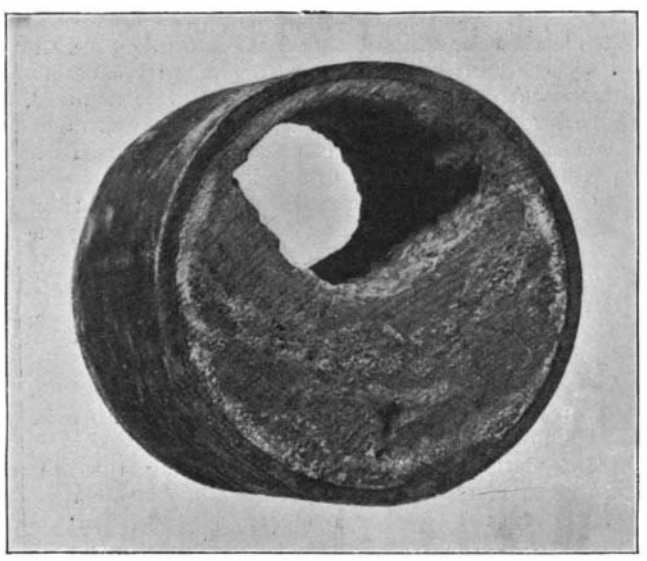
THE CORROSION OF A BOILER TUBE.

We are indebted to Mr. H. H. Shank, of Harrisburg, for the photograph of a section of a water tube which we present herewith. It was recently taken out of a Babcock & Wilcox boiler, in use at a large steel plant near Harrisburg, Pa. It is a striking example of what is apt to take place if the water is dirty or holds mineral salts in solution. The deposit in this case seems to be simply mud, which was held in suspension by the water at the time of the entrance to the boiler and afterward deposited. The tube is four inches in diameter, and more than three-fourths of the water space is filled with the deposit. The tubes were removed and new ones put in. It is a good object lesson, showing the necessity of frequently examining the boilers, as it is easy to see that the results obtained from boilers in such a condition must necessarily be uneconomical.



THE CORROSION OF A BOILER TUBE.

A Carthaginian Mask.

In 1893, the Rev. A. L. Delattre, having had his attention called by an Arab to several small objects that he had discovered while making some excavations at Douimes, decided to make some researches in the vicinity, says Cosmos. Toward the latter part of the summer of that year, having engaged some laborers and set them to work, he was soon rewarded, after excavating through six feet of soil intermixed with rubbish, by the discovery of the primitive argillaceous earth in which the Carthaginians found a last resting place for their dead. In November, 1893, there had been discovered sixty tombs, almost all of which were placed at right angles with the seashore. The majority were simple trenches covered with slabs of tufa, the only kind of stone employed in the primitive structures of Carthage. Infiltrations had filled each trench with a fine yellow sand, the color of which was often confounded with that of the natural earth. The funereal furnishings usually consisted of two medium sized urns with a handle on each side, of two small jugs with a single handle, of a flat bicornous lamp and its patera (a sort of saucer), and sometimes of a bronze hatchet, a hand bell, cymbals and a mirror or other objects of ornament, such as collars, rings, bracelets, earrings, painted vases, figurines, amulets, shells, etc.

One of the most interesting finds was a curious terra cotta mask, brought to light in September. It was discovered at a new point of the Punic necropoli of Carthage, very near the site of Serapeum, in a very small space where had just been found more than twenty Carthaginian tombs, always containing funereal furnishings of the same character, save that the pottery was more highly ornamented and of finer quality. The mask is 8 inches in height and 5 in width, and the hollow part 3½ inches in depth. This grotesque face, with low and narrow forehead, projecting eyebrows, wide and flat nose, and angular cheeks and crooked mouth, preserves a few traces of black paint. The mouth and eyes are cut out through the thickness of the clay and the ears are ornamented with rings. Around the mask are distributed five holes—one at the top and one beneath and one above each ear. These holes certainly served for fixing the mask in place. There is nothing Egyptian nor Greek about the style of the work, and the specimen seems to be an authentic one of local art. In fact, at the base of the forehead and at the origin of the nose, it bears the mark of its Punic origin in the crescent surmounting the disk, which it embraces with its depressed horns—an emblem that is very frequent upon the votive stelæ of Carthage, and which we often find engraved upon the bezel of rings or arranged so as to be strung and worn as an amulet.

One peculiarity that this mask exhibits is that it changes physiognomy according as it is viewed in profile, at an angle, or full face. This mask constitutes a true caricature. Contrary to the opinion held up to recent years, the Carthaginians must have practiced the art of portrait taking. Prof. Duhn, in an article recently published at Berlin, observes that several Punic masks in the Saint Louis Museum remind us of Japanese rather than of Mediterranean art, on account of the extraordinary naturalism exhibited therein and that makes true portraits thereof. Such is the first impression, but a profounder study of these interesting pieces permits us to recognize an entirely archaic art in them. The mask under consideration is less than natural size and consequently could not have been applied to the face of a corpse; neither was it suspended in the tomb. Notwithstanding the holes with which they are provided, these sort of masks, as well as the clay statuettes that are found in the necropolis, were simply placed alongside of the dead. The object of the relatives or friends who inclosed these objects in the tomb was merely to know that the body of the defunct was accompanied with an object to which they attributed a magic virtue capable of protecting the mortal remains in their final dwelling. Such masks have been discovered in the most ancient necropoli of Sardinia. The Cagliari Museum possesses several of them.

How Worry Affects the Brain.

Modern science has brought to light nothing more curiously interesting than the fact that worry will kill. More remarkable still, it has been able to determine, from recent discoveries, just how worry does kill.

It is believed by many scientists who have followed most carefully the growth of the science of brain diseases, that scores of the deaths set down to other causes are due to worry, and that alone. The theory is a simple one—so simple that anyone can readily understand it. Briefly put, it amounts to this: Worry injures beyond repair certain cells of the brain; and the brain being the nutritive center of the body, the other organs become gradually injured, and when some disease of these organs, or a combination of them, arises, death finally ensues.

Thus does worry kill. Insidiously, like many another disease, it creeps upon the brain in the form of a single, constant, never-lost idea; and, as the dropping of water over a period of years will wear a groove in a stone, so does worry gradually, imperceptibly, but no less surely, destroy the brain cells that lead all the rest—that are, so to speak, the commanding officers of mental power, health, and motion.

Worry, to make the theory still stronger, is an irritant at certain points, which produces little harm if it comes at intervals or irregularly. Occasional worrying of the system the brain can cope with, but the iteration and reiteration of one idea of a disquieting sort the cells of the brain are not proof against. It is as if the skull were laid bare and the surface of the brain struck lightly with a hammer every few seconds, with mechanical precision, with never a sign of a let-up or the failure of a stroke.

Just in this way does the annoying idea, the maddening thought that will not be done away with, strike or fall upon certain nerve cells, never ceasing, and week by week diminishing the vitality of these delicate organisms that are so minute that they can only be seen under the microscope. — Pharmaceutical Products.

RAILWAY MAIL CATCHER AND DELIVERY DEVICES.

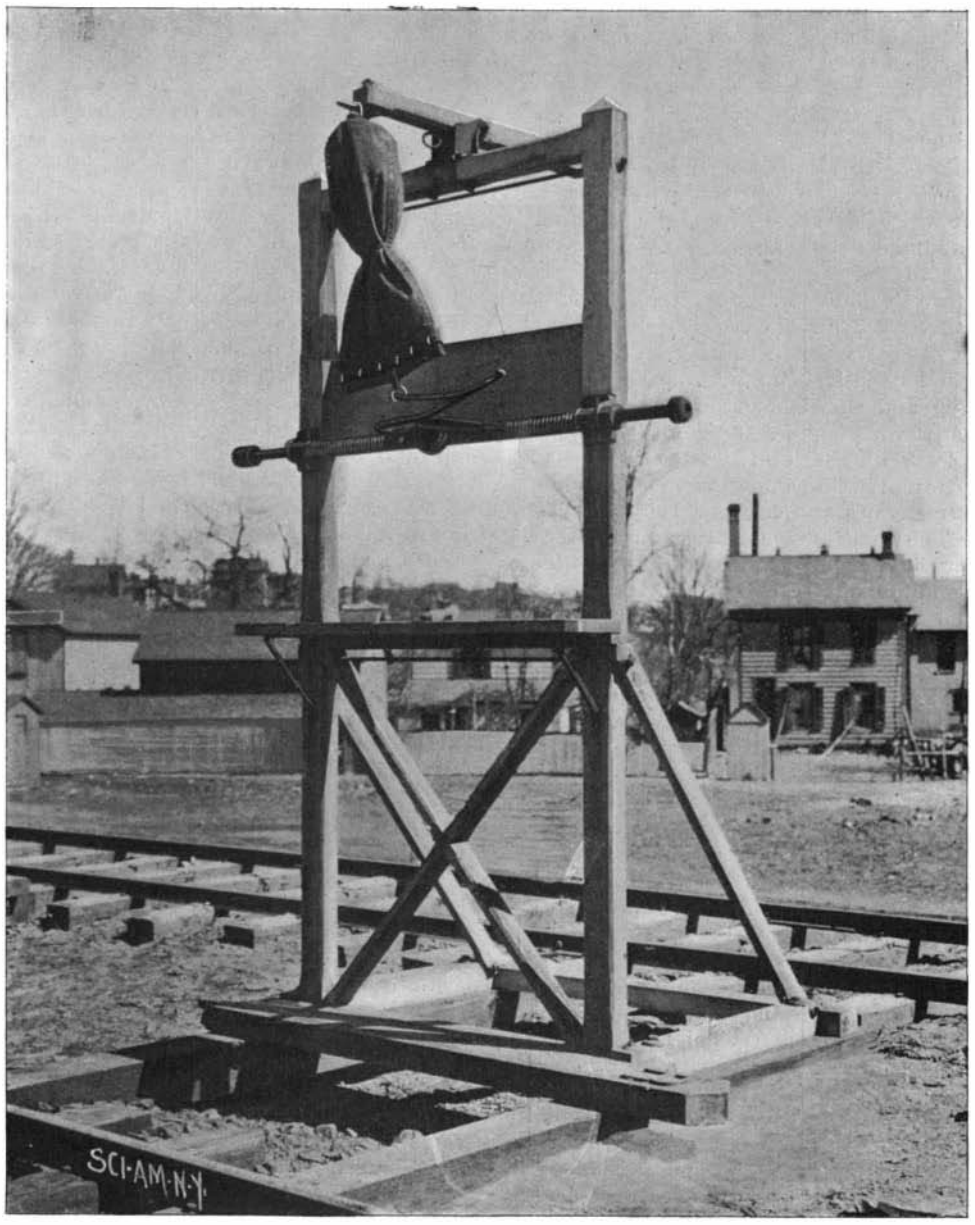
In the SCIENTIFIC AMERICAN of August 14 and August 21 we described and illustrated two systems of mail catcher and delivery devices which have been approved by the Post Office Department and recommended for adoption by the various railroads, and the accompanying illustrations represent the appliances and operation of still another system, the Winsor, which has met with similar governmental indorsement. Of all these systems it may be said that their completion, in their present practical operative form, is a matter of comparatively recent date, considering how many years inventors have been working upon this subject, and the great number of patents issued in this field.

So, too, the number of railroads which have failed to supply themselves with improved mail catcher and delivery devices is still very large, although it is fair to presume that progress in this direction will now be more rapid, from the fact that several devices have received official sanction, as well as because the public are becoming more insistent, year by year, on all matters tending to promote rapid transfer and handling of the mails.

The Winsor device (C. B. Winsor, general manager, Jamestown, N. Y.), attached to the car, comprises two main parts, the upper one of which forms the catcher and deliverer, while lower down is a swinging arm, being a half circular steel bar having a bow shaped spring on its extreme end to hold in position the lower ring of the pouch as it is held out from the car, as shown in one of the illustrations, and assist in holding it steadily in position to be engaged by the catcher on the crane at the station. The catcher and deliverer is supported by a steel bar extending across the car door, the bar rotating in half a circle in a plate bolted at one side of the car door, whereby the whole device may be swung down out of the way at the side of the door.

Upon that portion of the steel bar between the two projections of the bracket at the side of the car door is a collar with a lug to engage a projection on the back of the bracket to hold the catcher arm in horizontal position. A coiled spring at each side of the collar, bearing on the projections of the bracket, holds the lug in operative position and at the same time breaks the force of the blow on the catcher arm when the pouch is caught.

The catcher arm rotates with the bar by a sleeve extending from which is a handle at right angles to the catcher, and the latter itself



MAIL BAG IN POSITION AT STATION TO BE TAKEN BY APPROACHING TRAIN

WINSOR MAIL CATCHER AND DELIVERER.

is bent to form a parallel side jaw, and contains besides a spring-actuated bar, pivoted on the inner side of the jaw and normally engaging the other side, but opening on the passage of the bag into the jaw and closing behind it. When the pouch enters the catcher arm, it slides the bar past a catch and allows the arm to drop to the side of the car, the bag being securely locked as soon as caught and avoiding all danger of being thrown under the cars. The mail clerk does not have to hold the device while catching and delivering pouches, but simply pulls down a handle which throws the pouch out to position, and holds it set to such position as the car approaches a station.

Our view representing the exchange of car and station mail bags is made from a photograph showing the making of such exchange when the car was traveling at the rate of forty miles an hour, although the device has been tested with trains running at all rates of speed up to sixty miles an hour.

The catcher and deliverer bar on the crane at the station is made of steel tubing, on which are fastened the bearings, to which an arm similar to the catcher used on the car is pivoted, the supplemental interior spring-actuated rod for holding the bag after it is caught being clearly seen.

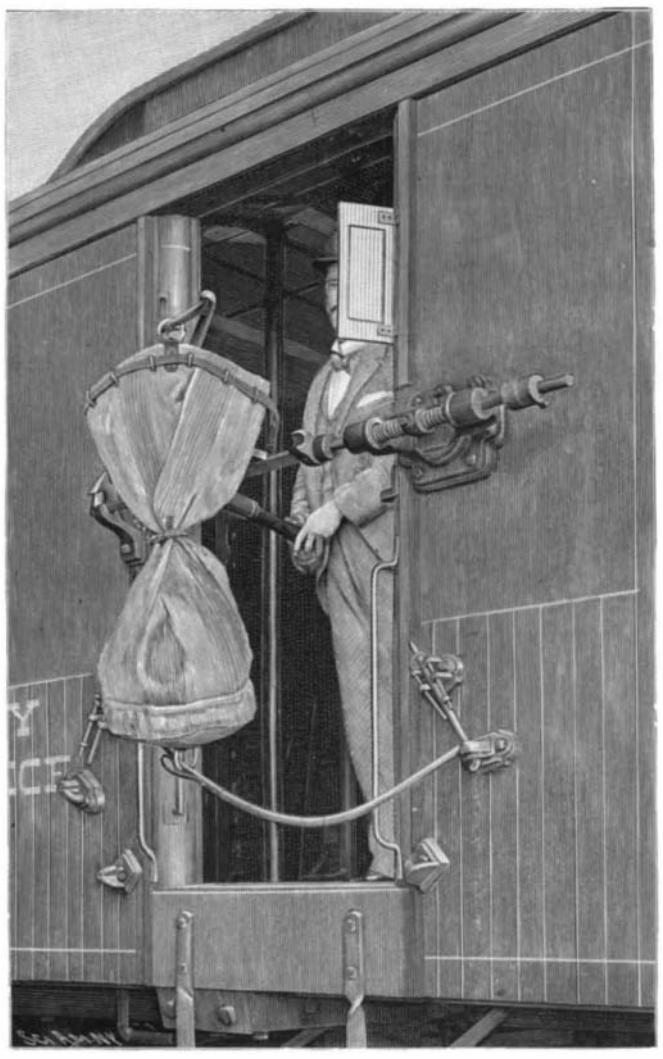
The coiled springs on each side of the catcher fork break the force of the blow when the bag is received. The device on both the car and train is readily reversible, to receive and deliver mail bags when cars are going in opposite directions.

MAIL BAG LEFT BY TRAIN AT STATION.

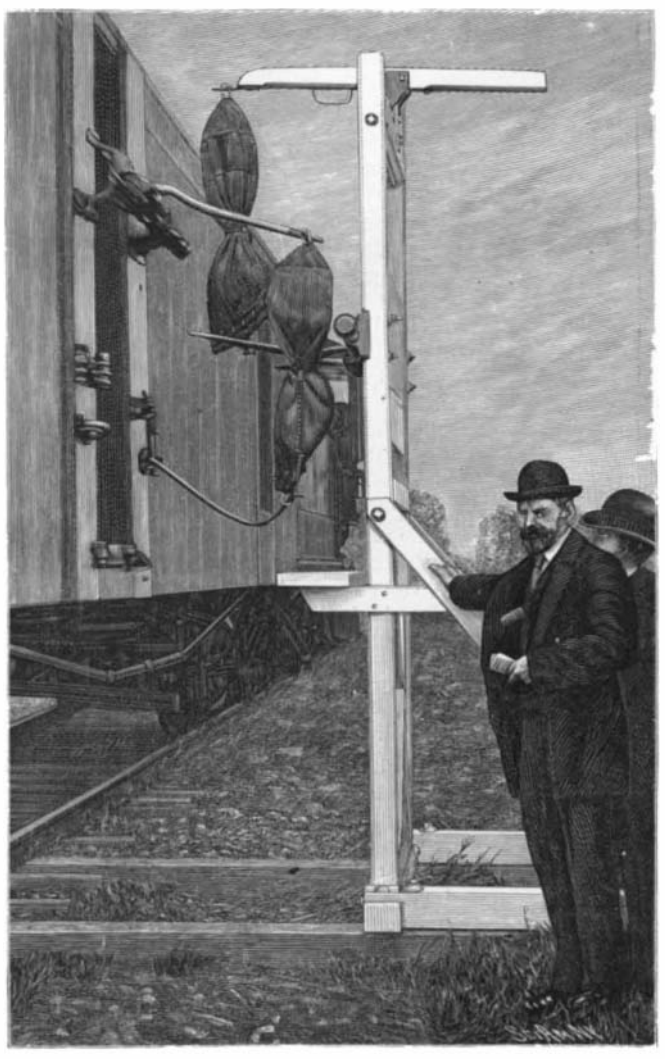
MAIL CATCHER AND DELIVERER.

Lessening the Dangers of Fog.

Nothing is worse than fog at sea. A storm may cause discomfort, and accident may cause delay, but in neither case does the traveler feel so helpless as when his vessel is completely shut in by a dense fog. To lessen the danger which then exists, Prof. E. C. Pickering, the director of the Harvard College Observatory, suggests, says Nature, in a pamphlet, a method of determining the position of a vessel in a fog based upon the velocity of sound. If two fog horns of different pitch be placed at equal distances from the middle of a channel or entrance to a harbor, and be sounded simultaneously at regular intervals of about a minute, it will be evident that a captain of a vessel will be able to locate his position with fair accuracy by noting when the sounds of the horns are heard. If the two sounds are heard at the same instant, the vessel will be in the middle of the channel, and if they are heard after one another, it would be possible to judge from the interval between the two how much the vessel is out of the middle of the channel. For vessels passing one another, Prof. Pickering suggests that each should whistle or blow the horn or siren as soon as the sound is received from the other vessel. Then, if they are five miles apart, each will whistle every fifty seconds, and the distance in miles between the two vessels can always be determined by dividing the intervals in seconds by ten. By placing two different fog whistles on a long steamer, one at the bow and the other at the stern, and arranging that the sounds emitted by both should be heard together by an observer standing at the bow, many collisions might be prevented. Instructions could be given to sailing vessels to keep quiet so long as both signals were heard separately, for they would then be in no danger, but to fire a gun or make other loud noise when both whistles were heard together, for they would then be in front of the steamer. These various methods may be combined indefinitely, and they seem to be worth the consideration of navigators.



MAIL BAG HELD OUT FROM CAR APPROACHING STATION.



EXCHANGING CAR AND STATION MAIL BAGS.

WINSOR MAIL CATCHER AND DELIVERER.

Philippium, a New Element.

M. Marc Delafontaine announced some years since that Mosander's erbia contains two yellow earths, which he named terbia and philippia. The latter was questioned, but accepted later. Now the discoverer has worked out his investigation. Philippium has been found in gadolinites, samarskite and fergusonite. The article in the Chem. News (May 14) describes the compounds, from which the metal is inferred, and its relationship to other elements. Its symbol is Pp.

Philippium is more closely allied to cerium and terbium than to any other of the yttrium and cerium metals. It is to yttrium what cerium is to lanthanum. Its equivalent, the color of its subnitrates and that of the philippic salts, the solubility of its formiate, separate philippium from terbium. These characteristics, and the solubility of potassium-philippo sulphate in potassium sulphate solutions, distinguish it from the two ceriums of M. Brauner and M. Schutzenberger. A heated mixture of cerium nitrate with that of the fergusonite earths (left after the removal of Pp) does not behave at all like the original nitrates; the residue of cerium subnitrates does not resemble the corresponding compound of philippium. Terbium nitrate melts into a colorless glass, which, after partial decomposition, is not yellow, and leaves no yellow residue after washing.

AN improved diving bell of great capacity, moving along the sea bottom by means of screws moved by electricity, is on exhibition in Paris. It is the invention of an Italian named Piatti del Pozzo. He states that it can be worked at very great depths and holds air enough to supply the crew for forty-eight hours without renewal. It is lighted by electricity, which also furnishes motive power for any tools that may be used. On tipping over the cases of ballast, the bell rises to the surface itself.

Science Notes.

Verestchagin, the Russian battle painter, will be the first recipient of the Nobel prize, given for "the propagation of pacific ideas," it is said, as his pictures have brought out the true horrors of war. Kaiser Wilhelm calls them "the best assurance against war."

According to Herr Levinstein, the action of the rarified air on the animal organism is to produce a very strong fatty degeneration of the heart, the liver and the muscles, while death sets in through want of oxygen. The experiments from which these facts were ascertained were performed on a rabbit at 30 or 40 centimeters pressure.—Revue Scientifique.

The Coast and Geodetic Survey has authorized Augustus F. Rodgers, in charge of the bureau's San Francisco office, to proceed with an assistant to the head of the Lynn Canal, Alaska, and make a thorough survey of that part of the Klondike route. Particular attention will be given to the topography and hydrography of the Skaguay and Dyea localities. Mr. Rodgers will leave at once.

The lightest substance known is said to be the pith of the sunflower, with a specific gravity of 0·028, while elder pith—hitherto recognized as the lightest substance—has a specific gravity of 0·09, reindeer's hair 0·1, and cork 0·24. For saving appliances at sea, cork with a buoyancy of 1 to 5, or reindeer's hair with one of 1 to 10, has been used, while the pith of the sunflower has a buoyancy of 1 to 35.

Italy has produced the smallest book in the world, a volume of 208 pages measuring 10 millimeters by 6, or four-tenths by a quarter of an inch. Each page contains 9 lines and from 95 to 100 letters. The text is an unpublished letter written by Galileo in 1615 to Mme. Cristine, of Lorraine. The printers are the brothers Salmin, of Padua, who in 1870 produced the microscopic edition of Dante's "Divina Commedia," 38 by 22 millimeters in size, with 31 lines to the page.

The influence of hygienic improvements on the rate of mortality is well shown by the figures below, which give the mortality of the years 1882 and 1895 in the world's greatest cities:

	1882	1895
Paris	26·3	21·1
Rome	26·1	20·8
Berlin	26·4	19·0
Amsterdam	24·3	17·6
Rotterdam	23·5	19·7
Vienna	29·2	23·1
St. Petersburg	35·2	27·2
New York	30·6	22·4

New York shows the greatest improvement.

The discovery by M. Sabouraud of the microbe of seborrhœa (suet flow), or the "bacillus of baldness," attracted much attention, and a special meeting of the Paris Academy of Sciences was held recently, at which the matter was discussed. M. Brocq remarked that the seat of the bacillus was not in the hair follicle, and that its action on the skin could not be explained. M. Sabouraud had said it was from a toxin; but from his experiments the toxin apparently worked at a distance from the hair follicles, at least in the rabbit, while in man it acted locally if the bacillus was always the cause of the seborrhœa and the baldness. All clinicians knew that temperament played an important part in the matter of seborrhœa and alopecia (fox mange). As regards the latter, the arthritic diathesis had to be considered; as regards the former, the lymphatic. In a non-arthritic person baldness never occurred, not even when abundant seborrhœa was present. Clinically, seborrhœa must not be confounded with baldness. If baldness was always due to a microbe, it should be easily contagious, and it was not so, except as accessory to some other disease. M. Jacquet considered that the rabbit was not a good subject, for baldness can be easily produced in that animal by the simple application of bisulphite of lime. M. Darier stated the histological analogies between seborrhœa and baldness; but as the results on the clinical side were different from those of the laboratories, it was impossible, without further information, to identify the two lesions. M. Barbe said that many seborrhœic patients never had the least amount of falling off of the hair. M. Sabouraud replied, in effect, says Nature, that members used similar arguments when Pasteur laid the results of his studies of fermentation before them.

Disreputable Patent Competitions.

We have recently received a copy of a paper called the National Recorder, issued by a firm of Washington patent attorneys, claiming that a million copies of their journal are regularly printed, and who offer monthly medals and prizes for especial ability in invention, to inventors taking out patents through their agency. This is one of the many "catchpenny" devices bringing discredit upon the patent system of this country. In the heat of securing prize money, young men and mechanics are induced to take out patents upon unsalable inventions, squandering money and time to the ultimate benefit of no one except the patent attorneys. Perhaps for sale abroad such a medal may give an undue importance to a trivial invention, but we cannot see any way in which such a system can be of advantage in legitimate business. No one who has ever patented an invention has failed to receive from one or more companies very flattering letters concerning the value of his invention and its patentability abroad, with the offer of a medal or a diploma for a small fee, though the fee is always much greater than the value of the medal received and there is no intent on the part of the grantor of the medal beyond the deception of the unfortunate patentee who may be allured by their flattery. There are in France and in this country respectable patent competitions whose medals attest the excellence of inventions, but these competitions are not administered for the purpose of inducing applications for patents through particular firms, but are offered by such institutions as the Franklin Institute and the French Institute for the Encouragement of National Industry. These legitimate prizes are not fictitiously offered and their awards have real value, while such schemes as those presented by the firm in question can only have the effect of increasing the number of useless patents and of bringing discredit on the whole system of issuing patents.—The Journal of Electricity.

Eye Sanitation.

If one organ more than another in the human body should have all the benefit of prevention, it is the eye, and yet to what abuses do we not see it daily and hourly subjected, says the Independent. People will read while riding on jolting cars, they will read by a poor light, not reflecting how much wiser and pleasanter it is to pay money to the gas man than to the oculist. There are many expedients that will help to preserve the sight of workers who can have but little time to rest; by closing the eyes for a few moments, or by looking off at a distant object so as to change the focus completely, and thus resting those parts of the retina that have been in use continuously for a long time, much may be gained. Then when one feels that the sight is failing, do not delay going to an oculist, and having him furnish you with a formula for the glasses that your eyes need, and at the same time secure the services of a good optician. The "mathematics of the eye" are very well understood now, and the law that will make the light enter the eye at just the angle to correct the aberration that age has made will give you great comfort, and do much to prolong the usefulness of your eyes. The skillful way in which astigmatism and near-sightedness are now corrected is a matter to rejoice over. One person asks: "Is it not dreadful to see such numbers of young children going about the streets with glasses on? Are everybody's eyes degenerating?" Not at all. The child who, fifty years ago, would have been unable to learn to read from sheer inability to see the letters, is now able to keep up with his fellows, and escapes the inevitable headache that comes from eye strain, simply because a well-adjusted pair of glasses has been supplied to him. As to the carelessness of employers, in failing to provide a good light for men who write all day, and whose eyes must pay the penalty—there is no greater field for the application of the Christian rule "Do unto others," etc., than here. This is seen more often in the city than in the country; but even here, we should like to see the census of the men who have made it a matter of conscience to supply a perfect light for their clerks and other employes. Then, when you learn that a cataract is forming, do not despair; in these days of advanced surgery they are removed with but little injury to the vision. Tight shoes, tight collars and tight waists are detrimental to eyesight, by causing undue pressure on the brain; but of all the destroyers of this precious possession of perfect vision, veils are the worst. One wealthy oculist, owning a fine city mansion, in talking with a friend, saw a lady with a finely dotted veil pass. Said he: "Those are the things that have built my house." Very lately the following experiment was tried:

"Dr. Casey A. Wood, of Chicago, selected a dozen typical specimens of veils and applied the ordinary tests of ability to read while wearing them. These tests showed that every description of veil affects more or less the ability to see distinctly, both in the distance and near at hand. The most objectionable kind is the dotted veil. Other things being equal, vision is interfered with in direct proportion to the number of meshes per square inch. The texture of the veil plays an important part in the matter. When the sides of the mesh are single, compact threads, the eye is much less embarrassed than when double threads are employed. The least objectionable veil is without dots, sprays or other figures, but with large, regular meshes made with single, compact threads. Eye troubles do not necessarily result from wearing veils, for the healthy eye is as able as any other part of the body to resist the strain they impose upon it. But weak eyes are hurt by them and prudence should teach not to strain healthy eyes too much."

ISAAC F. BASSFORD, of Helena, Mont., is probably the oldest inventor in the world. He is ninety-seven years old, and is now trying to find some one to buy a half interest in a new invention.

Archæological News.

Ancient Egyptian doctors knew the groin and the perineum and had a name for each, which M. V. Loret, of Lyons, has discovered in medical papyri. The terms occur in the celebrated Ebers papyrus, but the meaning had not been proved.

The museum of African antiquities in the art of the Mussulman has been opened at Algiers, and a large number of antiquities have already been placed in it. The museum is in one of the most beautiful of the public gardens. It is in a position which can hardly be surpassed.

An important archæological discovery has been made near Thermopylæ, between the old barracks and the water mills. On making excavations there were laid bare a number of sarcophagi containing ores, vases, coins and medals. It is believed that the skeletons were the remains of the Spartan hosts of Leonidas.

Another fragment of the famous Parian chronicle, part of which is in the Ashmolean Museum at Oxford, has been found on the island of Paros. It is very important, as it contains the chronology of the years from 336 to 299 before Christ, the period of Alexander of Macedon, and of the Diadochi, the generals who divided his empire among themselves.

The foundation stone of the new museum destined to contain the collection of Egyptian antiquities of Gizeh was laid in April by the Khedive, the ceremony being attended by the ministers, high officials, diplomatic corps and a few invited European residents. An Egyptian monolith coffer which dated from about 2500 B.C. was used to hold a box containing the documents, coins, medals, European journals, etc.

M. Berthelot, the chemist, reports that the copper objects found at Negadah and Abydos, in Egypt, by M. De Morgan are of pure copper and not of bronze. Among them are a button, a curiously shaped pair of scissors, and some needles. The inscriptions found on the tombs are so old that they have not, as yet, been deciphered. They are believed to date from the First Dynasty or earlier. M. Berthelot thinks that the evidence of a copper age is conclusive.

The design for the monument to be erected to the late Lord Leighton in St. Paul's Cathedral—where the late president of the Royal Academy is buried—has been submitted to the Prince of Wales and approved by his royal highness. The memorial is to be in the form of an altar tomb, supported by emblematic figures, and will be executed by Thomas Brock, R.A. The committee, of which the Prince of Wales is chairman, announces that the monument will cost £2,500, of which all but £100 has been subscribed.

Sir A. Wollaston Franks, K.C.B., president of the Society of Antiquarians and for many years the keeper of the British Museum, recently died in London, at the age of seventy-two years. His chief collections were of Chinese and Japanese porcelains and of English pottery. These collections have been presented to the British Museum. He also had probably the finest collection of rings in existence, besides one of gold ornaments and one of book plates. His greatest archæological service was the discovery of what he called "the late Celtic" period of art.

The Journal Egyptien announces the finding of an excellently preserved avenue of sphinxes, leading to a temple built by Rameses III, near the outskirts of Luxor. The entire place was buried under the sand. The most of the temple, as well as a considerable portion of the avenue of sphinxes, has been uncovered.

M. De Morgan has returned to France, leaving the Egyptian exploration in the hands of Mr. Loret, the well known Egyptologist from Lyons. He was his collaborator in the first volume published on the Dashner. M. De Morgan will in the fall take the direction of extensive excavations in Persia.

It is generally thought that among the ancient civilized peoples the Romans had the most perfect system of water supplies. But excavations in Greece have shown that in several respects its inhabitants were more advanced in the art of laying aqueducts than their Italian neighbors. Their water was brought to them in subterraneous ducts, so that greater purity was secured, and the liquid was kept cool. The very fact that the Roman aqueducts are more visible, as being over ground, probably accounts for the fact that Roman constructions have enjoyed worldwide fame, while the superior Greek art was unknown in this respect.

M. Osiris, who has bought the historic château of Malmaison in order to save it from ruin, has intrusted to M. Daumet the task of overseeing its repair and (to a certain extent) restoration, says the Builder. The personal apartments of Napoleon are to be brought back to their original condition—his library, his private room, and Josephine's bedroom, dressing room, and bathroom. The first floor, which is in a ruinous state, is to be rebuilt and transformed into a series of galleries in which will be placed all the souvenirs, artistic objects, furniture, bronzes and medals which are connected with the career and the reign of Napoleon.