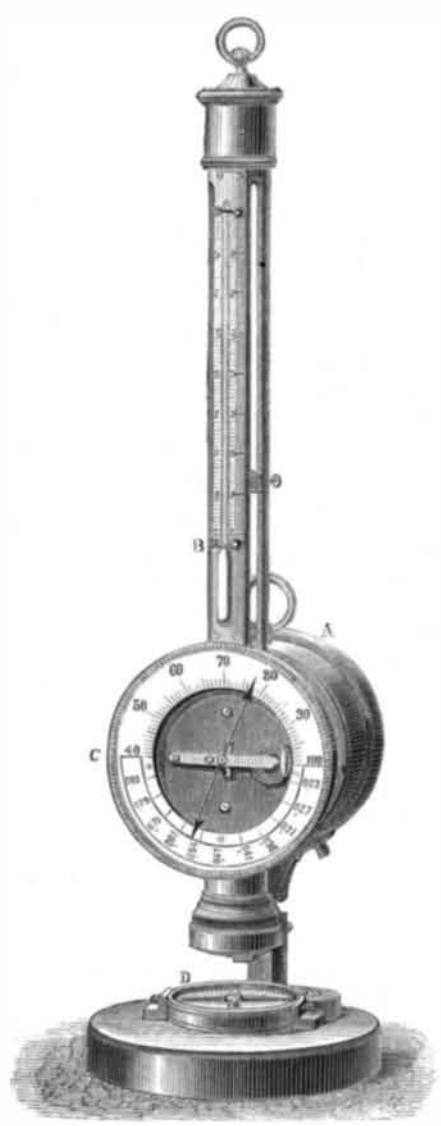
chair and covered with a metal plate, C, which fits the cavity in the chair, and is concaved on its under surface, forming an air cushion. The rail, D, rests on the plate, C, and is secured by hook-headed spikes passing through square holes in the chair into the timbers.

This method of fastening gives great elasticity to the joint and prevents hammering the rails end and bruising the ties.

This device may, with advantage, be applied to the middle or other portions of the rail.

PORTABLE METEOROLOGICAL STATION.

Under this name is designated an instrument especially adapted for the use of travelers in mountain excursions in



PORTABLE METEOROLOGICAL STATION.

order that they may be able to observe and accurately register the different atmospheric phenomena they experience, and so fill the gap that generally exists in the history of Alpine and other ascensions.

This instrument is so arranged that it can, in any place, conveniently and exactly determine the most important meteorological phenomena, the pressure and temperature of the air, and its degree of humidity. It is a combination of a barometer, thermometer, hygrometer, and compass, arranged in a small case that can easily be carried, as it weighs only one kilogramme.

The different parts are so perfectly balanced that the instrument can be used in any position and can stand without injury the rough usage of mountain traveling.

The barometer, A, is the aneroid, a well known instrument, and is especially adapted to show the pressure of the atmosphere and the elevation of the place of observation above the sea level.

The temperature is shown by a mercurial thermometer, B, fixed on a copper tube, that forms a general support for the whole apparatus. The thermometer registers the centigrade system from 25° below zero to 40° above.

The degree of humidity in the atmosphere is determined by a Saussure hair hygrometer, which is slightly modified in this apparatus. A well constructed hair hygrometer gives results sufficiently accurate for general meteorological observations, as the hairs work regularly, and their small bulk causes them to be easily affected by the surrounding air, which is a great advantage when there are only a few moments to make an observation.

This hygrometer is the only one available for those altitudes where the temperature is below zero, and where, consequently, neither the psychrometer nor the condensing hygrometer could be used.

Another advantage is that it shows immediately the degree of humidity, for a table, inscribed on the semi-circumference, C, of the circle, gives in a moment the equivalent of the degrees of the hygrometer in the fractions of saturation of the air.

By this method we can make most interesting comparisons of the humidity of the fogs and mists that are encountered on the mountains and in the vicinity of elevated lakes.

It is easy to see the utility of the compass, D, which shows the position of the country, and is especially useful to the traveler, when exploring an unknown place or surrounded by a heavy fog. The direction of the wind can also be easily ascertained by tying a piece of ribbon to the ring at the top of the instrument, and so making it still more useful.—*La Nature.*

STEAM-BOILER NOTES.

It will be remembered by those who gave attention to the subject of steam-boiler construction, how the steel plates used by Messrs. Elder & Co., of Glasgow, in the construction of the boilers of the Livadia, the Russian war yacht, behaved in the most capricious manner, after having passed the tests that are approved by Lloyds, the Admiralty, and the Board of Trade, and how since that event the attention of civil, metallurgical, and mechanical engineers throughout the civilized world has been drawn to the subject of so-called mild steel as a structural material for engineering works.

According to a recent report on the behavior of the steel plates above mentioned, by W. Parker, Esq., chief engineer surveyor of Lloyds' Register, which was read at a meeting of the Institute of Naval Architects of England, it appears that, up to the date of the Russian event, Mr. Parker and his colleagues of the Lloyds' Register had never observed a single instance of brittle steel plates during their manipulation of 17,000 tons that entered into the composition of no less than 1,100 steel boilers now in use in steamships.

The report shows that, during the construction of these Russian boilers (which were 14 feet 3 inches diameter, with triple-riveted lapped longitudinal seams, plates ¾ inch thick) a plate fell from the slings on to a piece of metal, the shock of which cracked it between the rivet holes at a distance from the place that received the blow; thereupon all the plates were annealed in a furnace specially adapted for the purpose.

The first boiler that was tested after completion gave way in three places before the required pressure, 140 pounds, was reached, and the second gave way in anticipation of the test; in other words, it was found to be cracked by those who were about to test it in a similar manner behind the rivet holes.

In the general chemical analysis which followed their failure nothing seems to have been found to warrant such conduct on the part of these plates. But the appearance of the fracture indicated that the metal was not of uniform structure throughout the thickness of the plate, and a series of special analyses performed on successive layers, each $\frac{1}{16}$ thick, planed off, showed that there was a notable difference in the chemical composition of the middle as compared with the surface layers of the plate. There was more carbon, more phosphorus, and more sulphur in the intermediate layers; of carbon and sulphur they contained nearly double, at the middle, the average quantity of all the layers. Mr. Parker concludes from his investigation that there is nothing but the want of uniformity of structure to account for the singular freaks of these plates. He says: "The tensile strength was not reduced by the punching, but the plates, where punched, were *extremely brittle.*"

In 1848 the ex-Commissioner of Patents, in his report, which was published in the SCIENTIFIC AMERICAN of May 19,

1849, gives it as his deliberate opinion that the best remedy for boiler explosions is making the steamboat masters and other owners of exploded boilers liable for damages, and he recommends that property of such owners be held as a lien to respond to damages to plaintiffs, and that members of corporations be held jointly and severally liable. Whatever may be said of the justice of such legal enactments as the ex Commissioner then recommended, there seems to be little doubt that the effect would be salutary, inasmuch as it would cause steam users to look a little closer into the principles that underlie proper construction and preservation at full initial strength of their steam generators. It would thus promote a community of interests and tend to diffuse correct technical knowledge of the subject, and prevent its concentration among professional experts at whose mercy steam users, as a rule, are now compelled to move.

It appears from the local press of Detroit that the *boiler inspection and engineers' license* ordinance, as originally drawn and vetoed by the mayor, is about to be modified and another effort made to secure its adoption. The suggestions of the mayor relative to inspections will be adopted, at least in part, and provision made for appeal. The local engineers' association, it is claimed, approve the proposition to license them. They are to be divided into three classes: the license fees to be scaled so that they will pay the salaries of an inspector and an assistant.

Wagner's *Jahresbericht* warns against the use of copperas for the prevention of incrustation in boilers, as the acidity of most of the copperas products causes very destructive action of the boiler iron. The use of copperas was some time ago recommended by certain parties, who also patented it, and it has been tried in several works. At the time of its first coming out, a great many parties and authorities in this branch strongly opposed its use, but nevertheless many victims had to pay dearly for the experience they have now acquired. Things of this kind occur too often for our times, and inventions of doubtful merit are too often accepted as valuable additions to industrial purposes. They should be examined, not only by practical, but also by scientific authorities. Practice is a good thing, but theory combined with practice is far better, not only for the pockets of manufacturers, but also for the advancement of industry in general.

A portable steam boiler exploded at Decatur, Ills., on the 28th of July, causing a loss of $1,200 to L. F. Webb; nobody killed.

The locomotive of a freight train on the Chicago and North Western Railroad exploded on the 31st of July, about 14 miles from Milwaukee. A brakeman was killed and the engineer and fireman were severely injured. Five cars were demolished and the rails were torn up for some distance.

Since the explosion of the still at the Woolner Distillery on the 30th of July, Ignatius Woolner, Henry Cashin, Charles Hebner, John Kirkland, William Reif, Henry Goetz, William and Fritz Fehl, William Rice, August Stetler, and Theobold Seiler have died from the effect of injuries received, making twelve persons who have died. Thomas Lawless and William Fehl will probably die, in which case but four will remain out of the eighteen who were injured by the explosion. Nearly all the victims inhaled the escaping steam, and their sufferings have been intense.

The verdict of the coroner's jury is that the explosion was caused by an unnecessary pressure of steam in the still.

At nine o'clock on the evening of August 1, the boiler of French & Son's paper mill, at Carrollton Village, Ohio, exploded, demolishing the boiler house and the bleaching house. The explosion was terrific and threw fragments to a great distance in every direction. The loss is about $3,000. No person was injured.

The boiler in Smith, Grant & Co.'s coal and lumber yard, at Pawtucket, R. I., exploded August 2. Bernard McCudden, the engineer, was blown a distance of forty feet, and instantly killed. He was forty years old, and unmarried.

Improved Hectograph.

The principle upon which the process depends is this, that a superficial tanning of the gelatin, in the gelatin-glycerin pad, makes the surface, wherever tanned or rendered insoluble, capable of taking fatty inks, while the rest of the surface rejects it. In practice then it is only necessary to have a perfectly level hectographic pad, to write the copy with ordinary nutgall ink, to which a little extra tannin and extract of logwood has been added, and to transfer the writing in the ordinary manner upon the hectographic surface. Wherever the writing appears, the surface becomes tanned, and on now applying a roller with printer's ink, the written characters alone take the latter. The pad is to be inked after each impression. It is said that 300 to 400 sharp copies can be made upon dry paper. The only material necessary, besides the hectograph, is a slab, or zinc plate, for spreading out the printer's ink, a small printer's roller with handle, and a roll of wood or paper or rubber for pressing the paper against the pad.

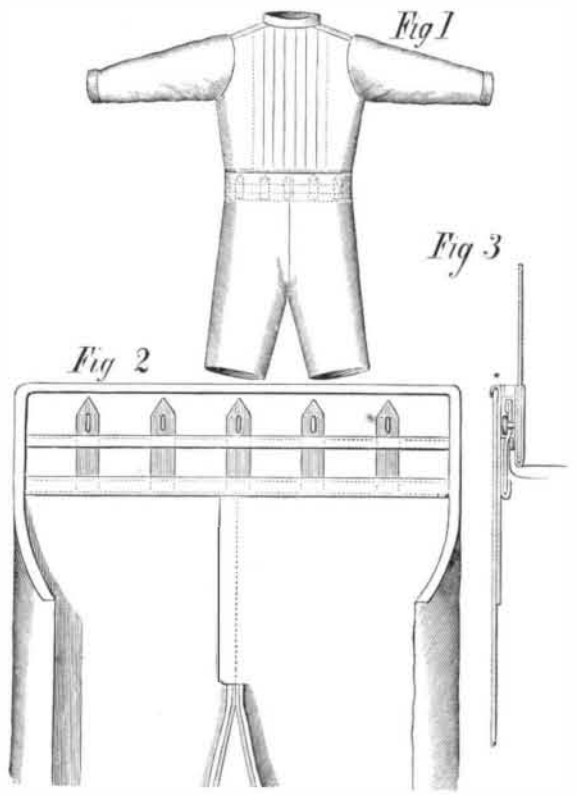
A Naphtha Locomotive.

During the month of June a number of experiments on the consumption of naphtha were made on the Tamboff Saratoff line by the engineer, M. Poretsky. The following points were established: (1.) Steam was got up from cold water to a pressure of 100 lb. on the square inch in two hours, and by burning 4 poods—or 144 lb—of naphtha. Usually in the same locomotive, with coals aided with wood, three and a half hours are required, and 26 poods of coals and wood—936 lb. (2.) The apparatus can be kept in use forty-eight hours without stoppage for cleaning, after which only two hours are required to clean out. (3.) In running 1,500 versts it was only required to stop the locomotive twenty minutes for fuel, and the driver and stoker have almost nothing to do, except to stop and start, the apparatus simply requiring opening more or less of the fuel. (4.) The flame is so well thrown over the whole of the fire box that after running 40,000 versts it is considered only one-half remount is necessary as opposed to coals. (5.) While it was found possible to evaporate 13 15/16 lb. of water with 1 lb. of naphtha, the absolute result with new men and on the whole runs was 9 lb., or about two and a half times more than the coals used.

ATTACHMENT FOR PANTS.

The engraving shows a novel device for fastening pants to waists or vests, so that the buttonholes will not tear out nor the buttons be torn off when the wearer stoops or bends over. The invention is intended more particularly for use on children's garments, and will no doubt be welcomed and appreciated by those who are obliged to keep children's clothes in order.

The invention consists in a series of elastic strips with buttonholes at the upper end, attached at their lower ends to a band fastened inside of the pants. These parts are arranged so that the upper ends of the strips will be below the upper edges of the pants.



IMPROVED ATTACHMENT FOR PANTS.

Fig. 1 shows the pants attached to the waist; Fig. 2 is a view of the inner side showing the arrangement of the fastening, and Fig. 3 is a vertical section of a portion of the pants and waist. By reference to Fig. 2 it will be seen that the elastic strips are attached by their lower ends to a band fastened to the inner surface of the waist of the pants, and a band passes over the middle of the strips and is stitched between them, forming guides for the strips and sustaining the waist of the pants.

With this improvement the wearer can easily bend in all directions without fear of bursting off buttons or of injuring the garment, and it improves the fit and general appearance of the clothes.

This invention was recently patented by Mary R. Barhydt, of Burlington, Iowa, who should be addressed for further information.

A Minnesota Meteor.

A comet-like meteor, which appeared to pass close to the earth without striking or exploding, was seen in Eastern Minnesota, about 8:30 P.M. July 25. An observer at St. Paul, Mr. T. D. Simonton, says: "The meteor came from the south-eastern heavens, below the star Altair, some 15° or 20° above the horizon. It was exceedingly brilliant, with a well-defined head, as large or larger than the planet Venus at her brightest, and seemed to move about as fast as a rocket at a square's distance does just before it explodes. There was to me a sense of retardation in its movement, just as there is in a case of a rocket; but this was probably only apparent, because it looked so much like a bright rocket ready to explode, and because, in fact, I was expecting to see it explode every instant. Its direction was toward the north-west, toward which it crept as a fiery serpent, disappearing some 10° above the horizon. I use the word 'crept' because its movement was in no sense the darting motion of the ordinary meteor, but a deliberate, majestic course, giving one a great sense of the power with which it moved through at least 100° of the heavens. At its highest point I should think it was about 30° above the horizon. My estimate of the time the meteor was visible is from six to eight seconds, certainly not ten seconds. The tail was probably 10° in length."

A REMARKABLE CASE OF RETARDED DEVELOPMENT.

BY PROF. C. V. RILEY.

Early in the summer I received a statement from Professor I. D. Graham, of the Kansas State Agricultural College, at Manhattan, to the effect that he had hatched out some young locusts from eggs which had remained latent since the fall of 1876. While the occurrence did not strike me as impossible, it was, nevertheless, so remarkable that I entered into correspondence with him with a view of getting absolute proof of the accuracy of his statements. The young locusts which he sent me for identification proved to be *Caloptenus spretus*, or the destructive Rocky Mountain locust, and all the facts connected with them are so well attested that there is no doubt in my mind as to their trustworthiness.

About the 15th of September, 1876, the Chemical Laboratory Building of the Kansas State Agricultural College was completed, and the grounds immediately surrounding it were graded.

In the process of grading the bits of stone, mortar, and the clay which remained after the excavations and work of building had been completed, were used. The eggs of *Caloptenus spretus* were found in large numbers, and when the college grounds were graded, many of them were buried. The specimens in question were buried to a depth of about 10 inches, and remained in that condition until the third week in May, 1881, when some workmen, who were regrading the grounds, discovered them. As they looked quite fresh after their long burial, Mr. Graham concluded to try the experiment of hatching them out. He placed them under favorable conditions, and in due time was rewarded by the appearance of an active brood of young locusts, of which he forwarded samples to me.

When discovered in May, these eggs were surrounded by black earth. This earth was enveloped in closely packed clay, which, in turn, was covered with "spalls," mortar, and other building rubbish. In 1876, when the grading was finished, a plank walk was laid alongside of the building and above the buried eggs. This walk had never been removed since that time until in May, 1881, when the eggs were found.

In view of all the facts in the case Mr. Graham believes that the walk so shaded the ground that the sun's influence did not penetrate very deeply into the earth at this point, and also that the peculiar compositions of the earth surrounding the eggs, would keep them cool, moist, and in an almost air-tight place, all of which are conditions favorable for preservation.

However this may be, the fact that the eggs did remain in the ground unhatched for nearly four and a half years seemed undeniable, as also the further fact that the young when hatched were as active and voracious as their remote parents had been. The question arises as to how much longer eggs so situated might have remained undeveloped and sound, and it opens up a most interesting field for experiment.

It is not my purpose to discuss here the general influence of temperature in accelerating or retarding animal development, nor the many curious cases of retarded development among insects that are totally independent of temperature. Semper, in his recent work on Animal Life, has an excellent chapter on the influence of temperature, especially as to the optimum required for the favorable development of different species. As a rule a rising temperature stimulates and accelerates growth and development, and a falling temperature retards or torpifies, and this holds true with the eggs of *Caloptenus spretus*, as I have shown in experiments recorded in my ninth report on the insects of Missouri, and in the first report of the Entomological Commission. But there are many strange exceptions, as in the heat coma of tropical animals, the summer dormancy of certain lepidopterous larvæ, and the retarded development of individuals placed in the very same conditions under which others normally develop. There is, therefore, much mystery yet connected with the subject which offers a most inviting field for experiment, not only as to the other influences affecting retardation, but as to the length of time development, as under the influence of continued cold, can be kept latent without loss of vitality. The case here recorded is consequently most interesting, for it is evident that the eggs were not buried deep enough to be entirely free from the changes in the temperature of the earth at different seasons.

Washington, D. C., August 1, 1881.

Spiders Obstruct the Telegraph.

One of the chief hinderances to telegraphing in Japan is the grounding of the current by spider lines. The trees bordering the highways swarm with spiders, which spin their webs everywhere between the earth, wires, posts, insulators, and trees. When the spider webs are covered with heavy dews they become good conductors and run the messages to earth. The only way to remove the difficulty is by employing men to sweep the wires with brushes of bamboo; but as the spiders are more numerous and persistent than the brush users the difficulty remains always a serious one.