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VIEW OF CAISSON AND PLANT FOR NEW EAST RIVER BRIDGE.-[See page 90.]

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## appeal in the cordite case rejected

 It is not the less regrettable, because expected, tha the appeal of the Maxim-Nordenfelt Guns and Ammunition Company against the judgment delivered by the English courts in the celebrated Cordite case has gone against the appellants. The judgment wa given in such strong and explicit terms that it is scarcely to be expected that the Maxim-Nordenfel Company will carry the case to any higher court Whatever may be the technical merits of the case thus concluded between Mr. Maxim and the English govern-former-it must be "enerally admitted that the de cision is a distinct "hardship," as it has been termed by a prominent English journal, upon the distinguished inventor. Mr. Maxim's smokeless powder was not one of that class of inventions that are suggested or prompted by some existing and profitable device. It was produced as the necessary counterpart of the Maxim rapid-fire gun, in experimenting with which it was found that the ordinary powder produced such a dense volume of smoke as to make it impossible to see the target. The smoke of the old powders, which was merely an inconvenience when the interval between shots was measured by minutes. became a positive ob struction when the interval was reduced to seconds. Mr. Maxim set out to produce a smokeless powder, and the result of a long series of costly experiments was the smokeless powder maximite. It was by a mere rearrangement of the proportions of maximite and the substitution of a constituent which differed from the one replaced, as was proved by its experts' own testimony at the trial, merely in name, that the English government succeeded in producing cordite-a powder which has never shown the stability possessed by maximite, and only recently exploded in large quantity during some tests at the government proving grounds. It is certainly a hard ship that after so many years of toil and expense the inventor should see the largest share of the materia fruits of his labors, estimated by Mr. Maxim at severa million dollars, snatched away from him on a lega technicality of the flimsiest description
## THE COMMERCE OF THE PORT OF NEW YORK.

There is food for thought and not much room for en couragement in the pages of the last report issued by the New York Chamber of Commerce. The first thing that is apparent in looking over the tables of import and exports is the fact that, though in the preceding decade the volume of trade had been growing at a steady and rapid pace, in the present decade it has re mained about stationary, the totals for 1896, indeed being somewhat less than those for 1891 . In view o the fact that the trade of the whole country that crosses the Atlantic seaboard is steadily increasing, this stagnation will come as a surprise to those citizens of New York who have never believed that it could pos sibly have a successful competitor as the great port of entry for the United States. Th facts, however, are indisputable. What are the
causes? One of these, to which we drew atten tion in a recent issue, is to be found in the diffi tion in a recent issue, is to be found in the diffi
cult entrance to New York Harbor, and its inadequate cult entrance to New York Harbor, and its inadequate
depth as compared with the rapidly increasing size and draught of the large freighters which are being built for the American trade. It was only yesterday that a freight steamer of from 5,000 to 7,000 tons was considered to be exceptionally large, yet to-day we have a vessel plying regularly between this port and Europe which has a displacement of over 23,000 tons, and draws from 29 to 32 feet of water. A winding chan nel, with a mean depth of 30 feet, will be a constant menace to the safety of vessels of this class, and ye the present indications are that on account of their great earning power they will be built in increasing numbers in the near future. There are indications, however, that this difficulty is in a fair way to be re moved, and surveys are now in progress looking to the creation of a 35 -foot channel with a minimum width of 1,000 feet.
A more serious check to the commercial prosperity of this port-more serious because it is even now actively in operation-is the costly handling which most of the freight has to undergo between rail and ship when it reaches the Hudson River. New Yorkers who speak with some degree of pride of the vast and well organ zed system of lighterage on the East and North River forget that, however well it may be carried out, thi transfer by lighters is a heavy handicap upon New York in its competition with other Atlantic ports where the cars unload directly into the ship's hold. It is a well recognized fact among railroad men that the cos of handling is relatively far greater than the cost haul, and this explains the fact that the in a ransfer rate from Buffalo than the expense of the journey by rail. Although it is not our intention at this time to enter fully into the question of remedies, it may be pointed out, in passing, that just here is found one of the strongest arguments in favor of the construction of the North River bridge; for this structure, taken in connection with a belt line around the lower end of
Manhattan Island, and the proposed railroad bridge
across the East/ River, would enable a train load of reight to be shipped from interior points and landed t any pier in New York and Brooklyn
In its report to the Chamber of Commerce on improv ing the dock facilities of the port of New York the com mittee on the harbor and shipping mentions the fol owing disabilities under which the port is laboring: A ack of proper and sufficient wharves and docks; ex orbitant charges by the city; the requirement tha steamship lines shall build their own sheds, which rever to the city at the expiration of the lease ; that steam ship lines have to pay for the dredging of the docks and that there is a movement on foot to subject to tax ation the very sheds for which the city practically re eives rental, which the lessee never really owns, and which must revert to the city at the end of the lease. On the face of it these appear to be very severe condi ions, and viewed in the presence of the fact that com peting ports are pursuing a very liberal policy toward steamship companies, the New York methods would seem to be almost suicidal
Coupled with the above, which might be called the internal difficulties of the situation, are others of an ex ternal nature in the shape of discrimination by the trunk railroads in favor of other ports such as Balti more, Philadelphia, and Boston. Freight can be shipped by rail to these ports for from 2 cents to 5 cent per hundred pounds less than it can to New York Moreover, the railroads make an extra charge of $21 / 3$ cents per hundred pounds, or $\$ 6$ per car, on each ca load of produce from Chicago to Europe by way of New York that has more than one bill of lading-a charg that is not made on freight through any other port. The injustice of this discrimination is too glaring to call for any comment. On the whole, it is satisfactory to not that every one of the evils above mentioned is remedia ble, and it is to be hoped that the rude awakening which has come to the business men of the metropoli as to the fancied commercial impregnability of the port will result in energetic measures to remove ever stumbling block to the city's continued growth and prosperity

## alleged fraudulent patent business

As annouriced in the Scientific American of June 6 , proceedings looking to the debarment of Wedder burn \& Company from practice before the Paten Office were officially begun in Washington July 24 Assistant Commissioner A. P. Greely having been designated by Commissioner Butterworth to hear the vidence. The government was represented by Examiner F. W. Winter and Law Clerk Charles C. Stauf er, and the defendants by Judge Jere M. Wilson, William L. Ford and William H. Bond. The trial wa begun with the presentation by the government of arge amount of documentary evidence which had been carefully arranged and alphabetically assorted The charges are said to have contained many specificaions of unprofessional methods pursued by the de fendants, and to have cited cases of alleged fraudulent practice, Examiner Winter going over the evidence and claiming to have abundant proofs to sustain al he charges. "There were" said Mr. Winter "device sumitted to this office by Wedderburn \& Company submitted to this office by Wedderburn \& Company
that were unpatentable and upon which no two men that were unpatentable and upon which no two men bad repute, the defendants in such cases excusing thei ailure to obtain patents for their clients by casting re lections upon the department," the clients in many ases proceeding with patent cases "on account of th prizes held out to them by the defendants," as part of a widely advertised scheme of awards for those who should obtain the greatest number of patents. It was also charged that the defendants were guilty of un rofessional practice in their advice to clients on the taking of appeals from the Commissioner's decisions "thus securing large fees that were not deserved and were unfairly obtained.
In regard to searches, or preliminary examinations conducted in the Patent Office on the part of the de endant firm for their clients, to determine the proba ble patentability of an invention, one witness declared that he was employed by the defendants as a searcher, though he was known to be "without experience in the patent business or with mechanics or inventions," and that he was instructed to "report favorably" on cases which he "could not understand, or that seemed very complicated." This witness also mentioned sev eral cases on which he was instructed to report favor ably without any search. Other witnesses testified to similar effect.
On the part of the defendants it was claimed that they had always endeavored to practice before the de partment in an upright and honest manner; that they had not defrauded a single client; that they had always instituted a careful investigation in the office records before accepting fees or applying for patents and that their offer of prizes was merely for the pur pose of "stimulating the dormant inventive genius of pose of "st
The trial is likely to be somewhat prolonged. It has attracted great attention in legal circles, and is neces sarily of great importance to all who have business
with the Patent Office. That a firm of patent attor neys doing a large business should be specifically charged with the offenses here made the subject of a trial is not only calculated to reflect discredit upon all trustworthy practitioners, but is a matter of serious concern to all who believe that the progress of inven tions is

## american association for the advancement OF SCIENCE

The forty-sixth annual meeting of the association to be held in the city of Detroit, Mich., on Monday August 9, and is to continue to August 14.
The place of the meeting is the spacious Detroit high school building, having a large auditorium, nea which are several class rooms where the different sec tions will meet.
The meeting on the first day in the morning will be given up to the organization of the several sections. In the afternoon at the different rooms the following papers are announced to be read by the respective vice presidents : in physics, "Long Range Temperature and Pressure Variables," by Carl Barus; in anthropo logy, "The Science of Humanity," by W. J. McGee in geology and geography, "The Pittsburg Coal Bed, by I. C. White ; in mathematics and astronomy, Chapter in the History of Mathematics," by W. W Beman; in social and economic science, "Improvi dent Civilization," by Richard T. Colburn ; in chemis try, "Sanitary Chemistry," by W. P. Mason; in botany, "Experimental Morphology," by George $F$ Atkinson; in mechanical science and engineering "Applied Mechanics," by John Galbraith; in the zoological section L. O. Howard will read a paper in place of Prof. Goode, who died during the year.
The general session will meet in the evening in the auditorium, when a memorial address on the life and work of the late president, Edward D. Cope, will be given by Prof. Theodore Gill, of Washington, D. C.
On August 10, 11, 12 and 13 there will be meetings of On August $10,11,12$ and 13 there will be meetings of
the general session in the morning and of the sections the general session in the morning and of the sections
in the afternoons. On Saturday, August 14, a compliin the afternoons. On Saturday, August 14, a compli-
mentary excursion is arranged to inspect the United States ship canal in Lake Ste. Claire Flats
About the same time or shortly after, the British Association of Science will hold its annual meeting in Toronto, and there is to be a visitation of members of the American Association and a general interchange between the members of both associations. The meeting of this year promises to be full of interest to all who are able to attend.
preparing for civil service examinations.
The recent action of President McKinley, requiring emovals to be for cause only after proper examination of complaints in a large number of positions under the government, gives greater importance to the matter of civil service examinations, the whole scope of which is yet but partially apprehended by the general public. The qualifications required and the nature of the ques tions to be asked of one who desires to qualify for any of the offices which have thus been opened to public competition may be learned without difficulty, but in large numbers of cases the applicant does not realize the absolute necessity there is of proper preparation until he fails to pass the examination. The National Corre spondence Institute, of Washington, D. C., organized in 1893, undertakes to prepare applicants for examination on the correspondence plan, in this way drilling them in just the line of information and knowledge they will be required to possess in any particular place for which they apply. The Institute is conducted by a combination of specialists familiar with the classifications made in the different departments of the public service, and its scope is so extended that it undertakes even to prepare applicants for examination for the position of examiner in the Patent Office. The position is not an easy one to obtain, the examination embracing physics, technics, mathematics and mechanical drawing and chemistry, but the course of instruction by correspondence, as carried on by the Institute, is arranged to prepare an applicant for this as well as any of the other numerous positions open to public compe of the
tition.
the automobiles race in france:
Under the auspices of the Figaro and the Journa des Sports, the race for automobile vehicles between St. Germain and Dieppe, a distance of 170 kilometers ( 105 miles), was run on July 24 . The weather was splendid and the roads were in perfect condition. The organization of the race was perfect, mounted gendarmes keeping order at the start. Fifty-six competitors were checked at the start alone, and others left at a later hour. Nearly all forms of the horseless carriage were represented, and some of them carried as many as six passengers. The race took place under the most successus conditions throughout the whole ength of the
course. Crowds of people eagerly waiting for them were at the towns and cities through which the vehi cles passed. The start was made promptly at nine o'clock, and the competitors were expected at Dieppe
any time after one o'clock. Unfortunately, the special train which left St. Germain at the same time as the
automobiles only arrived twelfth at Dieppe, the engine automobiles only arrived twelfth at Dieppe, the engine breaking down beyond Rouen. As might naturally be expected, the motorcycle arrived first, that of M. Jatin reaching Dieppe in 4 h .13 m .33 s . The motorcycle of M. Pellier arrived 4:43:55. The first horseless carriage to arrive was that of MM. De Dion et Bouton, which arrived in 4 h .18 m .34 s . The second to arrive was the carriage of M. Gilles Hourgieres, the time being 4:36:00. M. Gilles Hourgieres wins the first prize for carriages of two seats and MM. De Dion et Bouton won the prize or the carriage with four seats. The race was free from incidents and there were no accidents of any importance. The Paris-Dieppe race of 1897 is considered to be the most successful one which has ever been held. This is largely owing to the excellence of the arrangements in regard to the race.

## prof. libbey conquers the mesa

In our issue of June 19 we described the preparations which Prof. William Libbey, of Princeton University had made to scale the "Mesa Encantada," which is near the Indian village of Tacoma, in New Mexico Prof. Libbey was entirely successful in his efforts and reached the top of the famous height. By means of a $21 / 2$ inch brass cannon he succeeded in throwing a cord over the crest of the Mesa, and by means of this cord the ropes required in making the ascent were pulled up. Fifteen hundred feet of rope was required to reach from one side to the other, and when all was in readiness a traveling block was attached to the pulley which had previously been spliced to the main rope, and pulled up to the edge of the overhanging ledge. A chair was then rigged on the traveling block and it was filled with pieces of rock which equaled the weight of a man. This was then sent up to the crest of the ledge, and the experimental trip was found to be entirely successful. Prof. Libbey then took his place in the chair and was raised to the top of the Mesa. All that was found at the top which indicated that it might have been inhabited was a monument of rocks which looked as if it were erected by man. With this exception, there were absolutely no indications that it had ever been inhabited, so that there is now authoritative proof that there is absolutely no ground for the romantic legends which have always clung about this nysterious table land.

## the curious death of a whale

The white whale which was brought from Canadian waters to the New York Aquarium on June 5 died on July 24, of œdema of the lungs. On July 23 one of the keepers noticed that something was wrong with the whale, as he was attracted by the loud wheezing that accompanied each blow the whale made when he came to the surface for fresh air. It was thought that the lungs of the whale had become diseased, but it was afterward found out that some foreign substance had got into the blowhole, and one of the keepers found a piece of eel floating on the surface of the water. The true cause of the whale's trouble was then found. It was discovered that a piece of an eel was hanging from the blowhole. The water was at once drawn off from the tank, but this did not save the whale, which died in the evening. The whale's blowhole was examined after his death, and what appeared to be part of an eel was found protruding from it. One of the men started to pull this out, and he pulled until he got to the end of an eel about two feet long, which had become par tially digested in the whale's stomach. The eel was preserved in alcohol.
A whale is obliged to come to the surface every ten seconds to blow. There is a valve in the blowhole which works very rapidly as the whale exhales the im pure and inhales the fresh air. The whale Seltzer took the whole eel into the air passage, thus preventing the air valve from closing tightly. By continued wheez ing he pushed more and more of the eel upward, thu opening the air valve wider. Finally the valve becam so open that the water rushed in and flooded the lungs,
and Seltzer drowned. and Seltzer drowned.

## PULUJ'S PHOSPHORESCENT LAMP.

Puluj, the Austrian scientist, some fifteen years ago invented what he called a phosphorescent lamp, but, as it seemed a sort of imitation of Crookes and Geisler, it did not attract attention. He has, however, been pushing forward with the idea. The lamp is lighted by means of an induction coil or a glass plate electric
machine. The static electricity thus produced is the same in every respect as lightning. The lamp can be operated even though only one terminal of the induction coil (the negative pole, for instance) is con nected to it. The lamp itself is shaped very much the same as an ordinary Edison incandescent lamp, excep that the wires leading into the lamp do not extend up the neck from a socket. They extend directly through the side of the bulb. They are made of aluminum The negative pole of cathode ends in a small reflector
shaped disk. Hanging from the point or apex of the shaped disk. Hanging from the point or apex of the
lamp globe is a small square sheet of mica. The piece
of mica faces the reflector disk or negative pole, and is painted with sulphide of calcium, an extremely phosphorescent substance. When the negative pole of the lamp is connected with an induction coil, the current is, as it were, concentrated by the little disk in the lamp, and a stream of radiant electricity flows from it to the painted sheet of mica, which immediately glows with an intensely brilliant phosphorescent light. This is Puluj's lamp as it is at present, but $i_{i}^{i}$ is not, in its present stage, available for general lighting purposes. Puluj is experimenting with a view to arriving at a solution of this problem. He is carrying on a series of investigations to the end of producing a chemical lighting system. Not the production of light through the consumption of chemicals, but, as far as can be learned, the development of ethereal light vibrations by chemical means.-Photography

## THE PARTHENON INSCRIPTION DECIPHERED

Mr George S . Horton, United States consul at Athens, Greece, has just transmitted to the State Department at Washington a most interesting report regarding the deciphering of an inscription on the architrave of the east end of the Parthenon. The face of the eastern architrave is thickly dotted with small holes, and for many years scholars have been under the impression that these holes were the traces of nails which had once held fast the letters of an inscription. It had also been suggested from time to time that a study of the nail holes might give some clew as to the letters themselves, which long ago were torn down, doubtless for the sake of the metal which they contained.
The difficulty of such a task, which has defied the archæologists until now, is at once evident. The architrave is about 100 feet long, and the holes extend over 90 feet of its length. They dot thickly spaces from 3 to 4 feet in length, between which are circular blanks, where shields about 4 feet in diameter hung at fixed intervals.
Various attempts have been made, chiefly by German archæologists, to read the nail holes. The most notable of the methods employed have been photography and transcribing with the aid of magnifying glasses No attempts met with any success until Eugene Plumb Andrews, of the American School of Classical Studies at Athens, hit upon a practical method. He threw a rope over the eastern end of the ruined building and pulled up a rope ladder. Then he suspended a swing in front of the architrave 37 feet from the marble step below, and took what is known as a "squeeze" of the holes. His method was ingenious. Damp "squeeze" paper was first applied to the surface of the stone and patted well down with a brush. The paper broke through over the holes. Mr. Andrews then poked ex tra strips into each of the openings and lapped their ends down on the large sheet. When he had thus treated all the holes, he laid another sheet over the first, to hold the ends of the strips in place, and pounded all together into one solid sheet, on which th exact position of the nail holes was represented by pro tuberances or nipples. The time required in making these squeezes, twelve in number, was about one and a half months. The twelve squeezes represented the twelve spaces between the shields. He then arranged them in order and began studying. His greatest diffi culty occurred at the start, for the reason that he did not know whether the inscription ran straight across all the squeezes or whether the squeezes were to be read separately, as the pages of a book. Moreover, the ancient workman who had nailed up the letter had made numerous mistakes, so that many of the holes were treacherous and confusing.

Mr. Andrews, however, persisted and light began to dawn. He found, for instance, that three holes placed thus. • indicated either a $\Delta$ or a $\wedge$ the metal letter having been nailed at its three corners, and that three holes placed thus • • showed where an O had been nailed He made a transcript of the squeezes on a long strip of paper, marking the locality of the protuberances with dots, and then attempted to form the ancient letters by drawing lines from dot to dot. Finally he deciphered the word "Autokratora," which proved that the in scription had been Roman, and not, as formerly sup posed, of an earlier date. The word "Nerona" threw further light on the matter. Here was evidently the dedication of a statue to the Emperor Nero, and the reading was simplified by a study of other similar inscriptions, as the same phraseology is used in all, much the same as in modern legal language.
The inscription translated is substantially as follows
The council of the Areopagus and the council of the 600 and the people of the Athenians erect this statue o the very great Emperor Nero Cæsar Claudius Sevasto Germanicus, the Son of God, during the generalship over the hoplites for the eighth time of Claudius Novius, the overseer and lawgiver, son of Philenous, during the priestess-ship of - , daughter of --
It appears, therefore, that the inscription recorded the erection of a statue to Nero, probably in the Par thenon. As it is known from another inscription that Claudius Novius was general for the eighth time in the Claudius Novius was general for the eighth time in the
year 61 A.D., we have the exact date of this inscription.

The illustration represents a folding chair whose back is a continuation of one of the legs, the parts being adapted to be folded and carried after the manner of a walking stick, as shown in the smaller figure. The chair may thus be taken into a railroad car or in a crowd of people much as a cane or umbrella would be carried, or $i \stackrel{1}{2}$ may be borne on the arm by a loop in its back provided for that purpose. It has been pa-


## hortman's folding chair

tented by John H. Hortman, of No. 323 Rutherford Avenue, Trenton, N. J. The leg forming the back is triangular in cross section, and the other two legs are pivoted on its side faces. The seat is formed of netting or a flexible fabric attached to a marginal rope or cord whose ends are secured in the back leg, and at two side faces of the latter, near the bottom, are studs or projections which engage the other legs when the parts are folded together.

## a ROCKING CHAIR WITH FAN aNd mUSIC BOX.

The illustration represents a rocking chair provided with an air-compressing device adapted to deliver a current of air for cooling the occupant of the chair, for sounding a music box or for any purpose for which compressed air may be applied. A patent has been granted for the improvement to Charles J. Michaelson, of No. 5 Elmwood Avenue, Charleston, West Va. Beneath the chair seat are two bellows, having the usual valves, and discharging into a receiver above, the lower portions of the bellows being extended to form arms with rollers which run on a bar beneath the chair, the bar having upwardly inclined ends, and the arms being normally depressed by springs. As the chair rocks, therefore, the air is forced into the receiver, from which a tube leads into a small compressed air reservoir at the top of the chair back, and in this reservoir is a passageway with reeds and adapted to be used as a music box. The music box is operated in the usual way, and is covered by a sheet of perforated paper wound on rollers, one of which has a pulley operated by a belt from a pulley which carries a fan, upon which air is discharged from the reservoir. The music box


MICHAELSON'S ROCKING CHAIR
may be detached, if desired, and the blast of air be turned directly upon the occupant of the chair. The compressed air may, otherwise, be conveved by tubes to any point where it is desired to use compressed air for other purposes.

Driving away mice from infected cellars is said to be successfully accomplished by woolen rags soaked in oil of turpentine and placed in front of the holes by which mice enter.

## Flying Without Wings.* by c. f. holder.

One of the most interesting sights one observes in Southern California waters is a flock of flying fishes in the air : not one or two, but often fifty or one hundred, ten or twenty feet from the water, lifted by the wind and whirling away like quail or a flock of insects, scintillating in the sunlight-a startling picture. The fish appear to be flying, but they are simply one variety of many animals which apparently fly without wings. The writer has had these fliers pass within a foot of his face, and has known several persons who have been struck by them ; but while the fishes dash through the air and cover distances of an eighth of a mile out of water, they are not strictly fliers, as they have no power to move the wings, as in legitimat flight. The wings are merely enormously developed fins, the pectorals resembling wings, with powerfu branches or veins, the anals being smaller. The fish, then, has not four wings in the strict acceptation of the word, but four wing-like fins which it holds firmly, and which serve as sails or parachutes, bearing it up against the current which it forms as it rushes along. In this way these fish fly or soar for long distances.
In the Gulf of Mexico there is a fish known as the flying gurnard, a really magnificent creature, which bounds into the air when alarmed, spreading its wide pectoral fins and darting away like some gorgeous insect. It has vivid colors of blue, purple, and red, while its large winglike fins sparkle and gleam in the sun as though they were inlaid with gems. This flier possesses a singular armor, its head being incased in bone, so that a blow from the fish in its headlong flight through the air is liable to result seriously. There are instances
known of men being knocked down and stunned by known

Certain fishes have the faculty of propelling themselves into and through the air in other ways. Such is the large gar of the South Pacific, which, when alarmed, bounds from the water by a twist of its tail and goes whizzing away, a living arrow and a dangerous one. When the ship Challenger made her famous trip around the world the naturalists on board had many opportunities to observe the flier with out wings. One struck the cap of an officer and several instance came to the notice o the naturalists of fishes which had struck natives who were wading in the water, inflicting fatal wounds.
The most perfect flier without wings are found


## the mallinckrodt Nicotine absorbent tobacco pipe.

among the mammals and reptiles. One of the lizards
has a peculiar frill connecting its limbs; this frill is braced by a series of false ribs. When the lizard wishes to escape from some enemy, it darts into the air and soars away downward, upheld for a long distance by the side wings, which are boomed out by the false ribs. The little animal now resembles a large dragon fly, its rich metallic colors and tints flashing in the sunlight On it rushes, making a graceful curve, rising and grasping the trunk of a tree, when it seems to dis appear, so close is the protective resemblance. If stil followed by some bird enemy, it will repeat the action continually dipping down and rising, ultimately escaping.
The flying squirrel well illustrates this curious faculty of soaring like a bird. Its fore and hind limbs are connected by a web of flesh that hangs in a wrinkle when the animal is at rest, and would not be noticed; but the moment the little creature darts into the air and moves away, the pure white parachute, winglike ar rangement is seen. It catches the wind or rushing air as the squirrel bears down, and seems to expand and extend outward, taking the little flier safely up ward, and enabling it to cross long distances and reach another point of vantage.
The flying lemur is one of the largest and most re markable examples of this device of nature. Here not only are the limbs connected by a web, but the tail and hind legs are booms for a fleshy, furlined sail, so that the lemur, with its young clinging to it, leaps boldly into the air and darts away, swooping down with great velocity, rising again to grasp a branch or trunk, to rush to the topmost bough and launch itself again into space. In this way a lemur will, if followed per sistently, cover miles in a forest, and as a rule escape its enemies. The grace, ease, and facility with which these flights are made is more than remarkable. The animal has but to extend its limbs, as one intuitively - Jes in diving or swimming, and plunge down into space.
The islands of Sumatra and Borneo have produced some remarkable fliers of this kind. A party of explorers in passing through a forest one day saw what they supposed to be a bird swooping down from a
sorbed by the blotting paper. When the paper tube becomes saturated, which may be in from one to three weeks, according to the practice of the smoker, a new tube is inserted, which may be done without soiling one's fingers, thus cleaning and renovating the pipe A package of tubes is furnished with each pipe, and fresh supplies may be obtained as desired. Eminent physicians recommend this improved pipe as taking away from smoking its most deleterious effect and ren dering it a harmless enjoyment.

## Transparency of Ebonite

In a note to the Academie des Sciences, of Paris, las April, M. Perrigot showed that plates of ebonite are ransparent, and that the phenomena attributed to what M. Gustave le Bon calls "black light" are ex plained by the fact of photographic inversion. Since the above date $M$. Perrigot has resumed these researches, in surrounding himself with the minutest precautions, with perfectly polished plates of ebonite 0.5 mm . in thickness and with Carbutt films. The ebonite appeared to act after the manner of a colored screen. If, in fact, we examine a thin plate of ebonite exposed to an intense pencil of white light, the eye perceives a feeble light in which orange red radiations prevail. In resuming the experiments described in his first note, but in making use of orthochromatic plate particularly sensitive to red and yellow, M. Perrigot always obtained the same results, but notably more marked. He adds that plates 2 mm . in thickness do not appear transparent to the eye, but that they still transmit the photographic impression, particularly when plates sensitive to red are used. Besides, if the author's first experiments are repeated with plates o ebonite 2 mm . in thickness, and an intense light, such as that of the sun or of electricity, be employed, the same results, either inverse or direct, are obtained, ac cording as the photographic plate has or has not re ceived a previous exposure.
The conclusion reached by M. Perrigot is, according to him, in perfect concordance with the experiments described by M. H. Becquerel in a recent memoir, in which the author speaks of M. Le Bon's "black light" as the "pretendue lumiere noire" due to radiations the principal properties of which have been well known for fifty years.

## THE MARVIN SEISMOGRAPH by emma v. triepel

Resting upon a square stone firmly embedded in the floor beneath the southwest corner of the main building of the Weather Bureau's headquarters at Washington, D. C., is a seismograph, the only instrument in the United States by which the time and duration of earthquakes can be recorded.
This machine may be described thus: A heavy lead


## THE MARVIN SEISMOGRAPH

weight, W, is pivoted to a short steel link, A, by means of a screw, $b$, the sharp point of which is just above the center of gravity of the weight, so that the latter will balance and remain stable on the pointed support. The top of the link hangs from a small projection from the frame of the instrument, $B$, being held in place by a second sharp pointed screw. A slender flexible needle, $f$, about six inches long extends straight upward from the topmost edge of the link, and its platinum tipped point normally passes exactly through the center of a platinum rimmed hole in an insulated metallic plate which is held stationary with the frame of the instrument.
One pole of an electric circuit connects with the needle at the pivot, and the opposite pole is fastened to the metallic plate. A seismic shock causes the needle tip to strike the platinum rim of the above mentioned hole, thus completing the circuit and being transmitted to the recording instrument in another building.
This register is a revolving cylinder which moves by clockwork and makes one revolution every six hours. A broad band of paper cross ruled with heavy hour lines, between which the space is subdivided by finer five minute lines, passes around the cylinder. Pressing against the moving paper ribbon is a small arm, tipped with a fountain pen, which is so controlled by the clock as to make a spiral line upon the recording sheet for seven days, without changing. The clock, which keeps standard time, is connected with the arm in such a manner that the pen is made to move every hour. thus making points in the otherwise even line. An electromagnet on the base of the register, which is connected with the pen arm, is connected electrically with the seismograph; when, therefore, the circuit is closed by the needle being jarred from its normal position so as to touch the platinum rim, the vibration is indicated by offsets, in the spiral line, between those regularly made The time of such disturbance is ascer tained by counting the hours since the revolution began, as indicated by the points regularly made, then the five minute lines exceeding the last hour point, and then applying a delicately graduated scale for the seconds and fractions thereof. Finally, any error in the clock which drives the cylinder is determined by comparison with a pendulum clock which is regulated by telegraphic signals from the Naval Observatory. The duration is indicated by the number of successive


A HORSELESS BROUGHAM
driver's seat and is operated by a small lever with the left hand, it being arranged so as to permit of three speeds ahead and one back. The carriage is elegantly finished and has luxurious fittings, and weighs very little more than the horseless hansom cab.

## Superstition of a well-Known writer

There are many persons who have a superstition regarding figures, and who believe in their influence, good or bad, upon the events, important or unimport ant, of their existence. The eminent writer, M. Emile Zola, is numbered among such. Quite recently, while he was going down Rue de la Chaussee d'Antin, at Paris, he was knocked down by a hack, which passed over his legs, without, fortunately, doing any other


## SEISMOGRAPH RECORDER.

damage than bruising him. M. Zola has a superstitious horror of the number 17. This number is to him unlucky. After he arose, he looked at the number of the hack, added up the figures in a flash, and found the total to be 17. The great writer had, for a long time, held the belief that the number 17 had a malign influence upon him, and that aggravated the case.
Dr. Tolouse has recently devoted a volume to a study of M. Zola, in which he character, temperament, and the very sources of the illustrious writer's talents are analyzed with all the resources of psychology and physiology. On pages 251 and 252 of this book, the author says
"Thus, certain figures have a bad influence upon M. Zola. If the number of a hack, when added up, forms this figure, he will not engage the vehicle, or, if he is obliged to do so, wili fear that some misfortune may happen to him. For example, that he may not succeed in the business that he has started out to do. Such superstitious idea may supervene apropos of any of his arithmomaniacal impulses. For a long time the multiples of 3 appeared favorable to him; but now it is the multiples of 7 that reassure him. Thus, in the night, it often happens that he will open his eyes seven times in order to prove to himself that he is not going to die. On the contrary, the number 17 , which recalls to die. On the contrary, the number 17, which recalls to
him a sorrowful date, seems to him to be unlucky, and chance has ordained that he should re cognize a coincidence of certain unfortunate occurrences with thai date. Similar superstitious ideas exhibit themselve outside of all arithmomania. Thus, he will perform certain acts with the idea that, if he does not do so, some annoy ance will happen to him. So he will touch the gas burners that he meets with in the streets, surmount an obstacle with the right foot, walk upon the pavement in a certain way, etc. For a long time he feared that he would not succeed in the proceeding that he was going to under take unless he started out of the house with his left foot foremost." - La Vie Scientifique.

The American X Ray Journal is a monthly journal devoted to practical X ray work and allied arts and sciences The June issue contains a number of interesting radiographs, but we regret to notice a newspaper story about an English lady who lost her diamond ring in the dough of a cake. She did not dis cover the loss until the baking was com plete, and rather than sacrifice her pro duction or run the risks of having her guests swallow her ring, she sent the cake to an X ray studio, the ring being located by the shadowgraph without spoiling the form of the cake, and the extraction was readily accomplished. This very improbable story undoubtedly origi nated in the brain of some reporter.

## The Number of Physicians and Me <br> An interesting statistical article on the medical col-

 leges, physicians, etc., of the United States, based on the last edition of Polk's Medical and Surgical Register and the census of 1890 , appears in the Virginia Medical Semi-Monthly of recent dateAccording to the above authority, the ratio of physicians of all kinds in the United States is about one to six hundred and thirteen of the population. This estimate is based on a population of sixty-five millions, and one hundred and six thousand of the physicians are thought to come under the head of "regular," while twenty-six thousand represent the eclectic, homeopathic, physio-medico, and other sects, together with professional quacks and irregulars in general. They are distributed throughout the Union in the various States and Territories as follows


The medical schools number about one hundred and seventy-five. Of these one hundred and twenty are regular, nineteen homeopathic, seven eclectic, two physio-medico, and twelve unclassified. Eight are for women specially; five of these being regular, two
homeopathic, and one eclectic. In eight of the other homeopathic, and one eclectic. In eight of the other
colleges women are permitted to matriculate, and four are exclusively for colored people.

## Statistical Research and Methods.

The Royal Statistical Society held the first meeting of the session 1896-97 in the theater of the Royal United Service Institution at Whitehall, London, November 17, when the inaugural address of the president, Mr. John Biddulph Martin, on "Some Developments of Statistical Research Methods During Recent Years," was delivered.
It was pointed out, says the Colliery Guardian, that the existence of the society was practically synchronous with the duration of her Majesty's reign. Ample material was now available for statistical treatmen which at the commencement of that period was non existent. Among subjects of this kind might be men tioned the statistics of railway locomotion as well as the statistics of steam tonnage, which last had fur-
nished matter for papers covering a space of four decennial periods, contributed to the society by Mr . John Glover. Electric locomotion was already beginning to furnish matter to be dealt with statistically, and it was impossible to say what might be the result during the next sixty years of the application of science to the service of man. It was conceivable that by that time some of the problems of aerial navigation would have been solved. Even the art of cycling, usually regarded as a pastime, was already beginning to exercise an economic influence. It was for the statistician to discriminate between the ephemeral phenomenon
and the inception of an aconomic movement, and to
present essential facts in a well digested form for the consideration of the economist.
Passing to the more limited period during which Mr. that he would be justified in the society, he thought a resume of the information which he had been enabled to collect by the kindness of numerous correspondents abroad, whom he wished specially to thank. He then proceeded to show the increased attention which had been devoted, both at home and abroad, to statistics under the following heads : (1) The increased attention bestowed on the collection of statistics by various govermments; (2) the increased pursuit of statistical inquiry by private societies, whether, as in some cases, purely statistical in their aims, or, as in others, politicoeconomic ; (3) the increased attention given to education and training in statistics, either at the initiative of government or at that of independent educational bodies. The information furnished to him showed that under all these three heads a marked impulse had been given to the pursuit of statistical inquiry. It could not be denied that the numerical method of statistical inquiry as applied to social and economic phenomena was an implement of the highest value and the most delicate temper. It was for statisticians to see that it be not used in any but a strictly workmanlike manner. Cases had occurred in which it had been willfully misused; misuse through carelessness was more frequent, and an imperfect statement of facts had in many cases led to divergent views on certain social problems.
Reference was made to the paper contributed by Monsieur A. de Foville to the jubilee meeting of the society, on the subject of "Statistics and its Enemies." Among such enemies were the laborious compilers of figures which were of no value when obtained. The statistician, so called, who aimed at minute accuracy in figures which it was impossible to estimate save approximately, was another of such enemies. A third class was composed of those who were ready to state in absolute figures the quantity and value of the imports and exports of Central Africa, or the tonnage statistic of Timbuctoo. Of faulty or fraudulent statistical re turns willfully made there was nothing to be said.
They not infrequently led to their own detection. It was through extravagances of this kind that Monsieur Thiers defined statistics as the art of stating in precise terms things which one does not know. The true statistician, if he would be justified of his pursuit, must learn to discard the superfluous, the imperfect, and the false, and to come under the definition which des
The next portion of the address
Thic method of statistics with phic method of staing statistical totals by the various forms of expressing statistical totals by geometrical
figures, accompanied in some cases by the employment of colors. It was to be regretted that the use of the graphic method, which had sprung up automatically, had not been developed on any conventional lines. Were the employment of particular graphic forms invariably applied to the exposition of the same phenomena, and if this conventional agreement could be made international, the interpretation of statistics graphically presented would be vastly facilitated, and might also serve to exchange ideas more efficiently than the illusive Volapuk, of which so much had been expected and by which so little had been achieved
Reference was next made to the application of the higher mathematics and the laws of probability to the elucidation of statistical problems, and, next in order, an historical account of the development of the idea of index numbers was given. The most recent inquiry into this elaborate subject had been made by a very strong committee, consisting entirely of members o the Statistical Society, appointed at the British Asso ciation of 1886. This committee had held frequent meetings, and had reported annually until 1890 . The abors of the committee resulted in a draft proposa for a government commission, which should watch and record the fluctuations in prices, and publish at fre quent intervals an adjusted standard of value. It was, however, doubtful whether public opinion was yet over a series of years. While the committee on index numbers aimed at establishing, on a sufficient series of individual averages, one comprehensive average of the price of all commodities, it was sufficiently difficult to stablish a simple average. One eminent statistician aised a voice of warning against large figures; another warning voice bade " beware of averages"! The ques tion of averages had been under the consideration of
the society on more than one occasion. The difficulty of allowing for all disturbing elements was admitted.
In conclusion, the president said that he was not ashamed to confess that the scope of statistical inquiry as essentially utilitarian. The papers read before the ociety from time to time must not be considered as limited to the exposition of the problems with which hey dealt, but their ultimate object was to show how the body politic would be affected by the advance of ndustrial enterprise or applied science. Abstract sci ence, save as it bore on the improvement of the human
rian aims of the society had been placed on record in an eloquent passage of the presidential address of the late Dr. Guy. Dr. Guy's views still held good. No improvement in the condition of society could be hoped for as long as the essential facts which make it such as it is at any point of time are imperfectly known or inadequately appreciated. It was for society patiently to investigate essential facts, not to be led astray by any incomplete data or preconceived theories, but to keep a true balance, and to give proper weight to all concomitant circumstances or countervailing influences. Truth must be followed fearlessly wherever it might lead. It must be the object of the fellows of the society to hand on to their successors the torch of knowledge that had been intrusted to them by those who had gone before, and to maintain in the future the prestige which had been deservedly won in the past.

The Number of Living Animal Species.
For the benefit of the curious, as well as the zoological student, the following table, from the American Naturalist, gives the census of the animal kingdom as known in the years 1830,1881 , and 1896. The first two columns are taken from a note by A. Günther, in Annals and Magazine of Natural History, and the last from a note in the Zoologist. The last was compiled in February, 1896, by the contributors to the Zoologica Record.

|  | 1830 | 1881 | 1896 |
| :---: | :---: | :---: | :---: |
| Mammalia. | 1,200 | 2,310 | 2.500 |
| ${ }^{\text {Aves. }}$, ${ }^{\text {depa }}$ | 3,600 | 11,000 | 12,500 |
| Reptilia.. | ${ }_{100}^{443}$ | 2,600 | \} 4,400 |
| Batrachians | 3,500 | 11,000 | 12,001 |
| Tunicata......... ............ ......... |  |  |  |
| Mollusca.. | 11,000 | 33,000 | 50,000 |
| Brachiapoda.. | . |  | 150 |
|  | 1,290 | 780 | 20,000 |
| Arachnida. | 1,400 | 8,000 | - 10,000 |
| Pycnogonida | 450 | 1,300 |  |
| Protracheata... |  |  | 3,000 |
| Hexapoda. | 49,100 | 220.150 | 230,000 |
| Vermes.... | ${ }_{230}^{412}$ | ${ }^{6,090}$ | ${ }_{3}^{6,150}$ |
| Ccelenterata.. | 500 | 2,2n0 | 2,000 |
| Spongix............ .............. 1835 | 50 | ${ }^{409}$ | 1,500 |
| Protozoa. | 305 | 3,300 | 6,100 |
|  | 71,588 | 311,553 | 366,000 |

## The Polar Problem.

A discussion took place at a recent meeting of the Royal Geographical Society on the North Polar pro blem. Sir Clements Markham, president of the society who occupied the chair, introduced the subject in a comprehensive address. He was disposed to regard the whole line of heavy ancient ice pressing upon the shore of the American continent, of the Parry Islands and of the northern side of Greenland as evidence of a continuous drift from the eastern to the western hemi spheres, across an ocean uninterrupted by land of any magnitude. The presence of warmer water in the depths of Nansen's polar sea was an important discovery. It commenced 100 fathoms below the surface and extended down to 250 fathoms. There was still much to be learned. An expedition should be sent up to Jones Sound to connect the 400 miles between Prince Patrick Island and Aldrich's farthest, and to xamine the line of ancient ice in that unknown region Another expedition should complete the examination of the northern side of Greenland. A third, equipped on Nansen's plan, should commence the drift much further to the eastward, and pass over the Pole itself. This would probably occupy four years, but it would bring a further installment of knowledge respecting the depths of the ocean, the current, and temperatures of the vast unknown area, and another series of mag netic observations. It should also decide the question f the existence of land between Prince Patrick and Wrangel Islands
Dr. Nansen, opening the discussion, said they could have great certainty in saying that the Pole must be situated in the deep sea basin. He thought perhaps here were some small islands to the north, where the ice drift closed in from time to time in order to get into the layers which were noticed. If it did not form into ayers somewhere, he did not think it would take such time as it did to drift across the polar region. The oldest ice he saw in the polar region was probably of five or six years of age. The ice which he saw was on an average from ten feet to twelve feet deep, and he did not believe the ice of the polar sea would freez any thicker. He did not think it was difficult to reach the Pole itself. If they cared for it, they could reach it in ne summer. If they took 200 dogs , they could reach it quite certainly, but he did not think it was worth while he could not see the importance of it, for they would not bring back sufficient observations, and it would be a waste of time and labor. If they wanted scientific observations from the Arctic regions, there was no bet ter plan than the one he adopted-of going into the ice. The ship was an excellent observatory. Sir J. Hooker, Sir Leopold McClintock, Sir G. Nares, and other speakers followed.

## Sorrespondence.

## Conversion of Knots to miles.

To the Editor of the Scientific American
Having experienced difficulty in appreciating distances given in knots, in the many allusions to maritime matters in the newspapers, your correspondent set to work to find a simple rule for converting them into miles. So far as he knows the following method has not appeared before, and it may interest some of your readers.
To the given number of knots add one-tenth and one-half of one-tenth of that number, and the result will be the number of miles very nearly. For example: Let the given number of knots be 20 , then $20+2+1=23$ miles. If the exact distance is required, add 8 feet for each mile. Thus the exact distance in the example is 23 miles and 184 feet.
miles and 184 feet. Wm. W. Blackford.
Lynnhaven, Va., July 14, 1897.
[To convert knots into miles, multiply the knots by 1•1516.-Ed.]

## Prolific strawberry Growth.

To the Editor of the Scientific American
As you sometimes publish notices of things extraordinary in horticulture line, I send you a photograph of some berries which I raised this spring. They are known as the "Bowker." The cluster contains sixteen matured berries and two that were not; the center berry of this particular group measured seven inches in circumference. I picked one larger than this. It measured eight inches in circumference. It was a common thing to pick berries all through the patch that measured five and a half and six inches. Unlike most large berries, they are solid, sweet and fine flavored, also fewer seeds they are solid, sweet and fine flavored, also fewer seeds
than most berries. I took great pains in making the bed on which these berries grew. Last July I took one thousand two and a half inch flower pots to my old bed, set them in ground flush with surface and filled them with native earth. I then laid the runners on top, securing them by placing small stones or chips, whichever happened to be the handiest. About the last of August I took a pair of scissors and clipped them from the parent vine. I then took up the pots and carried them to where I wanted to plant them. After first wetting the ground, I dug a hole sufficiently large to place them, then tapped the bottom of the pots. There was a solid ball of roots in every pot. After placing the roots in the ground I packed the earth solidly around them. The plants never showed any evidence of the change. About the first of December I covered all the plants with a good coat of stable manure. I would also state that, before I placed plants in ground, I sprinkled about a tablespoonful of bone meal around each plant.
I have raised a great many berries, but never saw so many grown on one stem before. I send you a photograph of the largest of them.
C. F. Currie.

The Psychic Influence of the Night Season.
Dr. A. B. Richardson, of the Columbus State hospital, Ohio, contributes an interesting article on this subject to the October number of the American Journal of Insanity, of which the following is the substance, says the New York Medical Journal.
The diurnal alternation of night and day is not without interest in its psychological influence upon the human race. The ebb and flow of energy that it represents is an element of vast importance in our existence. Day is the period of active energizing, night that of repose and recuperation. In the former there is a state of elevation, a natural confidence and a willingness to undertake whatever responsibility may present itself. In the latter there is just as truly a natural depression, a timidity and cowardice in confronting the obstacles in our path.
The accumulated inheritances of countless ages through this ever-recurring elevation and depression have stamped this wavelike characteristic upon every mental operation. The ebb and flow in mind activities is universal. It permeates every form of psychic energy. It gives coloring to our emotional states. It is seldom that in any individual, or at any time, we find an accurate ideal equipoise. We are either in a
state of exaltation or of depression, either too confistate of exaltation or of depression, either too confi-
dent and self-reliant, with vision too highly colored and enthusiasm too much exalted to be justified by the circumstances of our environment, or we are in the opposite condition of depression and timid coward ice, with little confidence in our pown pathway. Even when this becomes impersonal and is crystallized into the energy of nations, the same tend ency is seen. One extreme of opinion almost invaria bly follows another. The pendulum of thought and psychic energy forever swings first to one extreme of its movement, then to the other. The world is appar ently unable to calmly and deliberately maintain a correct status in opinion or practice. It is either too credulous or too suspicious, too indulgent or too in
to find cause for criticism and disbelief. How far this oscillation between antipodal points depends upon or is influenced by the diurnal withdrawal and return of the solar influence, says Dr. Richardson, is possessed of more than merely curious interest. It worthy of a few moments' time and study
Night is the withdrawal of the light and heat of the sun. No amount and no intensity of artificial illumination will replace this withdrawal. In spite of all the artifice and invention of man, night still reigns supreme. No matter how much we may attempt it, we cannot turn night into day. Although we may supply light and noise and the stir and bustle of day, it is still night. The tendency toward repose and a letting down of the armored guard that the activity of day brings with it are still there.
There is an element of timidit
There is an element of timidity and fear in our organization that is greatly enhanced at night, and this may largely account for our increased credulity at that time. Our belief is born of our fears. How many physicians are there, he asks, who cannot bring proof of this? Many of their night calls are due to the greater uneasiness of the patient or his parents or friends on the approach of night. They are affrighted then at symptoms that would not alarm them during the day, and hasten to send for the physician to relieve them of the fears that night itself has seemed to bring to them. Again, in many cases of illness there is an actual exacerbation in the symptoms with the approach of night. This is notably so in children. This may have a double origin. It may be due to the increased timidity of the individual at that time, and a conse quent increase in the subjective sensations of the disease, and it may be due, at least in part, to the natural letting down of the power of resistance of the organism that we believe does occur during the night. Whatever may be the explanation, says Dr. Richardson, the fact is indisputable, and there is not a mother who does not dread the approach of night when her child is seized with a dangerous illness.
A still more interesting fact is the influence of the night season over moral attributes. There is a letting down in this direction which is very similar to that seen in the field of the emotions. The power of resistance to things evil is then diminished. The very mystery of night is conducive to an expanding of the imagination. There is a sharpening of all the senses that renders every sound clearer and makes every object stand out in greatly heightened distinctness. The sense of hearing is more acute, the eyesight detects objects more readily, the touch is quickened, and the whole being is more sensitive. Whether this is evi dence of weakness, says the author, the hyperæsthesia of nervous exhaustion, or a quickening of every tissue
in its instinctive strife for self-preservation, may be in its instinctive strife for self-preservation, may be
beyond us; of the fact we all have proof in the promptings of our own hearts.
The most dangerous hours of the twenty-four, he continues, to the melancholic are the latter hours of the night. The depression is then greatest, obstacles then seem most insurmountable, and the power of resistance to the suicidal impulse is then least effective. He has often found it necessary to give special instruc tions to attendants in this regard. This all goes to
demonstrate, he says, that the energy of the patient is demonstrate, he says, that the energy of the patient is
at its lowest ebb during the night; that there is then a natural depression and timidity.
What is experienced by the sane, influences also the insane, and obstacles and misfortunes then mount highest in their vision. There is doubtless scarcely a melancholic who does not at one time or another have suggestions of self-destruction, and whether or not they will control him depends entirely on the strength of the suggestion. The particular hour of the night is often sufficient to throw the balance against the poor unfortunate, and in this sense it becomes an
actual exciting cause of suicide.
It is a fact that we should not lose sight of, and the author is convinced that it has its basis in a physiologi cal variation of the organism at this hour. Just as certainly, says Dr. Richardson, as there is a physiologi cal condition of exaltation and sense of well-being, so also is there a physiological state of depression and rritation with our environment. It is not necessary o assume that this implies disease. It does not. It is simply an inevitable reaction, such as is seen in all
physiological phenomena. There is a coming and a going, a rise and fall, a season of joy and a sense of pain, and he is persuaded that the greatest factor that nstituted and enforces this law of Nature is the daily tation and withdrawal of organic life to that source of all life and energy, the solar center. In its presence we imbibe warmth, energy, confidence, life; in its absence we suffer the reaction of coldness, lowered ambition, lack of confidence, and moral cowardicecurious physiological fact and one not without it practical application.

AMONG the portraits recently acquired by the trus tees of the National Portrait Gallery, London, is tha of Sir Francis Ronalds (1788-1873), the inventor of the first working electric telegraph.

An annual meeting of the American Microscopical Society will be held at Toledo, Ohio, on August 5-7, under the presidency of Prof. E. W. Claypole.
The specifications of the new wing of the American Museurn of Natural History, New York City, have been approved by the Park Board, and bids for the building will soon be opened.
Harvard University has conferred the degree of A. M. on Prof. Franklin W. Hooper, of the Brooklyn Institute of Arts and Sciences. Prof. Hooper's great work in the city of Brooklyn is certainly worthy of some recognition
The London Chronicle calls attention to the death rate in many of the model dwellings in that city. In particular there is found in the houses of the Metropolitan Association for Improving Dwellings of the Working Classes a death rate of only $9 \cdot 64$ to 1,000 . The inmates of these houses number 6,430 , and are The inmates of these houses number 6,430, and are
housed in fourteen blocks in different parts of the housed in fourteen blocks in different parts of the
city. This rate is only half the rate for the whole of London.
A note in Cosmos states that Kotz measured the amount of fatigue produced on the eye by different kinds of artificial light, by counting the number of winkings of the eyelids in ten minutes. For the candle he obtained 6.8 per minute ; for ordinary gas, 2.08 ; for sunlight, $2 \cdot 2$; and for the electric light, $1 \cdot 8$. All lighting causing more than three per minute ought to ba rejected. (It is not stated what the eye was looking at when the measurements were made; it certainly could not have been the source itself.)
The Albert medal for the present year has been awarded, with the approval of H. R. H. the Prince of Wales, President of the Society of Arts, to Mr. G. J. Symons, F.R.S., for the services he has rendered to the United Kingdom by affording the engineers engaged in the water supply and the sewage of towns a trust worthy basis for their work by establishing and carry ing on, during nearly forty years, systematic observa tion (now at over three thousand stations) of the rainfal of the British Isles, and of recording and tabulating and graphically indicating the results of these observation in an annual volume published by himself.
Since the application of photography to stellar chart ing, the discovery of planetoids between Mars and Jupiter has gone on apace, upward of four hundred and forty of these bodies having been recognized as such. Of these, M. Charlois is to be credited with the discovery of no less than eighty-eight, five of them during the year 1896, during which nineteen additions altogether have been made to the already overgrown list. With telescopes of the enormous aperture now constructed, and with sufficiently prolonged exposure there seems no particular reason why this number should not ultimately increase very materially.
Indians and animals typical of America are to be perpetuated in bronze for the National Zoological Garden at Washington, if the plans of certain men o public affairs at the national capital are carried out. And Edward Kemeys, the Chicago sculptor, is the artist who is to execute the statues of the fast disappear ing red man and the fauna of America. Congress will be asked for an appropriation for the purpose, and it is expected that that body will respond as generously for the purpose as it has heretofore in the beautifying of the great national park. Capt. Kemeys has returned to his Bryn Mawr residence after a six weeks visit to Washington and is at work on the project.
An interesting discovery from a geological point of view, says Le Génie Civil, was recently made by an explorer in the mountains of Witzies Hoek, Natal. On the summit of an extinct volcano, on the edge of a lake that occupies the crater, soundings revealed a layer of sand inclosing small diamonds. It would be interest ing to know whether these diamonds were there acci dentally, that is, as the result of washing operations carried on by the natives, or whether this discovery corresponds to an actual mine of diamonds, for the hills of Witzies Hoek are not situated in regions known to be diamond bearing. On this last hypothesis, the presence of precious stones in the crater of a volcano would doubtless throw some light on the formation of the gems in nature
M. H. Leman says, in a German technical paper discussing standards of length, that the straight liiie mark on a scale is in reality a trough with inclined sides, the surface of the trough being more or less rough and uneven. In order to define more minutely the distances on a scale, the author adopted the following arrangement : A fine platinum wire, 0.04 millimete in diameter, had an electro deposit of copper until the outside diameter was 1 millimeter. Short pieces of thi compound wire were driven into holes in the bronze body of the scale, and the whole surface carefully polished. In this way the white circular marks wer clearly defined from the body of the scale, the centers of these circles could be very accurately determined by the two parallel wires of the microscope, the distance between the wires being slightly less than the diameter of the platinum wire.

THE $X$ RAYS IN THE CUSTOM HOUSE. The $\mathbf{X}$ rays are winning fresh laurels nearly every day through some new application of their mysterious and irresistible power. The most recent of such applications is the utilization of these inquisitive and all-seeing radiations by the custom house. In the railway stations of Paris, the $\mathbf{X}$ rays have been employed for a week past for examining packages of all kinds and sizes, from small parcels and valises up to trunks and large bales, in order that their contents may be ascertained without having to open them. The experiments are not confined to baggage, for the travelers themselves are inspected, in order to have the $X$ rays reveal any objects that may have been concealed under the clothing. Before long a radioscopic service is to be organized in one of our frontier cities, probably in Bellegarde.
Our readers will certainly not be very greatly surprised to hear about the experiments that are being made by M. Pallain, director of the custom house, a man of learning and progress, who has a thorough dislike for routine; nor will they be surprised either to learn the very satisfactory results given by such experiments. Nearly six months ago we described in these pages, in its minutest details, the method of investigation of which the custom house is now endeavoring to make a happy and supplementary application. The apparatus proposed for the instantaneous inventory of packages are the same as those used for experiments in radioscopy or fluoroscopy. Let us again briefly explain the principle of the method. Let us take a Crookes tube in which a vacuum up to a millionth of an atmosphere has been formed, and let us cause the current of an electric machine (preferably a Ruhmkorff coil) to circula te therein; and let us place before the tube a screen covered with a fluorescent substance, say (to confine oursel ves to the most active materials) platinocyanide of barium or tungstate of calcium. The screen will be immediately illuminated, even when the Crookes tube has been covered with a thick envelope of black paper. This is the fundamental Roentgen experiment. As all the radiations known are incapable of traversing an en velope of blackened paper in order to go far enough to influence a fluorescent substance, it became necessary to suppose the existence of radiations formerly unknown, invisible to us, and capable of passing through obstacles impermeable to other radiations. These are the Roentgen or X rays.
Scientists have multiplied the observations and have found that, as with light, there are bodies transparent to the X rays, that there are others that absorb them more or less, and that there are others again that are opaque to them. But, while with light it has been im-
possible to connect these differences of transparency with another physical or chemical property of bodies, for X rays a sufficiently exact rule has been formulated, viz., substances are so much the more opaque to the $X$ rays in proportion as they are more dense, and so much the more transparent in proportion as they are less dense. Thus wood, a porous body, opaque to light, is traversed by the $X$ rays, while glass, a dense body transparent to luminous radiations, arrests the $X$ rays. If, then, between the Crookes tube and the fluorescent screen we interpose a thin piece of wood or even a box, the latter will arrest but a small number of $\mathbf{X}$ rays, the the latter will arrest but a small number of $X$ rays, the
screen will remain illuminated, and the illumination of


ARRANGEMENT OF THE INSPECTION APPARATUS.
perceive the fluorescent screen, and, upon the latter the shadow of the objects opaque to the $X$ rays, it is essential to operate in darkness. In the full light of the day the feeble glow emitted by fluorescent substances would be extinguished. Nothing is easier, how ever, than to succeed with these experiments in broad daylight. It suffices to fix the screen to a tube of black paper and to look through the other extremity in order to immediately observe upon the screen the appearance f the shadow of invisible objects placed in front of the rookes tube.
Such an arrangement is within the reach of every body. It may be very easily realized by procuring half a dozen objects of everyday manufacture; Ruhmkorff coil, which may be supplied by bat teries or accumulators, a Crookes tube or one of those vacuum tubes designated as "focu tubes," a fluorescent screen and a cornet of black paper.
M. Seguy, preparator at the School of Phar macy of Paris, in inventing his "Human Lorg nette," has merely put this arrangement into a convenient and portable form. As his appara tus has been presented to the Academy of Medicine by Dr. Roux, and as the customs ad ministration is using it in its present experi ments, it appears to us of interest to give a description of it. The human lorgnette, as a whole, is contained in a box, M , of cubical form measuring 24 by 24 by 24 inches and weighing 62 pounds. This box is provided with three compartments, one of which contains four light accumulators, B; another, a special high tension transformer, $C$; and the third the tube that
the part corresponding to the box will undergo scarcely any reduction. If, on the contrary, we interpose a metallic object, the latter, arresting the $X$ rays, will project upon the screen a shadow of which the dimension will depend upon the respective distances of the tube, object and screen, as well as upon the position of the object with respact to the tube and screen. If we place a coin in a wooden box and look at the latter, nothing will apprise us as to the presence of the money, because the wood is opaque to light; but if we arrange the whole between the Crookes tube and the screen, a shadow will immediately appear upon the latter and reveal to us the existence of a metallic object in the box. Finally, if we interpose an object of variable density between the tube and screen, the hand, for ex ample, the fleshy parts of the latter will allow most of the X rays to pass and produce but a slight reduction of the illumination, while at the same time the bones, which are dense, will project a shadow that will detach tself sharply from the screen.
In order to succeed with these simple experiments in
In order these simple exp
produces the $\mathbf{X}$ rays, fixed upon a jointed support that permits of turning it in all directions and moving it along a slide. It is likewise in this third compartment that is placed the lorgnette, L, properly so called, the body of which consists of a bellows similar to that of a camera. One of the extremities of this is closed by the screen, the fluorescent surface of which, formed of sheet of paper covered with platinocyanide of barium, sturned toward the interior. The other extremity is turned toward the the upper part of the observer's face and thus prevents the introduction of the surrounding light.
In order to proceed to the examination of a package, E, by radioscopy, the box is opened, the lorgnette is extended, the support of the vacuum tube is moved orward, and the button of the commutator, C , is then pushed. The current of the generator of electricity enters the tube, and cathodic rays are emitted by the cathode or negative pole arranged in the form of a concave mirror. These rays, striking the anode or positive pole, which is in the form of a plane mirror,


RADIOSCOPIC EXAMINATION OF A VALISE AT THE CUSTOM HOUSE.
is placed as near the lorgnette as possible, that is to scopers." The indications furnished by the $\mathbf{X}$ rays will, coming president at the opening of the session and detance of about eight inches from the tube. It suffices to look into the lorgnette in order to perceive at once the shadow of the densest objects contained in the package under observation. We therefore perceive only the densest objects, and, consequently, the use of radioscopy in customs ex aminations is limited. In fact, the aid afforded by the $\mathbf{X}$ rays to the officers whose business it is to inspect the entry of duti able objects or materials at the frontier or at the gates of cities must not be exaggerated.
We reproduce a photograph of a scene that occurred recently in the large merchandise hall of the Saint Lazare station. We have seen a customs in spector examining a valis by means of the human lorgnette and in the pre sence of the members of the High Commission of Customs. It is certain that the inspector distinctly perceived in the interior of the valise the metallic objects that the latter contained. Amid the linen he plainly saw cigars and metallic boxes in which con traband objects could be concealed. But the fluoro scopic examination could not teach him any more It would be impossible, for example, to distinguish by fluoroscopy such things as new fabrics and laces, which are dutiable, from those that have been worn and are admitted free.
M. Remond, who presented M. Seguy's apparatus, after ward proceeded to make a series of very interesting experiments. He brought in a carelessly wrapped package tied without any precaution, and which was apparently valueless. Having placed this before the fluorescent tube, there were at once observed upon the screen a number of loose cigars scattered through the bundle He showed a deal box, which, when opened, appeared to contain nothing but straw and rags. This box had a false bottom, and upon the fluorescent screen there were instantly seen the objects that were concealed beneath the partition.
The most curious scene was undoubtedly the examination of a female smuggler, as such examinations will hereafter be conducted by the searchers skilled in radioscopy. We reproduce this scene from a photograph taken upon the spot. A woman whose appearance was such as to avert any suspicion was placed before the telltale apparatus, and there was immediately observed upon the screen a bottle in front of her legs. This appearance had not all the success that it merited, since it had been predicted to us by a customs officer, whose practiced eye, skillful in detecting fraud, is no less piercing than the $X$ rays. M. Remond, complaisantly making the smuggler walk, asked the spectators if they remarked anything abnormal about her. The inexperienced answered, No; but a customs officer present was not to be deceived. "This woman," said he, "has something under her frock" H had observed some embarrassment in her walk, and had guessed the presence of the bottle.
It would be wrong, then, to imagine that the X rays are going to suppress customs inspectors and to substitute therefor what has been called, by an amusing neologism, "radio


PROF. THEODORE NICHOLAS GILL, PRESIDENT OF THE AMERICAN ASSOCIATION


PROF. OLIVER WOLCOTT GIBBS, PRESIDENT ELECT OF THE AMERICAN ASSOCIATION
say, almost in contact with the screen, and at a dis- in many cases, be inadequate, and will not allow livers his address on the same evening, and the president elect, who is chosen at the meeting held on the last day. This year, by the death of Edward D. Cope, whose demise in the spring deprived this country of one of its most brilliant scientists, a fourth name presents itself in that of the senior vice president, who suctravelers to escape an inspection of their trunks.
On the contrary, the rays discovered by Prof. Roent eminil be very usefully employed for the rapid amination of small parcels, postal packages, and valises. The officers of the custom house will have a


## A SMUGGLER DETECTED BY THE X RAYS

method, either with the human lorgnette or with an analogous apparatus consisting simply of an electric source, a focus, tube and a fluorescent screen, of imme diately ascertaining at a glance the relative accuracy of the declarations made by shippers or travelers. They will thus be able quickly to detect fraud; and, if they desire, to avoid submitting honest people to the useless annoyance of inquisitorial inspection. What is most unpleasant and vexatious in such inspections is the contact of the officers' hands with the linen and other objects contained in the baggage
If the new process does away with the necessity of such contact, or simply permits of diminishing the fre quency thereof, the director of the custom house wil gain the thanks of the public by adopting it.-L'Illus tration.

## MEETING OF THE AMERICAN ASSOCIATION.

by marcus benjamin, ph.d.
It has often been noted as an interesting fact that the American Association has commonly three presidents in attendance at one of its meetings. These are eeded to the presidency eeded to the presidency, and who will call the meeting to order in the place of President Cope and deliv er the retiring address, which on this occasion, at the request of the council, will take the form of a critical description of Cope's contributions to cience. No one is more competent to attempt this ask than Prof Gill, for he has been the friend and fellow worker of Prof. Cope in similar lines since he early sixties, when the two young men were fellow students in natural history under Prof. Baird in the Smithsonian Instiution. That the address will be a splendid summa y of the work in natural history for the last quar ter of a century is confi dently expected by those who are already fa miliar with Gill's admira ble biographies of Huxley and Goode that were prepared on the deaths of these two men.
Theodore Nicholas Gill, who ranks among the very first of American zoologists is a native of New York City, where he was born on March 21, 1837. His early education was received in private schools and from private tutors, and then he studied law, but never was admitted to the bar. As he grew to manhood he developed an interest in natural science, and during the winter of $1857-58$ he visited Barbados, Trinidad and other West Indian islands for Mr. U. Jackson Stew art, for whom he collected shells and other specimens in natural history. The results of his explorations were worked up mainly in the library of Mr. J. Car son Brevoort, and published in the Annals of the New York Lyceum of Natural History and in the Pro ceedings of the Philadelphia Academy of Science. It was in the library (the best of its kind in the United States) of this patron of science that he laid the foun dations for that great knowledge of books and authorities which, combined with a splendid memory, has stood him in such good stead in his latter years In 1859 he visited Newfoundland and studied it fauna, and in 1860 prepared a report of the fishes of the northwest boundary for the State Department.
It was about this time that he came to Washington which has since been his home, and in 1862 he became librarian of th Smithsonian Institu tion. This office he held until 1866, when the library was trans ferred to the Capitol where he was con tinued in service un til $18 \% 4$, having be come chief assistant Subsequent to the last named date he has devoted his at tention almost exclu sively to studies in natural history, and is a daily worker in the Smithsonian In stitution, having since 1894 held the honorary office of associate in zoology on the scientific staf of the National Mu seum.
Meanwhile he had become connected with the Columbian University, at first as associate professor of zoology and subse quently as full pro essor, which ap pointment he still holds, and gladly meets his classe
regularly, considering it a privilege to contribute his services without compensation to the university. It was from the medical department of Columbian University that in 1866 he received the degree of M.D.; that of Ph.D. came to him from Columbian University in 1870, and that of LL.D. in 1894, from the same source.
His activity as a zoologist has been unceasing, and his contributions to that science have included over five hundred separate papers, most of which have been on ichthyology. Of these, many appeared in the Proceedings of the Philadelphia Academy of Natural Sciences, but since 1878 the Proceedings of the United States National Museum has been his favorite place of publication. His work has been chiefly on systematic ichthyology, especially with the arrangement of fishes in their classes, orders, and families, yielding a more hatural and restricted distribution of genera, which has been almost uni versally accepted in the United States, and recognized in Europe. Among the most important of his contributions are "The Arrangement of the Families of Mollusks" (1871), "The Arrangement of the Families of Mammals" (1873), "The Arrangement of the Families of Fishes " (1873) ; the zoological portion of "Johnson's Universal Cyclopedia," the greater part of the volume on fishes and a portion of the volume on mammals of the "Standard Natural History," and the zoological text of the "Century" and "Standard" dictionaries.
Prof. Gill is a member of over seventy-five scientific societies, including the National Academy of Sciences, to which he was elected in 1873. His connection with the American Association began in 1868, and in 1874 he was made a fellow. Last year he was chosen vice president of the section on zoology, and as the senior vice president succeeded to the presidency on the death of Prof. Cope.
Oliver Wolcott Gibbs, the president upon whom the duties of presiding over this year's meeting will devolve, is also a native of New York City, where he was born on February 21, 1822. His education was likewise received in his native city. After passing through Columbia Grammar School he was graduated at Columbia College in the year 1841. Turning his attention to chemistry he studied for a few months under Dr. Robert Hare in Philadelphia, and then took a course in the College of Physicians and Surgeons in New York City, after which he spent several years in Europe studying under such famous masters as Rammelsberg, Heinrich Rose, Liebig, and Regnault. In 1848 he returned to the United States, and for a year lectured on chemistry in Delaware College, Newark, Del., whence he was called to the chair of physics and chemistry in the College of the City of New York, where he remained until 1863, and then was elected to the Rumford professorship in Harvard University, with charge of the laboratory of the Lawrence Scientific School, which place he held for a quarter of a century, and then was made emeritus. Prof. Gibbs fitted up a
private research laboratory in Newport, R. I., in private research laboratory in Newport, R. I., in 1887, where he had long had his summer home, and sonality attracted a large number of students to him at the Lawrence Scientific School, including such men as Frank W. Clarke, Charles E. Munroe, Samuel P. Sadtler, Thomas M. Chatard, and others of the foremost chemists of the United States. His research work has included elaborate memoirs on the platinum metals, on the ammonia-cobalt bases, on new analytical methods, and on complex inorganic acids. It is this last research, which has extended over many years, that led to his discovery of the platino-tungstates, the vanadio-tungstates, and the molybdates. He has also contributed valuable papers to the literature of physics.
During the civil war he was in New York City, and at that time became actively associated in the workings of the United States Sanitary Commission and was chosen a member of its executive committee. In this connection he frequently met the other members of that body, and out of their daily contact grew the idea that, for the successful carrying on of their work, their meetings should "take the form of a club which should be devoted to the social organization of sentiments of loyalty to the Union." This was the inception out of which quickly matured the Union League Club, of New York City, whose original meeting was held at his residence ou January 30, 1863, and of which he is to-day the senior honorary member. Prof. Gibbs has been honored at home and abroad as no other American chemist has. He has received the degree of LL.D. from Columbia and from Harvard. He has been elected an honorary member of the Chemical Society of London, and is also the only American who has ever received an election to honorary membership in surviving original members of the National Academy of Sciences, and in which he has held the office of for eign secretary, becoming in 1896 the president of that body. Prof. Gibbs has long been a member of the American Association for the Advancement of Science, and as far back as 1866 was a vice president of that organization.

At the meeting held last year, when it was proposed to hold a joint meeting with the British Association,
the nominating committee, in casting about for the most distinguished American scientist to represent the American Association, were prompt to recognize the fact that the president of the National Academy of Sciences was indeed the most eminent living American conceded, and the American Association quickly rati fied the action of their committee.

## The Precious Metals.

The product of gold and silver in the several States and Territories of the United States for the calendar year 1896 is estimated by the Director of the Mint to have been as follows:

| State or |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Territory. | Fine oz. | Value. | Fine oz. | Coining val. |
| Alabama......... | 275 | \$5,700 |  |  |
| Alaska.. | 99,44 | 2,055,700 | 145,300 | \$187,863 |
| Arizona ......... | 125,978 | 2,604.200 | 1,913,000 | 2,473,373 |
| California. | 737,036 | 15,235,900 | 600,000 | 776,533 |
| Colorado.. ..... | 721,320 | 14,911,000 | 22,573,000 | 29,185,293 |
| Georgia ......... | 7,305 | 151,000 | 600 | 776 |
| Idaho ......... | 104,263 | 2,155,300 | 5,149,900 | 6,658,457 |
| Iowa...... | 48 | 1,000 | .... |  |
| Maryland........ | 15 | 300 |  |  |
| Michigan... ... | 1,800 | 37,200 | 59,000 | 76,283 |
| Minnesota....... | 39 | 800 |  |  |
| Montana | 209,207 | 4,324,700 | 16,737,500 | 21,640,404 |
| Nevada ......... | 119,404 | 2,468,300 | 1,048,700 | 1,355,895 |
| New Mexico..... | 23,017 | 475.800 | 687,800 | 889,277 |
| North Carolina.. | 2,443 | 44,300 | 500 | 646 |
| Oregon.......... | 60,517 | 1,251,000 | 61,100 | 78,998 |
| South Carolina.. | 3,062 | 63,300 | 300 | 388 |
| South Dakota... | 240,414 | 4,969,800 | 229,500 | 296,727 |
| Tennessee ...... | 15 | 300 |  |  |
| Texas... | 387 | 8,000 | 525,400 | 679,305 |
| Utah..... | 91,908 | 1,899,900 | 8,827,600 | 11,413,463 |
| Vermont....... | 48 | 1,000 | ..... |  |
| Virginia..... . . | 169 | 3,500 |  |  |
| Washington..... | 19,626 | 405,700 | 274,900 | 355,426 |
| Wyoming . | 692 | 14,300 | 100 | 129 |
| Total. . .. . | $\overline{2,568,132}$ | \$53,088,000 | $\overline{58,834,800}$ | \$76,069,236 |

The increase in the production of gold over 1895 was $\$ 6,478,000$, while the production of silver shows an increase over that of 1895 of $\$ 4,018,000$.

## Foreign Papers Published.

There are 2,200 daily and 15,000 weekly papers pub lished in the United States, and twenty-three different languages other than English are represented in the Sun.
There is only one newspaper published in the Russian language in the United States. There are five newspapers, all weekly, in the Portuguese language. Of these three are in California and two are in Massachusetts, at New Bedford and at Boston. There are four daily newspapers in the Polish language, published at Chicago, Buffalo, Milwaukee, and Baltimore. Besides these there are seven weekly Polish papers at Chicago, six in Pennsylvania, one at Cleveland, one at Toledo, and three at Detroit. Most of the periodicals in the Spanish language are trade papers, but there is a daily paper in New York, and at Key West is another There are four Spanish papers in Arizona and twelve in New Mexico.
One Armenian paper is published in the city of New York, and there are two Chinese weekly papers in San Francisco. Five newspapers are published in the Fin nish language, two in the mine regions of Michigan and
one each in Illinois, Minnesota, and New York. There are two daily Bohemian papers in New York, two at Chicago, and one at Cleveland. There are three Danish papers in Chicago, one in Omaha, one in Racine, Wis., and one in Portland, Ore. The Danish paper the farmost exclusively, designed for circulation though there is one Danish paper published in New York.

The indisposition of the French to acquire any othe language must account for the large number of French papers published throughout the Union, even where the French population is inconsiderable. There are ans) at Fall River, Lowell, and New Bedford, and on published at Woonsocket, R. I. There are also French papers in New York and San Francisco and New Orleans. Eight other French papers, all weekly, are pub lished in the smaller towns of Louisiana.
Seven newspapers are published in the Slavonic language, and of the four in Welsh three are in Utica and its neighborhood. Thirty Swedish newspapers are published, but no daily papers among the number;
eleven Norwegian, seven of them in Minnesota; five eleven Norwegian, seven of them in Minnesota; five
Hungarian, one Greek, one Gaelic, one Arabic, and eighteen Dutch, nine of which are in Michigan, where the Hollanders are numerous, one only being published at the East, in Paterson, N. J. There are two Italian daily papers in New York and two in San Francisco, but outside of these two cities the Italian press in the United States amounts to very little. There are four papers published in the Lithuanian language, and twelve, three of them dailies, in the Jewish jargon. German newspapers are published in nearly ever
State, and German dailies in nearly every large city.

## THE FOUNDATIONS OF THE EAST RIVER BRIDGE,

 NEW YORK.Work upon the new East River suspension bridge, which is to connect New York and Brooklyn at a poind about a mile and a half to the north of the present bridge is now well under way, and by the courtesy of the engineers we are enabled to present our readers with illustrations and particulars which show the progress that has been made at the present writing.
In our issue of September 12, 1896, will be found a bird's eye view showing the bridge as it will appear when finally completed and its relation to the surrounding districts. The terminus of the Brooklyn approach will lie on the block between South Fourth and South Fifth, Driggs and Roebling Streets, and the New York terminus will be located on the northern half of the block lying between Delancey and Broome, Clinton and Attorney Streets. The foundations of the bridge will be four in number, two under each tower, and they will rest upon timber and concrete caissons, sunk by the pneumatic process, upon which piers of solid masonry will rise to a height of 23 feet above high water Above these will be built up the massive plate steel towers, each consisting of four corner posts, or legs, strongly tied together, the two groups of four on each pier being also connected by massive transverse lattice trusses and intermediate ties and struts. The top of the towers will be 335 feet above the river. The center span, 1,600 feet in length, will be carried upon four 18 inch steel wire cables, and the latter will be carried inshore 590 feet. where they will be-anchored to massive masonry anchorages, each of which will be 150 feet square and 100 feet high. The shore spans will consist of independent trusses carried by the main towers, the anchorages and a pier intermediate between the former The bridge will be stiffened against deformation under moving loads by a pair of continuous lattice trusses 40 feet deep. Between the trusses will be six elevated railroad and trolley tracks, and on the outside of each truss will be a roadway for vehicle traffic. Two walks for pedestrians will also be provided. These will be placed inside the trusses and above the trolley tracks. The total width of the floor will be 118 feet. There will be no terminal stations to this structure, as there are to the Brooklyn Bridge, the aim of the city authorities being to provide a broad, continuous thoroughfare over which trains, vehicles, and pedestrians may pas without any interruption
It can be well understood that in building a struct ure of these vast dimensions, whose term of life should be reckoned by the thousand years, the most important consideration is the foundations, inasmuch as upon these the stability of the whole structure depends, and when they have once been put in, they are forever beyond the reach of alteration or repair. It is conceivable that faulty design or poor material in the superstructure might be remedied, even after the bridge was complet ed-so great is the skill and resourcefulness of th modern engineer; but blunders in the design or con struction of the piers of a 1,600 foot suspension bridge would probably wreck it beyond all hope of recovery. The foundations of the new bridge will consist of timber caissons filled in with concrete. Owing to the varying depth of the rock below the surface of the river, no two of the caissons will be of the same dimensions, although they will all be similar in construction The structure which is shown in the accompanying llustrations is the north caisson of the New York tow e , and the description of the plant and methods em ployed in sinking it to place will apply also to the work on the other three. The borings show that the bed of the river consists mainly of sand, with some clay and bowlders. Below this, at a depth which varies rom 45 to 71 feet below high water, is a very irregular surface of gneiss rock, similar to that which is found on Manhattan Island. The caisson will be sunk through the sand until it touches the rock, which will then be blasted away and "stepped" until the edge has come to a fair bearing on all sides. When this has been done he space between the rock and the roof of the caisson will be carefully filled in with concrete.
Roughly speaking, the caisson, with its attached coffer dam, may be described as a huge boxlike struct ure, 60 feet by 76 feet on the sides and 19 feet deep, fitted with a bottom, which is placed, not at the lowe edge of the sides, but $71 / 2$ feet above $i$. The space be low the bottom or "roof," as it is called, constitutes a working chamber in which the blasting and excavation of the river bottom is carried out. Its walls are two feet nine inches thick and consist of two courses of $12 \times$ 12 inch timbers, the outer course being horizontal and the inner vertical, on the outside of which are two layers of 3 inch plank and one layer of the same thick ness is laid on the inside.
The bottom of the walls is furnished with a cutting edge, which extends continuously around the whole caisson. It is built up of $1 / 2$ inch steel plates, and it extends two feet below the bottom of the lower timbers, being stiffened at every two and a half feet of its ength by knee braces. The lower twelve inches of the edge is also stiffened with reinforcing plates, which brings its total thickness up to two inches. It should be mentioned that the cutting edge is not intended for
literally cutting through the river bottom, as its name would imply, but it is put in to enable the workmen to use their tools close up to the outside of the caisson, and, indeed, just a few inches beyond it. The wall proper is nearly a yard thick, and if a bowlder were lodged beneath it-supposing the cutting edge were not in use-it would be a more difficult operation to get at it than it is when the wall is only, as in this case, two inches in thickness. The shoulder, moreover, gives room to shore up if it should be necessary.
The roof of the working chamber is five feet in thickness, and consists of the following material: First, there are two courses of three inch plank, laid in opposite directions; then a layer of $12 \times 12$ timbers, followed by a layer of $12 \times 14$ timbers, laid crosswise; above this are two courses of three inch plank laid diagonally, and above these are two more layers of $12 \times 12$ timbers. All the joints in this working chamber and in the side walls are carefully calked and white-leaded, so as to make it perfectly airtight. The roof, and indeed the whole caisson, is stiffened with a series of massiv plate steel riveted trusses, eight in all, which extend entirely across it from wall to wall. They are placed immediately above and transversely to the first course of $12 \times 12$ inch timbers, the successive upper layers being framed in carefully between the struts and ties of the trusses. The timbers of the whole caisson, both walls and roof, are securely driftbolted together, and every care is taken to make this structure both rigid and waterproof. The details of this construction are clearly seen in the sectional view, showing the sinking of the caisson, and in the views taken during its construction. The working chamber is also strengthened with two solid bulkheads two feet four inches thick, which extend entirely across it, dividing it into three compartments, openings being left to allow the workmen to pass through. At the level of the bottom of the walls is a massive framework or gridiron of $16 \times 16$ inch timbers, which is bolted together and to the side walls with one and one-half inch tie rods. At each intersection vertical posts reach from this frame to the roof, and the whole system is tied together and stiffened against lateral distortion by diagonal struts and tie rods, as shown in the sectional view. The object of this mass of bracing and truss work is not merely to enable the roof to carry the superincumbent load of the masonry, but to enable the whole caisson to endure without distortion the heavy transverse strains to which it is subject when it gets "hung" upon any projecting point of the uneven rock bottom.
The steel trusses, which are 9 feet 3 inches deep and weigh 10 tons each, are a novel feature in this class of work. They were ren. dered necessary by the shallowness of the caisson, which was in turn due to the unusually short dis the unusually short the to id rock
The roof is pierced with seven shafts, each about 3 feet diameter, for the passage of men and materials, and also with a number of pipes, from 1 inch to 5 inches diameter, for supplying air and water, blowing out sand, and for carrying the electric light wires. The shafts are circular in section and are p
built up.
The caisson was built up as described to its full height of 19 feet, on launching ways, and previous to the launch a cofferdam or temporary wall, 10 feet in height, was added above the structure, and bolted to it with angle plates and tie rods. The object of this is to keep the water away from the masonry while the
caisson is being sunk to the bed of the river. When the caisson rests on the sand and the masonry pier is well above high water, the cofferdam will be unbolted and floated away. After that, as the caisson is sunk, masonry will be added, so that the top will be always kept above high water.
In the cut showing the caisson being towed to the site, the wall of the cofferdam can be clearly distinguished from that of the caisson.
Preparatory to launching the caisson, the river bot-
Preparatory to launching the caisson, the river bot-
tom at the site was dredged out to a depth of 25 feet,

opened, the workman enters the chamber, and the door, which opens inward, is closed after him. Air is then admitted to the chamber until the pressure rises to that in the shaft, when the lower door, being relieved of pressure, can be opened. The man then descends by the ladder into the working chamber The operation of the material locks is the same, the wire rope passing through a stuffing box in the outer doors.

As the material is excavated the caisson will sink
rom its own weight, and the process is carried on unti it has been carried down to a solid rock founda tion. The next step will be to fill up the void rep resented by the working chamber. For this pur pose concrete will be sent down the shafts and tamped in place, the filling-in commencing at the wall and being carried on to ward the center. The las of the work will be done by a single man, who wil place the last shovelfuls a the base of the shaft. All the shafts will then be filled with concrete, and after this is done the ma sonry piers will be carried up to their full height and capped ready to receive the steel towers.
It is expected that suitable rock bottom wil be found at a depth o about fifty-six feet below high water.
The plant concerned in these operations is quite extensive, as will be seen from our front page engraving. By a
and a fairly level bed was prepared on which it might rest. The caisson was then launched and towed to the site and sunk by filling the crib above the roof with concrete. The latter is carefully rammed in between the steel trusses and the crib timbers, and finished off fush with the top wall of the caisson. The weight of this concrete and a few courses of the masonry pier proved sufficient to sink the caisson to the bed of the river.
The next operation is to clear the working chamber of water, and this is done by the simple expedient of orcing air into it until the river bottom has been laid bare. The workmen, who are known by the expressive name of "sand hogs," are then sent down the center shaft and begin the work of excavation. The sand is


INTERIOR OF WORKING CHAMBER BEFORE ROOF IS BUILT ON. into place on the piers. piece of good fortune a substantial river pier is tanding exactly on the axis of the bridge, and therefore, between the two piers, which will be 97 feet inches center to center. Upon this has been erected an engine and boiler house, which contains three large boilers, two Ingersoll air compressors, a Knowles wate pump and an electric light plant. In front of this is ocated the concrete mixer and the derricks for hand ling the excavated material and passing in the con rete. Work is also carried on from scows on the end and side of the caisson, the stone for the piers being brought, already cut to the required size, on scow rom a point up the Hudson River and lifted directly

The estimated time of sinking the caisson to place is three months, and it is ex pected that the whole bridge, which is to cost about $\$ 7,500,000$, will be completed in about five years.
We are indebted for ou particulars to the courtesy of Mr. L. L. Buck, th chief engineer of the un dertaking, and Mr. E. G Freeman, the resident en gineer on the New York end of the bridge.

## How to Find Out if

## Room is Damp.

To ascertain whether or not a room is damp, a kilogramme of fresh lime should be placed therein after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the kilogramme has ab sorbed more than ten grammes of water (that is, more than one per cent) more than one per cent)
the room should be consid ered damp and classed a unhealthy. The question of the dampness of dwell
blown out through four inch pipes by means of ai pressure, the column of sand and water in the pipe be ing rendered buoyant by admitting compressed air through a small pet cock near the roof. A water jet is used to loosen the sand at the mouth of the blow pipe, nd it is carried out in a swift and steady stream. When harder material, such as clay or bowlders, is met, it is taken out in buckets through hoists reserved for that purpose. The top of each shaft is provided with an air lock, which is simply a closed chamber with an airtight door at top and bottom. The upper door i
ings is a frequent cause of dispute between landlor and tenant, and is naturally solved in the negative by the former. The question can be settled in the future by the test of the hydration of lime which will give rrefutable proof of the validity of such complaint. New York Dietetic and Hygienic Gazette.

According to Nature, the firing at Portsmouth, on June 26, was distinctly heard at Hungerford, Wiltshire, distance of forty-five miles as a crow flies, and also at
Great Malvern. Great Malvern.

## recently patented inventions.

## Engineering.

Steam Boiler.-William C. Stucke Chicago, Ill. To facilitate the distribution of the heat the burning fuel to all parts of the water, and thus prodesigned a boiler in which rods of copper, brass, or other metal traverse the water space and project into the fire other end, it being the idea of the invention that thes rods, with portions exposed where the greatest heat of combustion is being evolved, will take up and distribute the heat through the water most effectively
Furnace Door. - Russell B. Hobson, New York City. According to this invention the door is of an exploded tube or pipe the pressure of the escapin contents of the boiler will act to effectually close the door, preventing the blowing of steam or water, or the contents of the fire box or ash pit, into the fire room, but necessitating their passage into the smoke flue or stack.
It is an inwardly swinging door, with a casing or frame which overlaps the edges of the door at the outside, thus practically forming a valve and va've seat. The door swung open by pushing it inward, when an adjustabl mounted weight holds it open as long as desired.
Smelting Furnace.- John D. McDonald, Sudbury, Canada. This is a furnace designed
to facilitate the smelting of pyrites, blend, sulphurets or to facilitate the smelting of pyrites, blend, sulphurets o
sulphides, etc.., without the continued use of coal, the ap paratus providing a steady feed of the ore, the feed being controlled by lateral vibration, and the temperature a
which the ore is delivered into the crucible in treating which the ore is delivered into the crucible, in treating
fusible ores, being governed by the feeding devices. A feeding carriage has its frame formed with hollow bas and upright side sections forming water jackets, and a deflector prevents the ore from clogging in the mouth of
the crucible, and prevents the fine particles of ore from being subjected to the from the crucible.

## Railway Appliances

Switch. - Charles Troup, Watseka Ill. According to this invention the main rails an skitch rails may be of ordinary construction, and a train or
car may be shifted directly from the siding to the main line without operating the switch stand. In connectio ints a lock is
k, to be ope-
vices, there rated by the switch stand or other hand devices, there being also devices for automatically releasing the lock by the passage of trains from the siding to the main lin hen the lock is released from the switch point the ta et is

Car axle Lúbricator.-James S Patten, Baltimore, Md. When the oil box is filled to th the oil is in contact with the axle journal, and to insure contact when the oil surface is lower, an inclined trough is arranged lengthwise, causing the oil to reach the jour nal when the car lurches or makes a sidewise movement, wings, lined with leather or other flexible material, which mbraces the sides of the journal, to aid in effecting pe wiper to prevent the oil from running along the journal beyond the bearing, while baffle plates of flexible material prevent the escape of oil between the sides of the conductor and oil box.

## Electrical.

Fire Hydrant Valve.-Frank Mconala, Porlana, Me. Accoraing to this invention a iectrically operated valve is arranged in a casing to be situated near a fire hydrant, and through which run supply to be connected with a conductor on a reel to be carried yy a hose carriage, or as otherwise desired, and pro directing the nozzle will be able to control the flow of water, avoiding the necessity of shouting orders, and preventing the flooding of a building after a fire is ex inguished. When used in connection with a pumping gine an indicator advises the engineer as to the position of the v
Trolley Switch Mechanism.-Walam S. Browne, Brooklyn, N. Y. This invention is a same inventor, and provides for making only a single same inventor, and provides for making only a single
movement of the switch, for whichever way the car is raveling, instead of a double movement, as heretofore It is an automatic switch in which the current
switch consists of a short section of the trolley wire, split vertically into two parts insulated from rolley wire circuit and the other with the circuit operat ng the switch moving mechanism, and adapted to be connected by the passage of the trolley, to supply the current for throwing the switch.

Bicycles, Etc.
Bicycle Handle Attachment. James Godfrey, Pittsburg, Pa. A third or supplemental
handle, to facilitate steering a wheel with one hand, is provided by this invention, a vertically adjustable steering handle being pivotally attached by a clevis to the center of the havdle bar. Two slotted and segmentally curved
pieces are rigidly attached to the clevis and the central pieces are rigidly attached to the clevis and the central
handle bar, the pieces being adapted to slide on each other, and to be clamped in any desired adjustment, oo fix the central steering handle at a convenient

Making Cycle Gear Cases.-Horace W. Dover, Northampton, England. In moulding gear cases of xylonite this invention provides a preparatory ool for bringing the sheet roughly to shape to be completed by a flnishing tool, for which a further patent has ounded orifice, a pressure plate adapted to engage the fice in the die plate for drawing a plastic sheet between
the pressure and die plates and moulding the sheet. Care re of the plunger, while maintaining sufficient pressure prevent wrinkles in the moulded article.

## Mechanical.

Combination Tool.-Beniamino belii, New York City. A foldable measuring rule, with nife blades and a spring balance scale, is so made, ac cording to this invention, as to unite these triple func be carried in the vest pocket. The rule is in two hinged sections, there being in one section a recess for the knife blades and in the other a recess for a scale bar connected its inner end with a contractile spring, the bar bein articles to be suspended from a hook projecting from he outer end of the bar.

## Agricultural.

Planter.-Joseph A Pritchard, South Mills, N. C. A planter in which cotton seed may be laced just as they leave the gin, and without being eed, has been devised by this inventor. The hopper so made that it may be readily applied to the frame of a
machine for planting corn or similar seed, and means are machine for planting corn or similar seed, and means are
provided for keeping the driving wheel clean, and wherey the boot or furrow opener may be made to travel wheel cutter, to separate clods of earth, tough grase tc., and prevent trash from gathering around the boot.

## Miscellaneous.

Pasteurizing Milk.-Horace Atwood, Prden, N. Y. The apparatus designed by this invento adapted for the treatment of either mi aream, rounded by a jacket for steam and hot water heating, and arranged to be rotated by a belt, the contents of the receptacle to be subjected to the desired degree of hea or the length of time required, and then made to pass of through separate channels for the milk and cream from
the effect of the centrifugal force. 'The milk and cream are thus heated to a temperature below the boiling point to render innocuous any germs the liquid ma

Sewing Machine Needle Guard. Warren B. Davis, Brooklyn, N. Y. This device is
ormed of a single piece of flat material bent upon itself o form an eye, a twin shank and an arm at the end of each member of the shank, the arms being bent out-
wardly and then inwardly toward each other to form a lamp for engaging the presser foot shank. The devic simple and inexpensive, being applicable by a child, he in designed to prevent the operator from pricking while adjusting the work under the
the presser foot, or during other manipulations while the列
Sewing Machtne Presser Foot De-vice.-William A. Scott, Newcastle, Col. This is a de-
vice to be attached to the presser foot for folding in the edge of the material previous to stitching, and als pplicable for a number of purposes, being adapted fo 11 widths of hemming and all sizes of tucking, as wel ace of the material cal tube, holding clips on its lower side and an arm movable in the clips and having transversely extended
fingers at one end, the end being turned upward and curved rearward.
Pumping Jack for Wells.-Fred J Moser, Kane, Pa. This improvement comprises pairs of oggle links to whose upper sections are pivoted a clamp rod, there being a flxed device to which the lower secions are pivoted, a collar adapted for connection to pump tube, and a rock lever fulcrumed on the collar Links connect the opposite ends of the rock lever to the ivoted to the rock lever is adapted to engage near it angle with the fulcrum point of the rock lever. The device is designed to combine lightness with a maximu assist in its requiring no framework to rest it on tached to or disconnected from a pump.
Wire Stretcher and Staple Pull R. - Jesse R. McElroy, Southmayd, Texas. A tool vided by this invention, the tool enabling successive rips to be obtained on the wire, thus facilitating stretching and holding it under tension, while it may also be used for drawing staples and splicing between posts.
The tool has a curved jaw with a body and two member erminating in claws, a handle connected with the curved aw having a lengthwise slot in which a second handle erminating in a slot.
Swing Joint for Gas Fixtures. Henry P. Drew, New York City. This invention relates to joints in which two cupped sections each have a pivotally connected. The invention provides for making a reliable joint rapidly und at a moderate cost of manufacturing, affording a perfectly smooth working, tight joint at all points of swinging movement, and obviating wificulties heretofore experienced from which the joint

Spring Seat.-Jules Compin, Montargis. France. For all kinds of seats, chairs, benches, ccordin invention provides an improved construction, ferably fixed by one of its extremities to the frame of the bench or seat, while the other suitably bent movable extremity of the spring is arranged to engage a sleeve or The latter is compressed by pressure upon the leaf spring, giving a variable elasticity to the seat, the leaf spring being returned to its original position as soon as

Bracket.-Albert Taubert, New York
according to this invention, connected by a fixed sleeve
at its inner end with a vertically supported rod, an outer section of the lazy tongs being connected with a monipr lating rod having connection with a movable sleev and up as the manipulating rod is folded, with the laz ongs, close to the vertical rod, or held in extended pos ion. The bracket may be arranged to swing at any d
adjustable Index Tags. - Charles . Smith, Exeter, Neb. This invention is for a met clip and forming a cover for it, a projecting portion the tab forming a on which may be printed ant sired index guides, according to the use to be made of in ledgers, account books, correspondence records, etc. ook to another all, easily moved from one portion or thumb index is to a dictionary. The inventor has al ready, we are informed, had great success in the manufacture and sale of these tags for use by banks, financia and large manufacturing concerns.
Note.-Copies of any of the above patents will be end name of the patentee, title of invention, and dote of this paper.

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AUGUST, $\overline{1897 .-(N o . ~ 142 .) ~}$
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spective elevation and floor plans. A modern spective elevation and floor plans. A moder
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esiaence at Evanston, Ill., recently abn. A substantial and dignifeor plans. Messrs. A. M. F. Colton \& Son,
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