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|  | NEW YORK, JANUARY 26, 1895 |  |
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THE BOULEVARD LAFAYETTE NEW YORK CITY-VIEWS FROM DIFFERENT POINTS ON THE BOULEVARD-BIRD'S EYE VIEW OF THE BOULEVARD AND CONNECTIONS.-[See page 58.]

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## american firearms in germany

The German government is celebrated for its car of its people. Its laws are enacted and applied to the conservation of the health and lives of the populace whether threatened by impure foods or other causes Sometimes the German laws affect the importation of American goods. The German inspection of the smaller class of firearms has operated to completely prevent the sale of American guns
The German la ws provide for the proving by actua firing test of all firearms exposed for sale in that coun try. The law passed in 1891 states that the barrel and locks must be tested in official testing establish ments, and if approved must be stamped. The law describes the testing, which, according to circum stances, consists in a single or a double shooting trial. Any parts of the piece which fail to stand the trial are destroyed by being sawed into or by being broken up.
The law admits as valid the proof marks of the Bel gian government "proof house," and also the proo marks of the Gun Makers' Company, of London, and of the Birmingham "proof house." The effect is that American guns are practically excluded from the Ger arrange for the establishment of a proof house whose mark or stamp shorld be acceptable to the German government. As it now stands, all American guns have to be subjected to trial in Germany, and the ex pense has proved to be prohibitive. Since the accept ance of the English and Belgian proof marks, the business in American guns has come to a standstill There is an excellent opportunity for the gun trade of this country to take some action which will open for us the German market. It might have an excelen in the direction of proving arms for our domestic trade
the statutes of limitations in patent suits
To the doctrine of diligence in prosecuting cases within the Patent Office is now superadded by a recent decision of the United States Supreme Court an affir mation of the need of diligence in suing for damages
for infringement. It is held that the statutes of limitation of the different States apply in the defense of actions at law for damages for infringement of pat ents. The decision, dated January 7, 1890, was de Campbell v. City of Haverhill.

The action was brought to recover damages for in fringement of the claims of a patent, which infringe ments were committed between October 10, 1877, and December 20,1880 , and was begun more than six year after the last date of infringement. It was an action at law, brought in the United States Circuit Court in the district of Massachussets. The Massachusetts law declare that a limitation of six years applies to all actions of tort-that such actions must be begun within six years of the time when the acts were committed The Circuit Court decided that the statute of limita tions applied to this case. The Supreme Court up holds the Circuit Court
The United States Revised Statutes, section 721 declare that "the laws of the several States, except etc., shall be regarded as rules of decision in trials at common law, in the courts of the United States, in cases where they apply." This section has been repeatedly held to apply to the statutes of limitation of different States. The question then came up as to whether this section would apply in cases purely within the jurisdiction of the Federal courts, such as a patent case, based entirely on the United States statutes. In the words of the decision it is ex pressed thus: "It may be well questioned whether there is any sound distinction in principle between cases where the jurisdiction is concurrent and those where it is exclusive in the Federal courts. The sec| tion itself neither contains nor suggests such a distine tion.'
The court holds that an action for infringement of a patent should involve no privileges denied to the plaintiff side in other actions. It holds that it would be an anomaly to establish a class of actions subject to no statute of limitations. If this were the law users of patented inventions, perhaps innocent of any wrong intention, might be "fretted" by actions brought against them after all their witnesses are dead.
The court, therefore, finds that practical considera tions are favored by their decision that the statute of limitations does apply, and a quantity of decisions are quoted to illustrate the subjection of rights created by Congress to various laws of individual States.

It may very pertinently be asked why this point wa not settled long ago, for it has never been presented directly to the Supreme Court until now. There were two cases found bearing directly on it, but they wer Circuit Court cases and were decided in exactly opposite ways. The reason why the Supreme Court has that that the majority of patent cases are brought for present infringement of a live patent and ask for an little mand an accounting. Proverjunction is th
object principally sought. But in the case just spoken of, the patent had expired and damages were sought for infringements committed during its life. Such actions are generally regarded as of little value to any ne except the lawyers and masters or referees, and hence are seldom brought.

## The Telautograph in Earope

From private advices received in Chicago, the West ern Electrician learns that the long-expected test of Gray's telautograph over the long-distance telephone ne between Paris and London came off on the nigh of December 15, and resulted in a great success. The line is under the control of the French and English governments, and as no newspaper men were present no publicity has heretofore been given to this interest ing and important event.
Some delay at the outset was caused by a broken wire at the Paris end, but after this was remedied the telautograph representatives wrote back and forth fo an hour and a half without any trouble. The French government was represented by three engineers, who were delighted with the result. The distance ove which the writing was electrically reproduced was $3121 / 2$ miles, and all agreed that it was a wonderful spectacle to watch in Paris the instantaneous reproduction of the movements of a pen in the hands of a man writing in London.
Of the $3121 / 2$ miles of line, 23 miles is submarine cable and $51 / 2$ miles consists of buried conductors at Paris. All of the English land line is overhead. Current wa supplied, at the London end, by a battery of bichro mate cells, two rows in parallel, the voltage being 57 while at Paris there were storage batteries and Callaud ells, the latter being arranged four rows in parallel, the potential being 63 volts. The resistance of the circuit was 716 ohms and the capacity was 11 microfarads The platen resistance at each end was 550 ohms. The difference in voltage at the ends of the line was mere ly an incident due to convenient arrangement of the batteries. No change from ordinary conditions was made in the machines or adjustments, except in the Morse relays.
The actual counted speed of transmission was 18 words in 36 seconds at one time and 22 words in 40 seconds at another, the average number of letters in each word being five. The writing was perfectly leg ible, but somewhat ragged at very high speed.
The French minister of posts and telegraphs, with he officers of his staff, visited the laboratory at Pari and inspected the machines, appearing to be much nterested. One of the department engineers will nake an official report of the test to the government f France.
The telautograph was exhibited and explained at a pecial meeting of the Societe Internationale des Electriciens in Paris on December 18. M. J. Voisenat a telegraph engineer, delivered the lecture, which was illustrated by elaborate diagrams and by the actua operation of a set of the machines. About 300 person were present and all were greatly interested and eager to obtain samples of the electrically transmitted writing. At the conclusion of the lecture A. PostelVinay, the president of the society, spoke in terms of warm praise of Dr. Elisha Gray and his wonderful in vention.
Mr. Cushing, in a recent letter, makes amusing allusion to the difficulties experienced by the Frenchmen in pronouncing American names. Dr. Gray is known as Eleezi.g-r-r-r-ay and Mr. Cushing has become Mon sieur Coosteen.

Military Science at Yale University.
The Sheffield Scientific School of Yale University ffers this year two interesting courses of instruction in "Military Science and Tactics" and in "Military Engineering." The first course is obligatrry upon the whole senior class in all departments. The study in both courses will be carried on for the most part by ectures, though practical instruction in drill will be siven in the School of the Soldier and School of the Company, if a number of students desire it. The names of the three most distinguished students in this department are sent to the adjutant-general of the army and are published in the Army Register, and also are ent to the adjutant-general of the State to which th student belongs. The object of the instruction of both these courses of study, it is stated, is to disseminat military information and to a waken interest in the ap plication of arts of peace to those of possible war.
The courses propose to take up and discuss such topics as military economy, the American military problem, modern war on field and map, statistics and logistics, strategy and campaigning, the use of artil ery and infantry, the minor tactics of war and many ther similar problems. And in the course on military engineering lectures will be delivered on such topics as sstems of fortifications, sea coast defenses, hasty in trenchment, military bridges, ballasting machines modern ordnance, military electric installation, etc These courses will terminate with examinations, and a pecial military certificate will be awarded by the reg ular army officer in charge of the department.

An Attack on the Diphtheria Antitoxin. A paper of the greatest interest and importance wa read at a recent meeting of the Berlin Medical Society by Dr. Hansemann. The paper carries especia weight because the author is announced as an assistant of Professor Virchow, and his work and conclusions are presumably indorsed by the dean of modern pathology
Dr. Hansemann comes out in flat contradiction of the alleged properties and powers of the Behring immunizing serum. He asserts that in Bretonneau's diphtheria the Loeffler bacillus is not always present and is not its sole cause. This view will appeal to some clinicians and bacteriologists at least, for it is admitted that the Loeffler bacillus is present in some very mild cases of diphtheria as well as in apparently healthy throats, while, on the other hand, it is also known that a streptococcus diphtheria (or sore throat) is sometimes extremely severe and dangerous.
Dr. Hansemann asserts that Loeffler's bacillus is found constantly in rhinitis fibrosa, without producing dipththeria, and that these alleged pathogenic microbes may multiply in the throat without modifying the course of the diphtheria. All this, we believe, will have to be admitted by pathologists who have without bias studied the disease. Dr. Hansemann asserted further that in the case of animals an injection of a Loeffler bacillus culture caused, not diphtheria, but a disease sui generis, the Loeffler bacillus disease; that epidemic diphtheria had never been observed in animals; that guinea pigs, in contact with diphtheria patients, had never taken diphtheria; but that a case is known where a cat, with which a child suffering from diphtheria had played, had developed all diphtheria symptoms without, however, any Loeffler bacilli being discoverable.
He then proceeded to describe the three qualities claimed for the antitoxin-namely, its therapeutic ac tion, its harmlessness and its immunizing power. He said that the present statistics give an erroneous im pression (as already shown by Gottstein in his recently published pamphlet), as many children suffering from lighter forms of throat complaints are now sent to the hospitals to be treated with serum, thus swelling the proportion of cured cases, which would, he said, otherwise not be higher than the usual average. He said that the serum injections could by no means be considered harmless, as affections of the kidneys had fre quently followed, in one case more severe in type than had ever yet been observed after diphtheria. He said that it was clear, from Behring's new directions to in-
crease the immunizing dose from sixty to one hundred and fifty unities, that no results haveyetbeen achieved as far as immunizing goes.
The final criterium of the efficacy of the antitoxin treatment is clinical experience. Even if Hansemann's pathology is correct, therefore, it will make no differ ence, provided the diphtheria patients get well.
The difficulties in estimating exactly the value of a new therapeutic procedure, which comes loudly her alded and solidly indorsed, are very great. Unusual attention is paid to every patient, greater watchful ness, more thorough supervision and earlier diagnosis and treatment are always found. These factors must all be considered in estimating the results of the serum treatment

It would be not only a disappointment to all wellwishers of humanity, but would be a serious blow to the rising prestige of medical science, if, after all, the serum treatment should fall short of its high expecta tions.-Medical Record.

## The Late A. L. Dennison.

Mr. Aaron L. Dennison, who was known as the father of American watch making. died in Birmingham, England, Jan. 11, 1895, at the age of 82 . While still a youth he was apprenticed to a watchmaker, and soon became acquainted with the many different Swiss and English watch mechanisms. He was struck, during a visit to the Springfield Armory, with the idea of applying the interchangeable plan $t$, the manufacture of watches, muskets at that time being made on that system. It was a long time before he found capitalists to enter into watch making. At last in 1850 he formed with Messrs Howard, Davis and Curtis the American Horologue Co. Mr. Dennison made a trip to England and found that American watches could be made which would successfully compete with the English ones, where from fifteen to twenty people in different places were employed on each watch. A factory was built in 1851 at Roxbury, Mass., and a model watch was made by Mr. Dennison. It was designed to run eight days with one winding; this pian was, however, abandoned in subsequent watches. The first hundred American watches were put on the market in 1853. It soon became necessary to enlarge the factory, and the whole plant was moved to Waltham, Mass. The company was not prosperous, and in 1857 it was forced to make an assignment. The firm then became Appleton, Tracy \& Co., and Mr. Dennison was continued as superintendent until 1861. In 1859 the firm name was changed to the American Watch Co. After leav changed to the American Watch Co. After leav-
ing the American Watch Co., Mr. Dennison formed
with A. O. Bigelow the Trement Watch Co. In
1866 Mr . Dennison retired and went to Zurich, Switz erland, where he made an unsuccessful attich, Switz troduce American methods into Swiss watch making. He then went to England and assisted in organizing the English Watch Co. In 1875 he began the manu facture of watch cases in Birmingham, the firm being known as Dennison, Wigley \& Co.

A few years ago Mr. Dennison made a trip to Amer ca and received an ovation at every watch factory he visited. Mr. Dennison had many reverses in business, so that his weaith at his death was not great. Mr Dennison remained a true American to the day of hi death, and the world is greatly indebted to him as th pioneer of a great American industry.

## Progress of the Bicycle.

The recent Bicycle Exhibition, Chicago, was a great success. The attendance was very large and the ex hibits very interesting. The same may be said of the exhibition at Madison Square Garden, New York January 19 to 26. The Wheel has the following :
In cycle construction the one fact which stands out above all others is that the metal rim is well nigh thing of the past. Wool rims are almost universally used. Nearly every maker present will use them almost exclusively hereafter. The Eagle people will use their aluminum rim, and Gormully \& Jeffery a steel rim, but both are prepared to furnish wood rims when desired, the latter even estimating that nine-tenths of their output will be fitted with the wooden felly. This universal use of wood rims will undoubtedly amaze and possibly flabbergast John Bull and his followers.
The reduction in weight has also reached a startling point. Twenty-pound road wheelsare plentiful, and the manufacturer who is carrying anything over 28 pounds is the exception and not the rule. This information is also calculated to cause the English gentleman to wrinkle his brow and scratch his head. This marvelous reduction in weight would have been considered nothing short of phenomenal two years ago. Even some of the most intelligent and best posted ot the mechanical minds present confess that the light weight bicycle of to-day has no parallel as a sustainer of weight. They are even at a loss to explain how and why they can hold up. The simple fact remains that they do. Simply to show what can be done, the Black Manufacturing Company and Munger Cycle Company are exhibiting wheels weighing less than nine pounds. They have been and can be ridden, but are not offered as practical mounts.
A general narrowing of tread, and general use of detachable sprockets, both front and rear, is another marked feature of this year's wheels, $51 / 2$ inches appears to be the average tread, although many that are nar

## ower are very much in evidence.

With the feather-weight wheels has come a great increase in the new gears. A rough average would make 66 inches the standard gear for 1895. Seventy inches and over will be in quite general use next year. Two changeable speed gears are in evidence, and attrac considerable attention, but none of the larger makers have yet seen fit
special wheels.
Large tubing is used in very many instances, but is not employed so generally as advance reports had led one to expect. In the Lozier wheels $1 / 4$ inch tubing is wed. This is the largest in evidence. It
Adjustable handle bars have apearance
Adjustable hande progress The Pope Co., Lozier \& Co., Peerless Manufacturing Co., Waltham Cycle Co., and Syracuse Cycle Co being among the manufacturers who adopted the ad justable bar. The Warwick Cycle Manufacturing Co. Yost Manufacturing Co. and Stearns \& Co. used it last year and still retain it. The Pope Co., however is the only concern which is fitting the adjustable bar to their entire output. The Wheel can hardly believe that the demand and necessities will call forits general use, and scarcely expects that it will become a per manent feature, not even of the Columbias. Of the new adjustable bars shown at this place for the first time, that used by the Peerless Co. on their Triangle wheel appears to be about the simplest and mos practical and ingenious.
A deal of attention has, as usual, been lavished on the crank bracket groups. The general desire to ob tain a narrow tread in many instances has led to some ngenious but complicated creations. There also seems a tendency toward the use of a crank and crank axle in one piece. The object being apparently to lessen the number of nuts, washers and keys usually employed as a fastener.
A very general change in the construction of pedals is also observable. A projection on the outside is now rarely to be seen. Nearly all are either rounded or made flush or very nearly flush with the outer pedal plate.
No little attention has been given to the method of inforcing the joints. On many wheels the reinforc ing tube is on the outside. Something distinctly nove the Hoffe is a triangular reinforcement employed in
ined entirely to the joints, but runs the entire length of certain tubes. The Union Cycle Co. and Hay \& Wil letts are using an X -shaped reinforcement at all joints. Of course nearly all makers are now offering several heights of frames. In this respect it is worthy of note that all heights are built with the top bar of the frame perfectly horizontal, except in the Rambler, Columbia and Victor wheels. These firms build their highes frame with a perfectly horizontal bar, but in the wheels of shorter reach it is placed at an angle.
A distinct advance in the construction of ladies wheels is a noteworthy feature of the 1895 outputs. In previous years, wheelmen had but little more than Hobson's choice, and a very weighty one at that. Now, however, the ladies' wheels have been reduced to the same weights, proportions and equipments as those built for men's use. Not only this, but very many of he firms are carrying three and four patterns of ladie wheels-a straight frame, a loop frame, a demi-loop rame and a diamond frame safety, with 26 inch wheels, built specially for ladies' use
The Chicago show has also developed what the Wheel stated some months since-that there was an unmistakable demand in the air for tandems.
At least half a dozen firms are this year manufactur ng bicycles "built for two." All, or very nearly all, re built on most attractive lines, and are of the double steering type and marvelously light; few of hem approach 40 pounds.

## The "Missing Link" Found at Last.

No publication of late date is likely to excite mor interest than a quarto of forty pages which has just been issued from the local press of Batavia, with the itle, "Pithecanthropus Erectus. Eine Menschenan iche Uebergangsform aus Java. Von Eug. Dubois, Militararzt der Niederland. Armee "
This noteworthy essay contains the detailed descrip ion of three fragments of three skeletons which hav been found in the early Pleistocene strata of Java and which introduce to us a new species, which is also a new genus and a new family, of the order of pri mates, placed between the Simiidæ and Hominidæ-in other words, apparently supplying the " missing link" between man and the higher apes which has so long and so anxiously been awaited.
The material is sufficient for a close osteological comparison. The cubical capacity of the skull is about wo-thirds that of the human average. It is distinctly dolichocephalic, about $70^{\circ}$, and its norma verticalis as tonishingly like that of the famous Neanderthal skull The dental apparatus is still of the simian type. but less markedly so than in other apes. The femora are singularly human. They prove beyond doubt that this creature walked constantly on two legs, and when erect was quite equal in height to the average human male. Of the various differences which separate it from the highest apes and the lowest men, it may be aid that they bring it closer to the latter than to the ormer
One of the bearings of this discovery is upon the original birthplace of the human race. The author believes that the steps in the immediategenealogy of ou species were these: Prothylobates: Anthropopithe us Sivalensis: Pithecanthropus erectus: and Homo sapiens. This series takes us to the Indian faunal province and to the southern aspects of the great Himalayan chain, as the region somewhere in which our specific division of the great organic chain first came into being.-Science.

## Treatment for Cleft Palate.

An interesting article, by Eugene F. Hoyt, M.D., on the successful treatment of cleft palate appears in the current number of the Brooklyn Medical Journal Cleft palate is a malady, it may be seen, which no only causes great physical suffering, but acute mental distress. There are two methods of treatment gen rally employed, namely, surgery, which causes grea pain and suffering, and secondly, by means of mechan ical devices.
After an intelligent review of the subject, the article alls especial attention to the invention of a flexible palate, made some thirty years ago by Dr. Norman W Kingsley, whose office is now at 115 Madison Avenue New York City. It appears that in cleft palate ther is an absence of tissue, and however closely the sides of the cleft may be brought together and united, per fectly normal speech can rarely be produced. . The artificial palate replaces the missing tissue. It is per fectly flexible and may be so adjusted as to be brought under muscular control, and this enables the patient to articulate with ease and naturalness.

For the Madagascar expedition France is construct ing as fast as possible a flotilla of light draught gun boats and barges. Eight of the gunboats draw only sixteen inches of water and are 85 feet long by 17 fee beam. Four others are some what larger, with a draught of 24 inches. Engines and boilers are on deck and can produce a speed of six and a half knots. Each gun oat is armed with two one and a half inch rat-d-fire guns, protected by armor plating.

## improved artificial limbs.

Rapid travel in the streets and suburbs of our cities, whether by cable cars, electric trolley or steam, is becoming more and more a necessary condition of modern American life, even though it be accompanied by an increased number of accidents. Although our war has long passed, cases of amputation are constantly being attended to in our hospitals. The electric motor and steam engine continue to make as many cripples as did the missiles of war, so that we have an army of mutilated men and boys in whose interests the highest mechanical skill has been invoked in the production of an artificial limb that shall imitate with precision the movement of the natural member. Very few of our readers probably are familiar with the internal construction and method of attachment of these appliances, which add so greatly to the comfort, moral and physical, of those who have been unfortunate enough to require their service. We give in the accompanying illustration details of construction of a steel skeleton leg manufactured by D. W. Kolbe \& Son, of 1339 Arch Street, Philadelphia, Pa.
The principal conditions called for in the production of a false leg are strength, lightness and absolute reliability and freedom of movement at the joints, while at the same time the member must minister to the comfort of the wearer and must present a natural appearance while at rest as well as in motion.
The leather socket, as shown in Fig. 1, is made to perfectly fit the stump, and is firmly attached to a stcel band shown at a. This socket, while compara tively rigid, has sufficient elasticity to give more comfort to the stump than is possible to obtain in the old style of artificial leg, where the stump is necessarily placed in a rigid wooden box. The open work of stee gives perfect ventilation to the stump, and its framework is cut from a solid piece of high grade metal and is without rivets, thus making it light and very strong. The knee joints shown in Fig. 2 have cast steel bear ings and a take-up joint, so that any looseness is ob viated by merely tightening the screw, a, which is clamped by the small screw, b. The foot itself, shown in Fig. 3, is novel and unique, and in its construc tion so little metal is used that its lightness is re markable. The wood used is fine grained willow. The toe joint is entirely of wood and yet very strong, a result attained by making the rod of the under draw spring, a, of rawhide; this, together with the pure rubber cushion, $b$, gives ample strength to this joint and at the same time avoids the use of any metal to increase the weight, at a point where weight is most uncomfortable to the wearer. The ankle joint is made with a taper steel pin, c , which takes the stee straps, d, d', extending from the steel framework, closely fitted to square bearings, so that the pin is rigidly held in place to the upper part; the bearing, e, is of phosphor bronze, fitted to octagon holes in the bolts, $\mathrm{f}, \mathrm{f}$, which hold it rigidly to the foot. This ankle motion is con trolled by the spring, g , which is held in place by a hickory pin, h. The pure rubber cushions, b , $\mathrm{b}^{\prime}$, unde the heel and ball of the foot, are the most recent im-

steel artificial himbs.
provement, relieving the jar from the stump and giving the natural elasticity to the wearer.

The entire weight of the leg complete is only five and a quarter pounds, and the action of the whole is so natural that in use it cannot be easily detected from the natural limb. This artificial leg is highly recommended by those wearing it, and particularly by those who previously wore the old style of wooden leg; among
the latter is Dr. Mordecai Price, of Philadelphia, who has worn one of Kolbe's steel legs for the past fifteen years.

## THE MICROGRAPH.

The micrograph is an interesting little instrument for showing a succession of photographic pictures, such as portraits, landscapes, statuary, paintings, and all kinds of notable objects. It consists of a case which carries a microscopic lens and also a transparent wheel or disk, on which the pictures are photographed; and the pic tures are viewed by simply revolving the disk with the finger so as to bring the pictures successively under the lens, by which they are magnified or enlarged. The mode of using the instrument is shown in Fig. 1.


The full sized instrument is given in Fig. 2, from the side of which one edge of the picture disk is seen to project. Fig. 3 shows the picture disk itself. The cas can be readily opened and new photo. disks put in, bringing thus other series of pictures. In this way the photographic representations of hundreds of remark ble scenes and objects may be preserved in a ver mall space, yet always ready for interesting study and

examination. 'The micrograph is destined to become a very popular and useful instrument. Mr. F. W Gardam, of 58 Ann Street, New York City, is the inventor and sole manufacturer. Patented in the United States and foreign countries.

## Edward Swift's Comet.

The discovery of a faint comet by Edward, son of Dr. Lewis Swift, of the Lowe Otservatory, Mt. Echo, Cal., brings once more to the attention of astronomers the lost comet of Di Vico. The earliest orbits of the Swift comet suggested that it was probably a periodi cal one, and some points of resemblance in its elements make it quite possible that it may indeed be that in teresting object
Di Vico's comet is the longest and least well known of the short period comets. It was discovered by Di Vico at Rome on August 22, 1844, and near the end of the month it became visible to the naked eye. It soon became evident that the observations could not agree with a parabolic orbit, and elliptic elements were com puted by Brunnow and others, the period of the comet being established as 1,993 days. The next return was computed for 1850 , but it was found that during its time of possible visibility its place would lie so close time of possible visibility its place would lie so close
to the sun as to be overpowered by his light. The next to the sun as to be overpowered by his light. The next
return was fixed for 1855, but the object was not seen at that time or at any time since. It has therefore been known as Di Vico's lost comet. Le Verrier has shown that the comet was identical with that of 1678.
The orbit which was computed by Brunnow has not been forgotten by astronomers, and they have by no means given up the hope of finding it at some time Finlay's comet in 1886 was supposed to be the lost one, but a close consideration of its orbit shows that it is not the same.
When the possibility of the identity of Swift's come with Di Vico was known, the computers in this coun try as well as in Europe became at once exceedingly anxious to secure further data. In this the Europeans have had the advantage, for in this country not more record is not a creditable one to American astronomy

It is true that this object is a faint one; at the same time it has been seen in a six-inch telescope at Lick and in a nine-inch, by Father Searle, at Washington. It is surprising that with all the large telescopes of the country the whole month of December should have to show only three or four American observations alto rether. From this scanty data, Father Searle has computed a second and later orbit, but he is unable to prove positively the identity.
In Europe, however, Schulhof seems quite positive that the two objects are the same. He expresses his reasons in a late issue of the Astronomische Nachrich ten, reasons which it is not necessary to repeat here If the identity can be proved, there are several inter esting matters connected therewith, and the discovery is of great importance. In the first place, the redis covery of a comet lost for some fifty years is remark able, and further it seems curious that the comet could have returned again and again to perihelion and yet not have been seen. In this latter respect, the infor mation secured within the last few years is quite to the point, and Schulhof suggests that an outburst might have made it visible for a few days in 1844 at a brilliancy very much greater than its normal brightness. Severa comets have been observed in such outbursts, mor particularly the Pons-Brooks comet of 1888, the Brooks comet of 1889 , and especially the Holmes comet of 1892. Such is the story of the comet Edward Swift. It is the return of some comet, most probably that of Di Vico. It is most important to secure as many observations as possible; the more so, since in 1885 it must have passed very close to Jupiter and will bestill more close ly approached in 1897.-Boston Commonwealth.

## Mexican Onyx.

Mexican onyx has suffered a gradual decline in value for many years past. It is generally becoming known that Mexican onyx is not true onyx, but a spe ies of marble. It is really an aragonite and is com posed of calcium, oxide of iron and magnesium. The resence of these last two elements gives it its beauti ful color. It is said the use of African marble and other cheap stones is replacing it.
Mexican onyx is easily worked and has been used not only for building purposes, but for ornamenta household articles such as lamps, table tops, mantels, etc. It was used by the ancient Mexicans for masks, dols, and similar small objects. The price of all such articles has of late considerably decreased. Mexican onyx now sells in the rough at from $\$ 6.00$ to $\$ 20.00$ a onyx now sells in the rough at from $\$ 6.00$ to $\$ 20.00$ a
cubic foot. Very large pieces bring more than this cubic foot. Very large pieces bring more than this
proportional price. When it is sawed into slabs, $\$ 2.00$ per cubic foot is added to the price. The polishing furthermore, greatly increases the value of the stone In many cases there is a loss of 40 per cent of material in preparing it for wainscoting, so that the finished product is worth about $\$ 6.00$ a foot. The material is too valuable to be used in places where it would be exposed to the weather.

## AN IMPROVED VAULT LIGHT

According to the improvement shown in the illustration, the framing or body of the vault light is com posed of channel and angle irons, braced at special points by T, I, or angle irons, and the construction is such that the lights may be arranged in any desired order, each light being firmly held in position by one of the channel irons, and the spaces bet ween the light being easily filled with cement or other suitable material. A patent has been granted for this invention


## clopp's vault light

to Mr. George B. Clopp, of No. 3028 Market Street Philadelphia. The parallel flanges of the channel irons are tied together by bolts to form a rigid structure, and the connected irons are surrounded at the sides and ends by a frame of angle irons, whose vertical members are bolted to the marginal portions of the connected channel irons. The entire frame is braced and strengthened by another set of angle irons, and the frame and body are strengthened by T irons, which support the bottom portions of the channel rons, and are connected with the outer angle irons by brackets. This light is quickly and economically made, as all of its parts are stock material, so that it may be readily connected and built up for any situa tion where a vault light is desired.

THE NEW TELEPHONE SYSTEM OF PARIS. Despite its novelty, since the establishment of the first telephone lines dates back scarcely more than fifteen years, there are few industries of which we have had to record so numerous and so radical transformations as that of telephonic communications. formations as that of telephonic communications.
These incessant modifications, of which it is difficult to These incessant modifications, of which it is difficult to see the end or even the retarda
the special exigences of cities and states, in part to the unexpected increase in the number of subscribers and communications, and in part to the accessory services that are daily grafted upon the main service and peculiarly complicate the organism thereof.
The system, limited at first to a few subscribers not far distant from the center of the city, has become extended. It has been necessary to subdivide it by dividing the city into a certain number of districts, connected by an equal number of offices, which are themselves connected with each other by auxiliary lines arranged in a stellate polygon, that is to say, that permit of connecting any two subscribers in passing through two auxiliary offices at a maximum. After the city service, the progress made in telephony has permitted of rendoring the communications interurban, and then, in a certain measure, international. Let us mention, too, the public telephone booths, the multiple subscribers on one line in common, the theatrophone, etc., which have, each of them, special exigences.
All these complications of service, the necessary consequences of the very success of telephony, have brought to the surface hard problems, of which the solution has not always followed the new needs with sufficient closeness. In many cases, even, such or such a rational solution has quickly lapsed into desuetude, and, until a new order, it seems as if a perfect telephone service of a nature to give full and rapid satisfaction to the public will constitute an ideal as irrealizable as the philosopher's stone and perpetual motion. Such difficulties, upon which we cannot dwell too long, for the public is generally ignorant of their existence or does not sufficiently appreciate the importance of them, are particularly numerous at Paris.
The public and the administration have fallen into habits that they will renounce with difficulty and that naturally render the service more complicated and consequently less rapid.
In the najority of the large European and American cities, the subscriber is called up by the number of his apparatus. In France, we have still, and have had for a long time unfortunately, the call by proper name, with a telephonic population of trom 13,000 to 14,000 subscribers, including one hundred mutations per week, a somewhat floating personnel, voluminfloating personnel, voluminloss of time or to errors, especially whe index lead to des Telephones has, from the outset, given a good ex- by auxiliary lines. We described this system in it Mr. Durand or Mr. Levy withoutly when one asks for ample by establishing all its lines according to this of the subscriber with the too common proper name $\begin{gathered}\text { system. } \\ \text { After these general considerations, let us return to }\end{gathered}$ in question. The calling up of the office by the sub- the telephone system of the city of Paris, a simple and scriber and of the subscriber by the office is effected by a battery, while in other countries magnetic calls that lead to more simple arrangements are employed.

From another point of view, the use of exclusively subterranean telephone lines, generally placed in the sewer, increases the expenses of installation in a cer tain measure and complicates the surveillance and the search for defects. We speak of the double line only as a reminder, for, sooner or later, the development of the electric industry will oblige all the urban lines to
adopt what is known as the double wire system, and


Fig. 1.-entrance of the cables of 104 conductors into the cellar of the gutenberg STREET TELEPHONE office.


Fio. 2.-DISTRIBUTING BOARD OF THE TELEPHONE CABLES.


Fig. 3.-PRESS FOR COVERING THE TELEPHONE CABLES WITH LEAD.
after the discovery of the tedephone, three companies asked for and obtained concessions for the organiza tion of telephone lines exploited according to three rudimentary systems, but sufficiently different to ren der the putting of the three lines in communication impossible. Soon afterward, a fusion occurred, whence arose, on the 10th of December, 1880, the Societe Gene le des Telephones, which, at the beginning of 1881 hich, at the beginning of 1881,
had 300 subscribers. A few figures will permit of forming an idea of the truly extra ordinary development under gone by the telephone system since that epoch, and especially since the somewhat un feeling acquisition of the service by the state in Septem ber, 1889 .

At the end of 1880, the So ciete Generale des Tele phones had but 300 subscribers; at the end of 1881, the number had increased to 1,602 , at the end of 1882 to 2,692, at the end of 1884 to 3,700 , at the end of 1885 to 4,054 , and at the end of 1889 , shortly after the acquisition by the state, there were at Paris 8,306 subscribers, and, at the end of 1891, 9,635 ; while the figure that it will be neces sary to put down for the beginning of 1895 will be 14,000 , if it does not even exceed this figure.
At the acquisition of the lines by the state, the tax was reduced from $\$ 120$ to $\$ 80$. and this reduction led to so rapid an increase of the number of subscribers that it became necessary to entirely modify the processes and the communicating apparatus in order to respond to the re quirements, which, it must be admitted, exceeded the resources of the art and which had not as yet manifested themselves so rapidly in any other city in the world, even in America, where, nevertheless, telephony had birth, but where higher tariffs, with good reason, curtailed the number of subscribers. We say with good reason, contrary to the general public opinion, for if, in large cities, the prices were low enough to permit from 150,000 to 200,000 persons to become subscribers to the telephone, the latter would no longer render any service, in conse quence of the excess of the number and the slowness of the communications. The expenses of establishment, of maintenance, and of person nel would even no longer be covered by the receipts, since all the expenses sensibly in crease as the square of the number of the subscribers while the receipts, based upon a fixed tax, increase only proportionally. Sooner or later and by the very force of cir cumstances, the price of $\$ 80$ will become inadequate, and it will be necessary either to increase it or to make the budget support the deficit. The subscribers to the telephone will thus become new privilegees of the state.
In 1889, at the time of the forced cession of its system of lines, the Societe Generale des Telephones, which had bout 6,000 subscribers in Paris, was exploiting this sys tem by the aid of twelve district offices connected
by auxiliary lines. We described this system in its time. Its principal advantage was that of reducing the mean length of the subscribers' lines in a great measure, but it offered the great defect of giving the largest number of communications in passing through two district offices, the direct putting in communica tion being so much the rarer in proportion as the offices were more numerous and as each of them served
smaller number of subscribers. The number of subscribers and the length of the line, on another hand, prevent the connecting of all the subscribers of a large city with a single central office.
A selection has therefore been made of a mixed combination, and, in the general plan of the new system, the district offices have been reduced to four only : (1) An office on Gutenberg Street, near the Halles, for the 6,000 subscribers of the center and the one that we shall more especially describe; (2) an office on Wagram Avenue for 3,000 subscribers, which has been in operation for more than a year and does service for Auteuil, Passy, and the Batignoles; (3) an office on Belleville Street for 6,000 subscribers, for Menilmontant, La Villette, Belleville, etc. ; and (4) a single office for the entire left bank, as yet in contemplation.
These four offices will be able to do duty for about 20,000 subscribers, plus the auxiliary, interurban, international and accessory lines that are ingrafted upon them. The number of subscribers at presen is more than 13,000 . The prophetic figure of 20,00 will probably be reached even before the four constructed or projected offices are completely finished. It will then be necessary (sad perspective !) to rearrange the line and to once again modify the system, which has already ceased to meet its object exactly and is no longer abreast of the new progresses of telephonic technics. The Parisian system is the tapestry of Pene lope of our telephone engineers. The continuously renewed difficulties of the task that they have under taken ought to render us particularly indulgent to ward a service that is indisputably imperfect, but which by its nature, could not even reach mediocrity in im perfection.
One will be able to obtain an idea of the complica tion of the system, of the precautions to be taken and of the difficulties to be overcome from a simple enu meration of the connections necessary to bring a sub scriber's station to the board, and of the arrangements to be made in order that an accident (and the causes of accidents are numerous upon lines exclusively subterranean) may be quickly localized and repaired without the introduction of any trouble into the service of the other subscribers.
In order to simplify the explanation, we shall consider only the connections relative to an ordinary subscriber situated in the radius of the central office that does service for him. The double line of lead-covered wires insulated with gutta percha starting from the apparatus of a subscriber enters the sewer, where it meets other double lines with which it runs parallel as far as to a coupling box, which serves to connect seven subscribers with a

14-wire lead-covered cable insulated with paper. The first grouping is therefore made by sevens. Seven similar cables corresponding to 49 subscribers end at a cutting chamber whencestarts a 104 -conductor cable ( 52 lines). This chamber permits of making connec tions bet ween the 49 subscribers and the 49 double lines. The three last double lines form a valuable re serve in case of accident to a wire of the 104 -conductor cable.
These 104 -conductor cables enter the central office directly.
The length of the two-wire cables connecting each subscriber with a coupling box is quite feeble. The mean length of the seven-subscriber cables ( 14 wires) at Paris is 1.2 mile, but it reaches as many as. 3.5 miles for the wost distant subscribers. The mean length of the forty-nine-subscriber cables ( 104 wires) is 5,250 feet, with a maximum of $2 \cdot 4$ miles.
The linear insulation required for the 104 -cable conductors between each wire and the covering is at, least 200 megohms to the mile, but, in practice, it reaches wuch higher value, say from 10 to 30 times greater Thanks to the construction of the cable, it is possible to blow into it air dried over chloride of calcium, which improves the insulation.
At A, in Fig. 4, is seen a transverse section of a 104 conductor cable covered with its $\frac{1}{10}$ inch thick leaden tube.
Before going farther, it will be of interest to point out the reasons that have caused the substitution of the new cables insulated with paper for the old leadcovered cables of the Societe Generale des Telephones.
The old cables insulated with gutta percha were formed of fourteen wires inclosed in a leaden sheath, whose external diameter was $\frac{8}{10}$ of an inch ; the linear weight, 4 pounds to the mile; the linear resistance of each wire, 62 ohms to the mile; the linear insulation,
from 400 to 5,000 megohms to the mile ; and the linea apacity, 0.5 microfarad to the mile.
These cables presented several drawbacks. They were costly and had a great linear resistance, and es pecially a greatelectrostatic capacity. Moreover, they ook up so much space in the sewer that they soon be came cumbersome in the vicinity of the central offices especially when the reduction in the number of such offices necessitated the introduction into each of them of a larger number of cables.
The present main cables are of the Patterson sys tem, insulated with paper and without paraffine Each conductor is formed of a copper wire 0.04 inch in diameter, surrounded with two bands of paper, the first of which is wound with a very long pitch in order to facilitate the passage of the air, and the second with a shorter pitch in order to maintain the first, which orms around the wire a sheath in which the air cir culates freely. Two conductors are twisted with pitch of 8 inches and then corded in regular layers wound in opposite directions, so as to form a very regular cylinder. The 104 wires ( 52 pairs) are afterward covered with a lead tube, of which the thickness is about $1 \cdot 4$ inch, and the external diameter but 2 inches.
The similar cable has a linear resistance of no more than 40 ohms per mile and 012 microfarad per mile of linear capacity (per wire), while its linear insulation eaches 6,000 megohms per mile, and may reach 12,000 and even 16,000 through the passage of a current of dry air.
The putting of these cables under lead merits specia mention. The strand of the 52 pairs once finished is placed in a stove, where it is dried before reaching the lead presses. These latter, which are represented Fig 3 , consist of a hydraulic press whose piston exerts its pressure upon a piston that moves in a cylinder which pressure upon a piston that moves in a cylinder which
immense junction frame, the object of which is to permit of a direct putting in communication, without any other wire being touched, of any one of the 6,000 double conductors with any one of the 6,000 numbers of the office.
The object of this arrangement is easy to under tand. The subscriber preserves the first number given him indefinitely, even when he changes his address, provided his new quarters be within the peri neter served by the same central office. This number corresponds to that of the board, and is not changed on the latter except in case of accident thereto. But we have seen that between the subscriber and the office here are interposed multiple junctions that permit of replacing any one of the sections of a line that ha become deteriorated, and, particularly, of utilizing he spare lines of the 104 -conducter cables. The object of the distributer is to permit of such changes of ables without a change of the subscription numbe $r$ of a communication with the corresponding num ber of the central board
To this effect, all the 52 -conductor cables starting rom the cable ends reach the upper part and the rear of the distributer (Fig. 4), and end at terminals nountedupon large uprights arranged upon the poste ior face of the distributer. The double wires coming rom the communicating board form cables of 42 wires, 0 of which do duty for 20 subscribers, the twenty first forming a spare conductor. These wires are con nected in front of the board, with terminals ar anged upon horizontal bars methodically numbered by groups and by units.
The connection between any one of the cables and any one of the wires coming from the office is effected very simply by connecting the two pairs of terminals of a vertical bar (line) and of a horizontal bar (office) through a double wire. The inextricable confusion that would be produced by such puttings in communica tion and the frequent muta tions that they necessitate is avoided through horizonta frames upon which the wire rest in running from the front to the back of the board before ascending, descending and turning to the right o left in order to connect the conductor of the board with the conductor of the corre sponding line. When a communication is suppressed the double connecting wire like wise is suppressed, and thi renders both the number of the board and the correspond ing cable free
Finally, the following are as a whole, the connection interposed between the sub scriber's instrument and the central board : coupling box (from 7 to 50 ), end of cable (from 50 to 25 ), distributer (from 25 to 20). The 20 double conductors finally reach the
furnace, such as is represented in Fig. 3, between telephone or multiple boards. We shall endeavor t the two presses for which it does duty. The molten lead introduced into the cylinder of the press is kept t a proper temperature by a row of gas burners whic surround the cylinder. The cable is introduce through the back of the press into an ajutage of ap propriate form and makes its exit through the front o the press. Through the play of the pressure alone the lead is introduced into the ajutage, becomes moulded around the cable and pushes it forward. The temper ature of the lead is such that the paper is in nowise carbonized, and that on its exit from the press the lead overing is solidified.
Let us now return to the system of cables and wire of the central office. A central office for 6,000 sub scribers thus receives 12,000 utilized wires and from 120 to 130 cables, without counting the auxiliary lines, de signed to connect the various central offices with each other. The entrance of these cables at the office into arge iron plate boxes designed to support them and especially to protect them against the gnawing of rat is seen to the left in Fig. 1. Each cable ends in a coupling box, a sort of cast iron case, the details of whic are seen at B and C, Fig. 4. The 104 wire cable is in troduced through one of the extremities of the box and the wires, separated from each other, are attached to 104 terminals mounted upon the anterior wall of insulating material (Fig. 4 C). The terminals travers part (Fig. 4 B).
To these terminals are attached 104 wires formin two cables, of 52 wires each, and thus capable o doing service for 25 subscribers, the twenty-sixth con uctor forming a reserve
These wires leave the coupling boxes, as may be seen, for a part of the line (Fig. 1) and reach the dis-
tributer represented in Fig. 2. The distributer is an
follow them in a succeeding article.-E. Hospitalier, in La Nature.

## Tea and Coffee Culture in Hawaii

It is not generally known that the cultivation of tea and coffee in Hawaii is rapidly becoming a matter of inportance to our American markets. Fine qualitie of tea and coffee are being grown successfully and it may be expected in the near future that these islands will become an important source of supply. Both tea and coffee grow luxuriantly and both, it is note worthy; are being prepared almost entirely by machinery, in stead of by hand. This it is thought will compensat or the low wages paid to the pickers and other tea workers in China and enable Hawaii to rival the Chi nese market prices. The tea, for example, is picked by machine, which gathers only the young and tender leaves and never makes the mistake of picking the tough leaves. however thick they may be. Next the leaves are withered, rolled and then packed without being touched by any hand.
In preparing the coffee berry for market there are also a number of ingenious and efficient machines which do the work much more cheaply and in a more uniform manner than it could be done by hand. The disk pulper and the Gordon pulper are principally used. Several of the Hawaiian coffee planters have erected extensive drying houses and a large crop this year may be readily prepared for market. The coffee plant grows luxuriantly on the island in almost every soil. Wild coffee has even been planted among the highlands and in the forests, in some cases at an eleva tion of over 2,000 feet, and gives an abundant crop. It is reported that this year a number of people are ap plying for land with the intention of raising tea and coffee and several large plantations are being equipped

## Progress in Bacteriology

"I believe," said M. Pasteur, many years ago, "that we shall one day rid the world of all diseases which are caused by germs." He has done much to prove his faith by his works, and so have others who are laboring in the same field. The latest achievement in that direction, the discovery of anti-toxin, appears to be one of the most important yet made. There are indubitable reports from European hospitals showing that the great claims at first made for it were not exaggerated. The use of it has cured a large proportion of cases of diphtheria, and insured immunity against the disease in others. Failures there have been, doubtless. But a comparison of the death rate among those treated with it with that among those not treated with it, but in all other re spects similarly affected, satisfactorily demonstrates the value of the new remedy. And the disease thus dealt with is one of the most destructive. It has long been so familiar to us that mention of its name arouses no such horror as that of Asiatic cholera or smallpox or yellow fever. Yet its ravages, in this and most civilized countries, are incomparably greater than those of the three put together. Only two or three diseases endemic here surpass it in number of victims. A reasonably sure cure for or prophylactic against it will be one of the most beneficent inventions of modern medicine. There seems to be reason to be lieve, also, that the recently devised system of inoculation against Asiatic cholera will be productive of good. It was pretty carefully tested this last fall in India, and the results have now been published. The disease was accidentally introduced into the Gaya jail, where there were 433 prisoners. Of these, 215 were inoculated. The remaining 218 were ocul. All were equally exposed, and, apart from inoculation, were treated exactly alike. Diring the first five days after inocu lation nc material difference be tween the two classes was observed. Among the inoculated there were 5 cases of cholera and 4 deaths 5 cases of cholera and 4 deatihs among the others, 7 cases and deaths. The next three days, the sixth, seventh and eighth after inoculation, showed some contrast. Among the inoculated there were 3 cases and 1 death; among the others, 5 cases and 3 deaths, But after the eighth day the contrast was most marked. Among the inoculated there was not a singl case of cholera, while among the non inoculated there were 8 cases and 2 deaths. It will be remembered that Dr. Haffkine said the inoculation would only be fully operative after about ten days. The actual results are two days better than he claimed. It would be premature to say that an infallible preventive against chol era has yet been discovered; but certainly this showing is significant. A third series of researches in bacteriology has marked the year. Hitherto no specific bacillus has been discovered in the lymph of cowpox or smallpox, and the failure to find it has raised some doubts concerning the validity of the germ theory itself. An elaborate series of experiments has convinced Dr. Klein that such a bacillus exists, and may be found if the lymph be examined at proper time. But at the time when the lymph is taken for the purposes of vaccination, the bacilli have already perished in the process of sporulation. Hence the lymph is found to contain no bacilli, but only spores. Dr. Klein believes he has discovered the actual bacillus, but his attempts to cultivate it have not yet succeeded. It is reasonable to expect, however, that these attempts will one day be successful, and the bacilli of smallpox, as are those of other communicable diseases, will be cultivated in an artificial medium, thus ridding vaccination of the most serious objections now urged against it-New York Tribune.

New Foreign Postage Rates
The new rates for foreign postage and registry have just gone into effect. The rate of letters to all parts of the world, excepting Canada and Mexico, will be 5 cents per half ounce. The rate to Canada and Mexico will remain the same as the domestic rates. Postal cards to all parts of the world will be two cents. The fee for registering a letter will be 8 cents, instead of 10 cents. Printed matter will be charged 1 cent pe

## ©orrespondence.

## The Russian Thistle.

To the Editor of the Scientific American :
Referring to your article on the Russian thistle, issue of December 29, 1894, page 406, I would suggest the advisability of the government sending some one to the native home of the thistle to find such natural enemies as may be possible, either insect or fungoid. There must surely be one or both. The success of Koebele against scale and other similar work may in dicate that even noxious weeds could be kept in check. Lincoln Fowler.
Phœnix, Arizona, January 9, 1895.

## COMBINED PUNCH AND SHEARS.

To the Editor of the Scientific American :
In your issue of January 12, 1895, you give an illustration and description of a hydraulic punch used at Cramps. I would say that this punch [shown herewith] is not hydraulic, but worked by steam power, having an independent engine attached to the back of the punch. The engine makes some 170 revolutions per minute, the fly wheel of which is shown in your cut, that being the front. The machine is a combined punch and shears. That at the left of the illustration being a


COMBINED PUNCH AND SHEARS

The Lancet, London, has lately investigated the relative merits of the various systems of illumination now in vogue, among them the incandescent gas light system of Welsbach. The following are the results: The incandescent system of electric lighting must, of course rank first from the point of view of health, since it affords a soft, agreeable light, without giving rise to any vitiation of the air : there is no combustion, and, consequently, there are no products of combustion, complete or incomplete. From the same point of view we are bound to place next, in the face of the result of our present inquiry, the incandescent gas light in its improved form. It is even less productive of carbonic acid gas than the average oil lamp, and consumes not quite one-half less gas than the existing type of burners, giving rise, therefore, to the evolution of half the heat and half the amount of carbonic acid gas, while its illuminating power expressed in candles is more than three times as great as the best ordinary gas burners or the incandescent electric lamp, each of which does not generally exceed 16 candle power, unless a very great expense is no object to the consumer. We are far from saying that the incandescent system of gas lighting has attained to the highest pitch of perfection; still, we are well within bounds when we regard it as the system of gas lighting which utilize most efficiently and most economically the full powers or duty of coal gas as an illuminating agent. Some have expressed fears that the burner is a delicate instrumentmuch too delicate-for the part it is destined to fulfill; but we have found with ordinary care-and care is well worth a little exercise in view of the enormous advantages the system affords - that these fears neec not exist. We understand that in practice the average life of a mautle, taking risk of breakage into consideration, is between three and six months, but the mantles have been frequently known to last over a year, at the end of which time their lighting efficiency was still good. One more important point, already slightly touched upon, is that, in spite of its high illuminating powers, this burner does not require a gas possessing any special illuminating value it self ; and as it is the maintenance of a high illuminating value which contributes in a large measure to the cost of coal gas, the genera adoption of the incandescent sys tem of gas lighting would probably lead to the production of a cheaper gas, possessing little illuminating power, but adapted equally wel for the incandescent gas burner which would then contrast more favorably with coal as regards cost for heating purposes. The produc tion of a cheaper gas since the in troduction of the incandescent sys tem of lighting has, we believe, en gaged the serious attention of engi neers, chemists and others, and we may expect to hear more on this important question before very long. To hygienists this is an ex tremely important aspect of the in candescent gas system, inasmuch as punch for rivets, etc., the punch in the front being for it is obvious that the introduction of cheaper gas, by larger holes, and the shears being to the right, not its more extensive employment for fuel, would tend to shown in the picture, all of which are worked by the engine. The punch is thrown in and out of gear by a counterbalance weight, worked with a couple of rope by an attendant. Stephen P. M. Tasker, Jr Cramp Ship Yard.

## Dyed Grasses.

If natural dried flowers are scarce, the void is filled by the many beautiful grasses now used to so large an extent. Foremost is the Vera grass, with it bold and striking tree-like plumes, now very largely imported and dyed in various tints-salmon pink, canary, autumn tints, a combination of red, orange golden brown, shades of green, pink, and magenta the newest being heliotrope, as fashionable in artifi cial flowers and grasses as in those of nature; and next in importance is the Pampas grass in magnificent plumes, undyed and dyed in various colors. Some novel Japanese and African grasses are strikingly handsome; the latter are from the Congo, some in rich dark colors, and some delicately silky; they include he "Elephant" and "Congo" reed grasses. Barley ing a bright bronze. Eulalia, Bromus, Briza, Erian thus, Lagurus, Panicum, and others, with dyed form or the feather grass in abundance.
ree London from the reproach of being a city which during the greater part of the winter, is enveloped in vilely suffocating fogs. There is, therefore, we think a future for the new system of far-reaching importance to the community.

## Ornamenting Glass.

A new method of ornamenting glass has been dis covered recently by Gorlitz, of Zurich. The method is not a very expensive one and the results obtained are said to be very beautiful. The design to be reproduced on the glass is first engraved on "positively" on a printing plate of rubber, and this plate after being coated with varnish is pressed against the glass. Th class is then covered with bronze powder or othe lass the ill in will remain is then placed in a frame which has a backing of trong paper board, over the front of which is mounted a bright sheet of tinfoil or tin plate. It will be seen that the design will therefore be shown by a reflected ight through the transparent portions of the glass, while its other parts will form a background stamped in relief. The common plan for producing enameled writing and designs in relief on glass has been to apply enamel paint by means of a brush.

## THE ELECTROPLATING OF THE HULLS OF IRON SHIPS.

Paints and compositions innumerable have been tried to prevent marine growths from forming upon iron and steel vessels below the water line. $\mathbf{M r}$. Theodore D. Wilson, late chief naval constructor, says, "Thousands of dollars have been expended in the testing of protective and anti-fouling paints and compounds with very little encouragement to further experiments." The process of Mr. Thomas S. Crane, of East Orange. N. J., patented May 30, 1893, controlled by the Ship Copper Plating Company, of New York, has just been put to a practical test in coating the iron hull of an ocean tug 98 feet long with copper to the thickness of one-twentieth of an inch. The tug is being treated in a dry dock in Jersey City, but it is expected to coat new ships before they are launched to pected to coat new ships before they are lau
save the expense of docking and loss of time.
The destructive effect of barnacles on the hulls of the ocean liners and war vessels is well known. Some idea of the saving in cost by using the new process may be gained from the statement of Philip Hichborn, the U. S. naval constructor, in his reportj to Congress, in which he says that to dry dock, clean, and paint the cruiser Chicago in any port would cost
size is about five feet square, is securely placed in position, and after being shored up against the vessel's bottom, is calked around the edges with cotton and oakum till it is water-tight. Then it is filled with strong acid solution for twenty-four hours, which cleans the plates. The acid bath is removed, the spot washed thoroughly, then the wooden bath is filled with a solution of copper cyanide, and a current of six volts and 900 amperes is applied. The action of the cyanide solution is two-fold-it assists in cleansing the plates and also causes a firm film of copper to adhere in the next stage of the process. The cyanide bath is removed after having been allowed to act for twentyfour hours, and a solution of copper sulphate is substituted. Large copper plates are used as anodes; the current is reduced to three volts and the amperage remains the same.
The deposition of copper takes place immediately, and the process continues until copper has been deposited to the thickness of $\frac{1}{20}$ to $\frac{1}{16}$ of an inch; the current is then stopped, and the bath removed. The deposition of the copper usually requires about four days. The coating is closely adherent, and cannot be removed except by chipping with a cold chisel, in which case a portion of the iron usually comes away
the electro-plating baths in operation, as applied to the bottom of the tug Assistance as above described.

## The Cost of Electric Transmission of Power.

At a recent meeting of the North of England Institute of Mining and Mechanical Engineers, at Newcastle, Mr Alex. Siemens, president of the Institute of Electrical Engineers, read a paper on "The Cost of Electric Transmission of Power." He said that some time had elapsed since Lord Armstrong and Sir William Siemens installed electricity for this purpose, as well as for lighting, at their respective residences at Cragside and Tunbridge Wells. Those applications of electric transmission were perfectly successful, though it was only lately that the transmission of electric power had been taken up in earnest. First of all electric tram ways were developed, and their rapid extension was sufficient proof that reliable electric motors could be erected and would work reliably and without trouble. There was a belief in the minds of some people that an electric motor cost about as much for repairs as a steam locomotive did for coal. His firm had electric motors on tramways which had run 60,000 miles with out any repairs whatever. If they made a motor sufficiently strong, so that it could do its work comforta


THE ELECTROPLATING OF THE HULLS OF IRON SHIPS.
about $\$ 12,000$, and that on the average it would be, with it. The lapping of the coatings has been al-|bly, it would not use up the brushes. Mr. Siemen necessary to do this three times a year, making ready described. There is no chance for galvanic $\$ 100,000$ for a three years' cruise. Only a short time ago one of our war ships burned 1,000 tons more of coal on her homeward trip from Rio than on her journey there, and her speed was two or three knots less per hour because of a foul bottom. From the hulls of the Alert and Atlanta twenty-five tons of barnacles and incrustations were removed. Some of the foreign navies resort to the cumbersome method of covering the vessels with planking, which is in turn sheathed with copper. A coating of copper will keep barnacles off the hulls, and will also prevent the pitting and corrosion to which iron and steel vessels are now subjected.

By the new process, which we illustrate, the copper is electrically deposited in sections upon the surface of the vessel in successive rows, and the joints of the sections are overlapped during the electro-deposition in such a manner as to perfectly unite the whole coating of the vessel. The entire surface below the water line, including the riveted laps of the steel sheets, the keel, the stern and rudder post, are thus protected by an unbroken metallic sheet of copper. The baths are open upon one side, which is applied to the hull of the vessel, and our illustration shows the bath actually applied to the hull of the tug Assistance while sup ported upon blocks in the dry dock.
The method is a triple one. The bath, which in


#### Abstract

action to set in except by a blow or grinding upon a


 rock which might cut through the film. But after such a blow the vessel would undoubtedly have to be docked or repairs and a small bath could be applied to recopper the defective spot. The plating of propellers will be of particular value, as the least bit of corrosion interferes seriously with their efficiency. Of course in practice a large number of tanks or baths would be in use, and it is expected that an ocean steamer of the largest size ( 600 feet long) could be completely plated in four weeks.Experiments have been made on the copper coating, using sea water which has been brought from ten miles out at sea; it is found that this water has no effect on the coating. To Mr. Henry Bergfels, the plater of the tug, much credit is due in the way of overcoming difficulties, which naturally arise in a new undertaking of this description. It is now expected that an elaborate plant will be built to accommodate vessels of large size if the Assistance proves to be all ight in actual sea trials. The success of the plating tage of the process is assured, and all that is now needed to demonstrate the success of the process as a whole is a test in actual service to see if the coating has the permanency which there is every reason to believe it possesses.
Our engraving is from a photograph showing one of
bly, it would not use up the brushes. Mr. Siemens then described the system of electric transmission in
use in the works of Messrs. Siemens Brothers \& Company, at Woolwich, which has been put in to succeed steam power. He said the works were lighted from the same currents. If engineers introduced electric power for pumping or hauling in mines, whey could use the same mains for lighting purposes, and they would find it worked perfectly well. Having given the result of careful experiments as between steam and electricity, he said there could be little doubt about it that for new works electric transmission was the cheaper. Whether a change from the old system to electric transmission could be recommended could only be de cided by the local circumstances. As a rule, electric transmission was most valuable where power was re quired to be transmitted to various and distant por tions of the works, and especially in such places as mines, etc. By the conversion the colliery owner would save sufficient to repay the outlay in ten years. In other words, the cost of erecting the plant for the year would be less than the present cost by an amount equal to 20 per cent of the outlay.

Lord Kelvin holds that the internal heat of the earth has nothing to do with climates. The earth, he says, might be of the temperature of white hot iron ,000 feet below the surface, or at the freezing point 50 feet below, without at all affecting a climate.

PHOTOGRAPH OF THE PARTIAL ECLIPSE OF THE MOON, SEPTEMBER 14, 1894.
The accompanying photograph of the partial eclipse of the moon on September 14 and 15, 1894, was made with the 10 inch equatorial refractor of this observatory, with photo connecting lens placed in front of the visual objective. The diameter of the moon's image in the principal focus is about one inch, which is enlarged by a positive photographiwhich is enlarged by a positive photographically corrected enlarging lens to four and
one-half inches. This enlarged image is one-half inches. This enlarged image is
taken direct in the telescope at the time of exposure.
The time of exposure for this negative was two seconds. The driving clock of the telescope was regulated to lunar rate, so that the moon's motion was accurately fc lo ved.
This photograph was made at the time of greatest obscuration, or half past eleven, and shows the diffused circular outline of the earth's shadow.

William R. Brooks.
Smith Observatory, Geneva, N. Y.
The Interstate Commerce Report
The eighth annual report of the Interstate Commerce Commission, which recently appeared, deals with the year ending June 30, 1893. At that tirse there were 176,461 miles of steam railways in the United States open for traffic. This was an increase of 4,897 for traffic. This was an increase of 4,897
miles for the year. The total number of miles for the year. The total number of
persons employed by the railways was $878,-$ 602 , or about one in every seventy inhabitants of the United States. Notwithstanding the comparatively small mileage added during the year, 52,187 new employes were taken on during the same period. This increase may be attributed to the large number of additional men required for signaling purposes, for workers in freight yards and purposes, for workers in freight yards and
for porters in passenger stations. Since for porters in passenger stations. Since
June, 1893. nearly one-third of the entire June, 1893. nearly one-third of the entire
railway mileage of the United States has been in the hands of a receiver. The gross capitalization of the railways of this country was reported as $\$ 10,506,235,410$, or at the rate of $\$ 63,421$ per mile. These figures do not seem excessive when compared with the capitalization of the Englisn railways. Some years ago it was estimated that the railways of England were capitalized at a rate of $\$ 185,000$ a est armor. The scene during the heat of the conflict mile. A receivership on an English railway, especially was appalling. The fusillade swept away masts and for a trunk line, is not of frequent occurrence, so that funnels, shattered conning towers, pierced the gun we can safely assume that a part of the responsi-, shields and the hulls. Above the armored deck all bility rests with our State laws, which fix rates too was reduced to total wreckage. The battered ships low to be profitable, and federal laws, which prohibit railways from making agreements among themselves to reduce unprofitable competition.

## REPAIRING CHINESE WAR SHIPS.

In our issue of January 12 we described the great battle of the Yalu River, the most important naval battle of the Yalu River, the most important nava
engagement since the advent of iron and steel in shipbuilding. We now illustrate the repairs which were building. We now illustrate the repairs which were
made to one of the vessels of the Chinese navy, which had been riddled with shot from Japanese war ships. After the retreat, the remnant of the Chinese fleet steamed away toward Port Arthur, the Woolwich of China, to make repairs. Port Arthur, where many of the vessels engaged in the Yalu battle were put in a seaworthy condition, was afterward taken by the Japanese.

The Chinese admiral opened the Yalu engagement on September 17, 1894, at a distance of about 7,000 yards. The firing at the outset was indifferent, but the Japanese gunners improved their aim as the distance began to lessen. The Chinese barbette ship Ting Yuen was the first to suffer any severe injury, a Japanese shell bursting in her battery. Two of the big guns of the battle ship Chen Yuen were disabled and she was left defenseless, except for her secondary battery. She had 120 shot holes in her sides when she steamed away. The Ching Yuen was soon riddled with shells. The Chao Yung ran ashore and became a target for the Japanese gunners until she was set on fire. The King Yuen


CHINESE WAR SHIP AFTER THE YALU ENGAGEMENT.
have forsworn war forever. A shell glanced from the steel deck of the Chen Yuen and went through her conning tower, shattering everything. A lieutenant was in the act of speaking to the engineer; he was blown to pieces and his head was left hanging on the speaking tubes. The woodwork in nearly all of the speaking tubes. The,woodwork in nearly all of the painful wounds. In the first meeting of the painful wounds. In the first meeting of the Chinese and Japanese sea force, near Chemulpo, on July 12, the details are even more horrible. On the Yang-wei everything was a ruin. The funnel had been shot away to within four feet of the deck. As forced draught was used, the men rigged a jury stack of sheet iron and canvas supported by a derrick. A hose was kept playing constantly on this makeshift funnel to prevent it from taking fire or melting. Down in the boiler room naked coolies shoveled coal for dear life; gin was as free as water for them, and whenever a man lagged he was urged on with blows from a thick club made of rubber belting. The draught was so intense that a continuous sheet of flame poured from the funnel. The main deck was a lake of blood an inch thick. Floating in the deeper parts were fragments of bodies, and here and there a writhing human being whose tortures were not yet ended. Whenever a man was found hopelessly wounded, the surgeon gave him instant relief from his agony. He carried an atomizer filled with prussic acid, and when a man was found who was fatally injured, he sprayed the poison into the man's mouth and nostrils. The dying men craned their necks forward eagerly to escape the torture they suffered. The shattered remnants of humanity were thrown overboard and the humanity were thrown overboard and the hai.
Many nautical authorities are of the opinion that the work of the Japanese navy is the most successful since the time of Nelson. Captain Mahan thinks that nothing in the engagement will point to a remodeling of war ships, but it will certainly largely affect their equipment. The 66 ton guns of the Japanese fieet did good work, but it was not the large guns, which will send a 750 pound shot through the best ar$\mathrm{m} \subset \mathrm{r}$ made in Europe, but the rapid-firing guns which mar made in Europe, but the rapid-firing guns which
decided the battle by turning the decks into shambles decided the battle by turning the decks into shambles
and destroying gun mounts, stacks, fighting tops and and destroying gun mounts, stacks, fighting
conning towers, as well as riddling the hulls.
One battle cannot, of course, determine all the questions of naval construction, but the teaching of the battle of the Yalu seems indisputably in favor of swift cruisers armed with rapid-firing guns.
The conflict seems to have definitely decided that woodwork is out of place in war vessels. Baron von Sterneck de Ehrenstein, the chief official of the Austrian navy, says, in speaking of the Japanese cruisers being able to hold their own against the Chinese ironclads: "This fact has opened the eyes of the great powers, and induced them to give greater attention to the construction of cruisers in the future."

## A Bridge of Concrete.

A concrete bridge having a clear span of 164 feet and 26 feet wide was recently constructed over the Dan ube at IIunderkingen, in Austria. Stone is scarce and dear there, while good Portland cement is pro duced in large quantities. The centering was covered with oiled paper, on which the concrete was laid, con sisting of 1 part cement $21 / 2$ parts sand, and 5 broken stone, all thoroughly mixed. Blocks of this concrete have shown a resistance of 187 tons yer square foot in seven days, 235 tons in twenty-eight days, and 308 tons in five months. The concrete was applied in layers 12 inches thick, starting at the abutments and working toward the crown, wher it is $31 / 4$ feet thick; mid it is $3 / 4$ feet thick; mid way to the 41 in laying the concrete was only nineteen days, and ten days after the centers were struck. The defles tion proved less than $41 / 2$ inches.
the bodlevard lafayette, in the city of
new york.
We have already described and illustrated the Harlem River Driveway, extending along the edge of the lem River Driveway, extending along the edge of the
Harlem River from 155 th Street to the north, and terHarlem River from 155th Street to the north, and ter-
minating at Dyckman Street, near the north end of minating at Dyckman Street, near the north end of
the island, a road designed to provide a speed way for horses. While this work has been going on, which is destined to result in the development of a magnificent park region along the banks of the Harlem River, a similar work of equal or greater importance has been in progress, and is now nearly completed, on the west side of the island of New York, along the banks of the Hudson River. The backbone of New York is, to a great extent, primitive gneissoid rock, and the shores of the Hudson River, in many places precipitous as those of the Harlem, are composed largely of this formation. Starting at the intersection of the Boulevard on the line of the Eleventh Avenue, the Boulevard Lafayette, the work to which we have alluded, runs westerly a short distance and then, turning to the north, winds along the bank of the river, high above its level, until, in the neighborhood of Inwood, it turns to the east and intersects Dyckman Street. Most of the work upon it is done, and next summer, it is believed, will see it completed. By an act dated June 15, 1868, what is known as the Boulevard, corresponding to the old Bloomingdale Road, was designated as extending from Fifty-ninth to One Hundred and Fifty-fifth Street. By an act of June 18, 1873, the Boulevard was ordered to be opened and widened from One Hundred and Fifty-fifth Street to the present Dyckman Street, 100 feet being assigned as its maximum width. An ordinance dated October 16. 1891, empowering the Department of Public Works to do the work, went before the Mayor and was approved. The law empowering the Commissioner of Public Works to open the Boulevard to any width within the 100 foot limit appears among the laws of 1891, chapter 219, and the name of Boulevard given by an act of 1870 to this portion has been changed to the Boulevard Lafayette, a most appropriate name, on account of the revolutionary associations of the region. The bird's eye view shown at the foot of the cut gives the general course of the road, and shows how, connecting with Dyckman Street, it will lead to the northern end of the Harlem River driveway. But this is not all. At the point of connection of the Boule vard Lafayette with Dyckman Street, the old Bloomingdale Road, or Broadway, a fine macadamized boulevard, passes, leading to Kingsbridge, Yonkers, and the country north thereof, and running south to the city. Then between Broadway and the Boulevard Lafayette is another boulevard, known as Fort Washington Avenue, so that a number of circuits and openings and outlets are provided irrespective of the Harlem Driveway.

Starting at about 155th Street on the south side and winding through Audubon Park, the view at the upper right hand corner of the cut shows what may be termed the opening of the new Boulevard. It soon reaches the river, and our other views are drawn at different points along the line. Some are drawn looking north and others looking south, the river, which lies to the west of the Boulevard, showing how each view faces. The 100 foot width has been included in the survey, but owing to the expense, the road for the present has been made but 60 feet wide. This 60 feet however, has been measured in from the western done of the survey, so that any future widening willbe done
by cutting into the hillside toward the east, the level of the road being definitely fixed by the present operations, and the retaining walls being adapted for the ultimate widening. In some parts the ground is exceedingly steep and rocky, and along the western edge at many places a high retaining wall has been built laid dry and to a batter of three inches to the foot The roadway proper has been given a uniform width of 40 feet. As the bottom or foot of the retaining wall marks the western limits of the 100 foot space, it is ob vious that the area available for the sidewalk varies In some places, where the wall is 45 feet high, the bat ter alone occupies over 10 feet of the width which the sidewalk would otherwise have. The sidewalk space, therefore, varies from 10 to 20 feet. In order to ge filling and stone for the wall, the contractor availed himself of the fact that the 100 foot width was at the disposal of the city and cut into the hillside for filling so that in many places the excavation has practically reached the 100 foot limit without the city having to pay anything extra. The sidewalk will be curbed and flagged and the roadway be left as a first-class dirt road, so that a speed way will really be available and at the service of the horsemen of the city within a few months.
The views from the road are superb. From its re taining wall and western edge a precipitous woody and rocky hillside descends to the river edge, along which wind the tracks of the Hudson River Railroad. Then the waters of the Hudson River, at this point about a mile wide, extend to the Palisades, which rise from three to five hundred feet, a most impressive feature and one which is to be hoped will be soon pr
tected by legislation from destruction by blasting.
Near the southern end of the Boulevard, beginning Near the southern end of the Boulevard, beginning
at about 170th Street, a city park is to be established. This embraces the area approximately bounded south and north by 170th and 183d Streets, and bounded on the east by the Boulevard and on the west by the iver. It includes Fort Washington Point, seen in the bird's eye view projecting to the west into the Hudson River, one of the most picturesque spots on the island. This park is destined with its long water front to form the most beautiful of our city parks, but the three miles of the Boulevard Lafayette alone will almost represent a park. The unexcelled beauty of its views can only be judged by actual inspection. Those conversant with the driveways of other cities here and abroad say that the Boulevard Lafayette is the most abroad say that the Boulevard Lafayette is the most upon it the Hudson River can be seen running northward as far as Tarrytown. We hope later to recur to the subject.
The work has been in direct charge of Mr. W. M. Dean, superintendent of street improvements, and
has been executed by Mr. Rhody McLaughlin, conhas been executed by Mr. Rhody McLaughlin, contractor.

## Periodical Comets Due in 1895.

By w. t. LYNN, b.A., F.r.A.A.s.
Two comets of short period are due to return to perihelion in the course of the present year, but whereas one of these, which is in view while we write, has been
seen at no fewer than twenty-six returns and consecutively since that of 1818-19, when it acquired its name from that of the illustrious astronomer who investi gated its motions and calculated its orbit, the other has hitherto been seen at only one appearance.
The first comet is, of course, our old friend Encke. which was first discovered by Mechain, at Paris, on the 17th of January, 1786, and first seen the present the 17h of January, 188, and first seen the present then in the constellation Pegasus. very near the place predicted for it in the ephemeris of Dr. Backlund (Astronomische Nacbrichten, No. 3,263), who, we re-
gret to notice, stres r at this is the last time that he gret to notice, states $x$ at this is the last time that he
will be able to ut urtive its calculation. The comet he finds, willas, it ${ }^{2}$ perihelion on the 4th of February; the last tan 3 it, was in that position was on the 18th of October, 59.1, , 11 w i: $3 \%$ occasion it made one of its very near app oveles to the planet Mercury.
The othe: comet aue in 1895 was discovered at its first appearance on the 16th of July, 1884, by Prof. Barnard, now of the great Lick Observatory in Cali fornia, but who was then at Nash ville, Tenn. Although thus discovered in the northern hemisphere, the comet remained throughout that appearance in the southern. Dr. Gill and his assistants afterward obtained a number of observations of it at the Cape of Good Hope, and it was also observed at Melbourne and other places, but was always very faint and difficult of observation, Its orbit was determined by Herr Berberich to be one of short period, amounting to only about five and a half years; but its position at the return expected in
the winter of 1889 was exceedingly unfavorable, and it was not seen. Another appearance will be due in the summer of the present year. Herr Berberich calcu lates (Astronomische Nachrichten, No. 3,260) that it will then be somewhat brighter than at the return when it was discovered in 1884, and that its perihelion ts distance fromably take place on the 3d of June to that of Mars.-Knowledge.

Phonograph versus Graphophone
A decision was rendered in the Supreme Court of the District of Columbia on December 24, in the suit which had been pending for nearly two years, brought by the American Graphophone Company, nominally against the Columbia Phonograph Company, but the rea parties defendant being Thomas A. Edison and the Edison Phonograph Works. It was alleged by the American Graphophone Company that the original Edison tinfoil phonograph was a failure, as the sound ecords it made were not accurate, permanent, nor capable of being reproduced as often as desired, could oot be detached from the machine, handled, and trans ported, and that the art as now known was created by the inventions of Alexander Graham Bell, Chichester A. Bell, and Charles Sumner Tainter, who began their work under the auspices of the Volta Laborator Association, and whose patents were afterward acquired by the American Graphophone Company, and that every phonograph, every phonograph cylinder, and every phonograph record became practical and valuable only so far as it relied upon the principle of engraving the record as distinguished from the abandoned
method of indenting, used in Edison's original tinfoil phonograph. No testimony was taken for the Colum bia Phonograph Company in the case, and when the time limit fixed by the court had almost expired the defendant withdrew counsel and allowed a decree by default. The court finds for the American Graphophone Company on every point, issues a decree of incounting against the defendants, and other suits are
pending in New Jersey, New York, Ohio, Massachusetts, Illinois, and Kansas.

## Curious Foods of the Fishes in the New York city Aquarium.

The work of providing suitable food for the many varieties of foreign and domestic fish in the New York City Aquarium makes a very curious and interesting study. The food provided is as nearly as possible like the food the fish eats in its natural free state. The fish are fed once a day at a regular hour. The live food is placed in the tanks and is soon captured by the fish, and the dead food is thrown into the pools as required and the part not used is afterward taken out to keep the pool clean. It is found necessary to have as much variety as possible in fish foods, since the fish are very fastidious in their diet and often refuse to eat the food offered them.
The live food consists of clams, shrimp, killies, crabs, and a variety of small fish. Clams are used in large quantities, being cut up into sizes to suit the fish. For sharks and such large fish live menhaden are placed in the pools. The skate and the dog fish eat large snails, the striped bass are fed on soft crabs. The smaller fish require especially prepared fish. If clams are fed them, for instance, they have to be cut up into mince meat or else carefully scraped. The sea anemone, for instance, are fed on crabs and the soft parts of oysters, and it is necessary to place these par ticles of food on forks to place them within the ane mone's reach. The sea horses are especially delicate feeders, and great care is taken in preparing their food. A minute crustacean is sometimes put in their tanks Shrimps are also used at times for this purpose. They must be perfectly fresh, however, and be served with the greatest care to make it resemble the sea horse' natural food.
The barnacles are provided with a net which they nove through the water to secure their food, and are also very particular in their fare. The juice of clams or oysters is usually fed to them by dropping it in the water directly above them. The barnacles sub sist on the fibers of the mollusk. The smaller crusta ceans are fed with very small pieces of young hermit crabs, snails, lobsters, etc. The coral polyps and other very small varieties are fed in a similar way. Great care is always exercised to provide the best quality of food and to vary it so as to make it appetizing to the fish. The work of feeding and the antics of the fish while eating are well worth watching. The feeding hour is indeed by far the most interesting part of the day in the great aquarium.

## ucifer Match Inventor

It has been generally believed, and we gave the statement some years ago in the Leisure Hour, says the editor, that the invention of lucifer matches was due to Mr., now Sir Isaac Holden, M.P., who still survives as one of the oldest members of Parliament. This was in 1829, as we then said. In boyhood, before that time, a little bottle of phosphorus in a case was the ne plus altra of invention, and was used instead of the ruder fint and steel with tinder, either for domestic purpose or for the surreptitious midnight feasts of schoolboys. It turns out that the real inventor was John Walk r , an apothecary of Stockton, two years earlier, in 1827. In a lecture in the Borough Hall of Stockton on 'Methods of obtaining light and fire in all ages and among all nations," Mr. Parrott, the lecturer, exhibit ed the old shop book of Mr. Walker for that year. It was shown that a box of lucifer matches, getting light by friction, was sold in April, 1827, to Mr. Hickson, a solicitor, for 1s. 3d.
So important is the discovery deemed that an influential committee is formed to erect a statue to John Walker. Sir Isaac Holden is an honorary member of his Stockton committee, stating, when nominated, that he was not aware of the priority of invention. Other claims have been made in France and Germany, but the honor or good fortune certainly belongs to John Walker, who died in May, 1859, aged 52.
It was the beginning of a most wonderful movement in history, art, and commerce. Think of the superstitious awe with which, not in Jerusalem alone, but throughout the nations who are ignorent of the invention, is hailed the "miraculous" light obtained from lucifer matches! How vast the wealth derived among civilized races from the manufacture of "safety watches" of all kinds! A memorial plate has meanwhile been fixed on the site of Mr. Walker's old shop in the High Street of Stockton.

## Tons of Caterpillars.

Thirty-six tons of caterpillars and a large number of ocoons were destroyed in the effort to drive the pest from the young plantations of trees on Hong-Kong Island. They appeared on the pine trees with which the government is trying to reafforest the island, and lasted for two months. Stations were established where the caterpillars were received and paid for by解t; this method seems to have been successtul. It is estimated that $35,000,000$ insects were killed.

Why is not as much attention paid to the pleasure to be derived by way of the ear as the eye? In this country we treat the ear barbarously. The ear gets the minimum of pleasure, and it retorts by aggravating the nerves. And so it happens that much of the discomforts of our life come through the ear. What the foreigner most notices in this country, until he becomes, as we are, more or less callous to it, is "noise." We are not simply pitched on a high key nationally, but on a discordant key. It is not a gayer or more animated country than some others, but it is noisier. Certainly we do not cultivate harmony or moderation. To begin with, the "American voice" has an unenviable reputation. It is ant to be shrill, strident, high-pitched, unmodulated. This quality adds an unnecessary aggravation to social life. It dis organizes the nerves, and increases the tendency to nervous prostration-this and the other unchecked noises. The human voice ought to be a delight; it was meant to give musical pleasure.
There is no good reason why the American voice should not give pleasure. The voices of uncultivated races are often delightful. The negroes set us a good example in agreeable tones. That there is no radical incurable defect in the American voice we know, because we have had orators whose tones were as musical as the organ and the flute; there are communities where we hear for the most part modulated, low, and pleasing speech; and it is getting to be admitted that an American singer is the peer of any in the world. But in general no care is taken about the voice in speech. Girls as well as boys are permitted to make home discordant and school a babel of mere noise by the most vulgar and rasping use of the vocal organs. Mrs. Browning might have written, with us in view, a more pathetic poem on the "Cry of the Children." I children ought ever to be whipped, or, to put a case more in consonance with the tendency of the age, if children ought ever to whip their parents, the castigation should be given for the harsh, piercing, and dis cordant voice. It is idle to say that this sort of voice is natural to them. Any voice can be cultivated to a degree that it shall not be unpleasant, and this education should go on from infancy in every home and every school. It is a matter of public interest for the public pleasure. Think what a tea party might be!
The voice is, however, only set to the pitch of the other noises. In all thickly settled communities the ears are split and outraged by the steam whistle of the factories and the locomotives. In the depths of the night the startled sleeper has the veil of seclusion torn a way from him by the scream of the whistles, the in valid's excited nerves are worn to rags by the barbar ous pipe of the locomotive. We skringe and suffer with only faint protest. It is only a part of the uni versal noise and hubbub. Most of this screaming of the steam demon is absolutely unnecessary in this day of clocks and watches and guarded railway crossings. But if we must have the whistle, why not invent one
that is moderately musical instead of being a torture? that is moderately musical instead of being a torture This is a suggestion of quiet-loving people, who find the noise of our American life every day more intoler able. Perhaps any abatement of it would not suit the majority, who like to go tearing and whooping through the world

It is fortunate, considering our voices, that we are not Moslems, for then we should substitute for the muezzin's melodious call to prayer a harsh summons that would frighten every sinner back into his bed, and compel him to stop his ears against the rasping invitation to devotion. But is it altogether fortunate For have we not the church and other jangling bells These give out noise and nerve-shaking clamor instead of melodious notes. There are few bells in the United States that are agreeable to the ear. The foundries seem to go on the idea that anything in the shape of a bell will answer the purpose, with little or no regard to its tone, and we are called to church with the same metallic anger that invites us to a fire. The manu facturers are probably indifferent because the public are indifferent. Their products are mechanical, and only by chance musical. There is the need of art in the making and ringing of a bell, as in the making and playing of a piano. We appear to be content with any mass of metal cast in the bell shape, and to let a ringer with the instinct of a blacksmith evoke its dissonance with a sledge hammer.-Charles Dudley Warner, in Harper's Magazine.

## Work in High Altitudes.

Some curious facts were brought to light on the capa bilities of men to labor at high altitudes during the construction of the Peruvian Central Railroad. This line starts at Lima, and proceeding inland, reaches its highest point at the tunnel of Galeria, 15,645 feet above sea level. It is stated that men were able to do a fair "sea level" day's work as long as the altitude did not exceed 8,000 to 10,000 feet above sea level; but beyond this there was a sudden falling off in the work of onefourth to one-third up to heights of 12,000 feet, and at still higher elevations 100 men were required to do work easily done by 50 at sea level.

## a pnevmatic bicycle brake

An extremely simple and inexpensive brake, with which pressure may be immediately brought to bear on the wheel by operating a hand bulb, provision being also made for instantly releasing the pressure, is represented in the accompanying illustration. It forms Wallace 144 Fast Sixtieth Street New York City A portion of its structure is out of sight in the hollow A portion of its structure is out of sight in the hollow
frame of the machine, its supporting plate being bolted frame of the machine, its supporting plate being bolted
to a flange of the steering fork, in the upper portion of which is held the usual slide tube connecting with the handle bars. To the under side of the supporting plate is hinged a plate carrying a concave shoe adapted to bear against the wheel tire, the hinge plate being


WALLACE'S PNEUMATIC BICYCLE BRAKE.
supporting plate, while between the two plates is an inflatable bag connected by a tube with a bulb which partially encircles one of the handles of the handle bar. The tube is elastic, but has a rigid section, to enable the length of the inflating tube to be adjusted to suit the height of the slide tube. The brake is ap plied by repeated squeezing of the bulb, producing air pressure in the bag or flexible reservoir above the plate carrying the brake shoe, the air pressure being removed and the brake released by opening an ordinary escape valve at one end of the bulb. The device may also be used as a hydraulic brake, and may be ap plied on vehicles other than bicycles.

## AN ELECTRIC RAILWAY CONDUIT.

In the conduit shown in the engraving one side is formed by one of the rails, and the trolley arm is so still be sure conductor. The improvement has been patented by Mr. Albert M. Burgher, Clay City, Ky. The opposite


BURGHER'S CONDUIT ELECTRIC RAILWAY.
side of the conduit is formed by a timber laid paralle to the rail, a guard plate being secured to the top of the timber, leaving a slot between it and the rail for the trolley arm, while a strip of wood coated with insulat ing paint is bolted to the web of the rail. The heads of the bolts are covered by insulating blocks, agains which is secured the line wire, having a flattened face and rounded outer side. The trolley arm is pivoted at the top to have a limited lateral movement in a bracket insulated on and rigidly fastened to the truck frame he portion of the arm lying adjacent to the conduit top being coated with insulating material held in casing. On the opposite sides of the casing are recessed wear plates which receive screws in the ends of curved
springs rigidly attached to the truck frame, and pressing with equal tension on opposite sides of the trolley arm, holding it perpendicularly, and yet permitting
relation to each other. The hub of the trolley whee is held on the trolley arm between springs, to provide for the up and down movement of the car, the whee being grooved to fit snugly on the line wire, and pro vided with ball bearings, while, to insure a perfect contact, it has a radial bore in which is held a copper plunger, the inner end of which is held in close contact with the hub by a spring. In front of the trolley arm is carried a guard, hung in the same way, to brush is carried a guara, hung in the same way, to brush
aside any possible obstruction. The improvement is designed to afford an inexpensive and efficient substitute for the present overhead trolley systems.

## The Color of Horses

Mr. W. H. Hawkes writes to the Australasjan as fol ows on that vexed question, the color of horses :

It is an old saying among horsey men, 'a good horse was never a bad color,' and yet popular prejudice assigns all sorts of good or evil traits of character to particular colors. I can quite understand this with those who do not know better; but that an expert, like an Indian buyer, should hold to the popular fallacy is almost beyond belief, seeing that we have had innum erable instances, both in the old country and here, to the contrary. It was recently that some four or five races were won in one day upon one of our local courses by chestnuts, and I think the fact was mentioned by one of your contributors, and they are equally good either in saddle or harness. Yet there are numbers who will condemn a chestnut at once for his color only, be he ever so perfect in every other respect. The ob jection to a gray one can understand from a groom's point of view, seeing that they are so difficult to keep free from stains as age whitens their coats, but for no lack of good constitution or disposition.
"Some will tell you that a roan is the hardiest of all horses, and yet I venture to assert that a greater por tion of aged roans does not exist.

Others credit black horses with being allied to the devil himself for temper and untrustworthiness. The only objection to him is that he is very rusty in his only objection
winter garb.

- White legs are always a sign of weakness,' you are told by many. But I think three to one would be fair betting against the one white leg out of a set of four, the others being black. What about Odd Stockings and All Fours? Surely if white legs were a sign of weakness, such horses should break down at a very early stage of their career. Most judges prefer bays with black points, and it would be difficult to beat them for general appearance the year through, but I for one should certainly deny to them a monopoly of sound constitutions, tractability, intelligence, and all other virtues. I am quite with $\cdot \mathrm{Mr}$. Basil Gray in his general remarks, but even he errs the other way, as he credits white legs with being indicative of some peculia virtue-or, as he says, they always denote quality. This I very much doubt. That skillful breaking and future wise education has most to do with the character and usefulness of a horse, as well as a man, irre spective of his color, can, I think, he accepted as a set tled fact. Renfrew was a splendid tempered horse until teased to such an extent that he became a maneater. Many a two-legged brother has had his charac eater. Many a two-legged brother has had his charac-
ter spoiled by those who should have helped to make him better. That horses, like men, have their tem peraments goes without saying. That an eye for the beautiful leads fanciers to reject piebald, skewbald and horses with wall eyes and big blazes for hacks or carriage purposes is not to be wondered at. But that any should condemn many of our really beautifu chestnuts is an enigma.
"The objection purely to color is, I think, much akin to the action of one who crosses himself when passing in the street a person with oblique vision."Bell's London Messenger.

Cheap street Car Fares in Philadelphia.
The reduction of fare by the trolley cars to Germantown to 5 cents and to Wissahickon and Manayunk to 8 cents furnishes two very practical illustrations of the benefit to the public of the introduction of the new street car motor. One reduction was inspired by competition and the other appears to have been a conces sion to a popular demand, possibly expedited by a desire to anticipate steam railroad competition. Under the reported traffic agreement between two lines occupying the chief streets lying immediately west of the Delaware, it is probable that with the opening of spring passengers will be carried from any part of the city to any of the principal entrances of the East and West Park for a single fare. It is equally probable that the competition of rival lines will result in single fare transportation to Frankford in the northeast and Darby in the southwest. That many people now residing south of Lehigh A venue will seek homes farther from the heart of the city may be surely counted on, but the sections abandoned for residence purposes will probably be occupied for business purposes. This was the effect of the introduction of the old street cars. The introduction of the trolley has more than doubled the possible residence area of the city.-Philadelphia Times.
zinc to Bleach Molasses.
The adulteration of New Orleans molasses with sulphate of zinc is again attracting attention. The same question has been brought before the trade in various forms within the past ten years, but reports from various sections of the country now indicate a more vigor ous investigation of the methods being practiced by New Orleans and other shippers. According to a member of the New York trade, nearly 95 per cent of molasses received in this market is adulterated; but, on the other hand, it is explained that it is hard to sel straight goods, and that molasses is brightened so tha it will sell more readily. It is denied, however, that the introduction of sulphate of zinc is injurious, and to substantiate this several houses that deal in large quantities of molasses contend that zinc not only brightens the goods, but purifies it. At any rate, the proportion of zinc used, they say, is so small that it is harmless.
It is claimed for the zinc that it has peculiar proper ties which allow it to precipitate all foreign matter, and rise to the surface as a scum, which is then cleared off and the molasses is left a pure amber color. The fact that molasses is "bleached" in order to compet with New Orleans wholesalers was freely admitted in the local trade.

It was said that the New Orleans Board of Health had prohibited the use of sulphate of zinc in the adulteration of molasses, and for some time the prac tice ceased. The manufacturers of preserves, etc., declared that the enforcement of such an order would practically ruin their business; but nevertheless it was heeded until recently, when fresh complaints were made to the health authorities that sulphate of zinc was entering into the clarifying process of molasses more largely than ever
Mr. H. L. Hobart said in reply to inquiries: "There is nothing in the storyiworth discussing. Zinc is used to purify and brighten molasses, but not in sufficient quantities to harm anybody. It is an old matter often before the trade, and that's about all there is to it."
Mr. Post, of B. H. Howell's Son \& Co., replied Sulphate of zinc is one of the ingredients used in a formula to clarify molasses, but I don't believe enough of it is used to injure anybody. The adulteration can only be detected by an analysis. There are houses in this market that brighten molasses. I believe that the zinc precipitates any foreign matter which the molasses may contain, and then rises to the surface, where it is
recovered. I don't think enough remains to harm
reco
us."
A
A member of the firm of Gustave Jahn \& Co. an swered:"Yes; sulphate of zinc enters into the clari fying process of molasses. We have a formula for brightening our goods, but it is a common practice in the trade. Very few straight goods are received from New Orleans, and when we do get straight goods it is difficult to dispose of them when shown with brighten ed goods. It is a miserable practice, however, and wish it could be stopped."
A dispatch from Columbus, Ohio, states that a plan of adulterating New Orleans molasses came to the at tention of Dairy and Food Commissioner McBall, of Ohio. A very extensive dealer in molasses and pre serves sent him two samples of the classes-onebleached and the other unbleached. The manufacturer in ques tion stated that this "bleached" article is the un bleached with sulphate of zinc added. The zinc is poisonous. The manufacturer in question said he had been forced to "bleach" his sirup in this manner in order to compete with the New Orleans wholesalers Commerce.

Four Hundred and Twenty-four Degrees Below
Four hundred and twenty-four degrees Fahrenheit below zero! Just what this means it is almost impos sible to imagine, and, yet, it is one of the temperature which have been reached and used in laboratory re search, and has been made the subject of some highly interesting experiments and explanations by Prof Dewar before the British Royal Institution. Four hundred degrees below zero is not an everyday temperature, nor can it be reached by more everyda means than the expansion of liquid air, which latte Prof. Dewar has succeeded in producing in compara tively large quantities, and in storing by novel and in genious methods, to be used as required in the study of matter at abnormally low temperature, exactly as a spirit lamp or a Bunsen burner is used in studying the properties of different bodies at the higher tempera tures.
The tensile strength of iron at $400^{\circ}$ below zero is just twice what it is at $60^{\circ}$ above. It will take a strain of 60 instead of 30 tons to the square inch, and equally curi us results have come out as to the elongation of metal
that the magnetism in a permanent magnet would be increased at very low temperatures, and experiments with comparatively low temperatures had rather nega with comparatively low temperatures had rather nega tived Faraday's suggestion, but Prof. Dewar has coming shown that a magnet at the extremely low temperature made possible by the liquid air had its powe increased by about 50 per cent.-Cassier's Magazine.

## Work of the eoold Spring Harbor Hatchery

The fish hatchery at Cold Spring Harbor, Long sland, has done much good work during the year 1894 This hatchery is probably the most prominent and fficient of the seven stations of the New York Fish Commission. During the past year it has turned out $33,250,000$ tom cods and $22,500,000$ smelts, which have been liberated in the harbors on the northern shore of Long Island. There have also been some 300,000 trou placed in local streams and in the Adirondacks about 100,000 salmon and 700,000 shad have been sent to the head waters of the Hudson, and 500,000 lobsters have been freed in Long Island Sound.
At present the propagation of trout engages most of the time of the hatchery. The spawn this year number $1,500,000$ eggs. Besides this interest, much is being done to supply adequate quantities of tom cods and at present there are $60,000,000$ tom cod eggs in th hatchery in various stages of incubation. One of the most important results of the year has been the expe ience gained concerning the propagation of lobsters. The 500,000 lobsters raised last year were from spawn taken from females captured off Sound Beach, Connec ticut. Superintendent Mather believes, however, that n a few years lobsters will be cultivated as easily as trout.

## Microscopical Exhibition

The eighth annual exhibition of the Department o Microscopy of the Brooklyn Institute of Arts and Sciences was held in Art Association Hall, Monday, Jan. 14, 1895. The exhibition was one of the most successful ever held under the auspices of the Institute, eighty-six microscopes being used, the visitor passing from instrument to instrument. The present officers of the department are : H. F. Calef, president
 perat

## RECENTLY PATENTED INVENTIONS.

## Engineering.

Injector. - Benjamin M. Throop Geneva, Ohio. This injector has a steam inlet and water inlet connected by a set of lift nozzles with an in erior compartment, while forcing nozzles connect the latter with the outlet, there being a double valve ar
ranged in the casing and adapted to connect the steam nlet with the steam nozzle of the set of forcing nozzles, and the interior compartment with the outlet to the boiler. The construction is very simple and inexpensive, and may be easily operated to force water under either
Boiler Brace.--Peter McGregor, Chi cago, IIl. The body of this brace is preferably of light flat metal, having one end slitted to form two members, hich are twisted and semicircular in cross section, d form opposite outwardly extending feet. The im provement is intended as an inside brace for the heads or other flat surfaces of the boiler, and is very simple and inexpensive while yet having great strength.

## Railway appliances.

Car Coupling.-Carman Frost, Hewlett's, N. Y. This is an improvement on a formerly cavity coupling dog which will automatically couple with an opposing drawhead, a spring being applied to the coupling dog to insure its returning to its coupling or normal position and remaining straight. A section is combined with the drawhead section, the two sections
being side by side, and so located that the line of draught ill be immediately through the center of the drawbar and the center of the coupling proper
Car Coupling.-Edward C. Inderlied, Rock Rift, N. Y. This invention consists principally o link adapted to engage hooks on the opposing draw gage or disengage the link with or from the drawbar hooks. Cars of different heights may be readily coupled with this coupling, the several parts are positively co nected with each other, so that none are liable to be lost, nd the coupling or uncoupling is ea
Tie and Rail Fastening.-Ellery C Davis, Crookston, Minn. This is an improvement in ie is channeled and a flanged inverted chair permanently ecured to it, both having coincident bolt holes and on of them having lateral slots, flanged and notched clamping bolts being used, engaging a detachable locking de-
vice. For use on curves, the bolt holes of the ties and vice. For use on curves. the bolt holes of the ties an chairs are located at different distances, and the imovement is designed to afford the maximum of sin plicity, strength, cheapness, and durability

Electrical.
Closed Conduit for Ellectrical
Rallways.-Frank Windle, Philadelphia, Pa. Spring
the slot of the conduit, according to this improvement, conductor in the conduit being insulated from a longi tudinal support, while springs in contact with the con uctor have upwaraly curved arms with which the spring plates engage. The conduit may be very shallow, and pressed automatically into circuit by the passage of a car, so that only certain sections of the strips are energized at any one time, thus rendering the system ve safe and preventing any great loss of energy.
Rail for Electric Roads.-Charles Sill, New York City. This is a rail upon which the ahousing for the electric conductor and trolley wire The rail has a base from which extend upward two parallel webs upon which is bolted a top plate forming he rail tread, the rail thus affording a longitudunal duct for the conducting cable, while from the duct lead wire.

Mining, Etc.
Apparatus for Treating Ores. Norris H. Cone, Leadville, Col. This is an apparatus more especially designed for roasting and chloridizing gold, silver, copper and other ores. It comprises a revoluble cylinder on the inner face of which are arranged tationary cut-off covering some of the pipes, whereby they will be successively closed on their upward movement and opened on the downward movement, the pipes being held within a fire brick lining, and connected of heating and cooling.
Separating Precious Metals from Sand, Gravel, etc.-Pascal P. Cuplin, West Bend, dhe. This invention relates to dry placer mining, and by means of an apparatus combining a revolving inlined screen with different degrees of fineness of mesh in connection with tubes leading from an air supply, hutes leading from the screens discharging into th is supplied by bellows and a blower, and varies in the different tubes according to the grading of the materia by the several sieves, each pan of the separated metal differing from the finest flour gold to grain gold.

## Mechanical

Portable Hydraulic Punch. --Elijah Cornell, Philadelphia, Pa. This punch may bequick placed in position for effective operation and as readil released from the work, being especially designed to facilitate the punching of the webs of railway rails, metal beams and plates, and structural, architectural or
bridge work of all kinds. In connection with the pund piston is a coil spring, whose tension may be regulated, and which facilitates the backward movement of the piston after the punching has been effected, the liquid

Nut Lock.-Conrad Hahn, Pittsburg,
Pa. This improvement comprises a plate adapted to be
supported from the bolts, and having offsets which hold supported from the bolts, and having offsets which hold
a bar over which is fitted a locking plate held in place by keys which engage the offsets. The device is simple and easily applied, and will positively lock the nut or nuts in place on
Tap and Reamer Wrench.-Elmer . Nichols, Pawtucket, R. I. This tool comprises stock with threaded neck on which screws a sleeve, the a movable jaw sliding in the stock. The handle with nected with the movable jaw does not turn, but moved bodily in or out to open or close the jaws.

## Agricultural.

Harrow.-Joseph B. Morrison, Fort Madison, Iowa. The tooth holder of this harrow has upper and lower laterally projecting clamps which fit round the tooth, the inner ends of the side arms of the clamps being estenced or prolonged over the body, form a seat for the rail plates, and separated from each other to avoid any obstruction to clamping the tooth against the rail. This improved tooth holder not only clamps the tooth firmly, but also braces and gives rigidity

Planter Attachment.-William L. tickles, Churchtown, N. Y. This is an attachment for bed and without clods to interfere with the growing lants, the ground at each side of the furrow being left very light. 'The improvement also provides a furrow a marking a field to be planted by hand, and one which may be readily adjusted to run as deeply in the ground a desired.
Incubator.-Archibald Kerr, Carmithael's, Pa. According to this improvement the eggs conaind in the incubator may be bodily turned over, being ontained in revoluble tride of the machine.T The eggs ar om, enabling the hot air to circulate freely through them he trays having doors or removable sections in one eir sides, permitting the trays to be lifted out singly
ithoutremoving the tray drawer.
Folding Coop, etc.-Thomas A. Al en, Astor, West Va. This is a coop or crate in which
he sides and ends are jointed to the bottom, the sides folding inward and outward between the ends, and links connecting the ends and top and forming stops to limit heened for use or folded into smallspace, being especiall designed to facilitaled into smalisispace, being especilis pigs, rabbits, etc.

## Miscellaneous.

Bicycle Support.-Harry A. Brooks,
parallel with the machine is, according to this invention,
pivoted and held by means of a lock lug from a pendent
pivotal plate, in such manner that it will be held to a
supporting position by the weight of the itited machine
standing alone, and will automatically swing up out of
the way when such weight is removed. The device can
be quickly secured to and removed from the frame of an
ordinary bicycle, and when attached does not appear
clumsy or otherwise mar the general effect of the maclumsy
chine.
Bicycle Support.-Abraham H. Rihbany, Wauseon, Ohio. In guides at the front of the mawhose lower end is a fork straddling the front wheel, and links pivotally connect the lower ends of the fork with legs pivoted adjacent to the axle, whereby the legs may be thrown down into contact with the ground to support the wheel in upright position. This device is readily applicable to a new or an old machine, but in applying the
improvement when a machine is built, the swinging legs may be pivoted tolugs extended from prongs of the steering fork.
Scale Beam Computing Attach-ment.-Edward W. Wise, Las Vegas, New Mexico. the scale beam actuates a screw shaft and the gear conhection of a computing cylinder, whose surface is arranged in columns bearing computed rates, in such way as to indicate both the weight and the price of the article being weighed, the movement of sliding the weight upon the beam causing the computation to be automatically pinary maner the

Finishing Coverings of Braided Moulds.-Franz Markgraf, New York City. The bulbus effects in gimp, trimmings, tassels, etc., heretofore principally finished by hand, are provided for by this in.
ventor by a new method of and device for finishing the ventor by a new method of conds of covered by a special machine, the braided projecting ends of mould coverings being inserted by a special progressive movement, whereby the work is performed in a superior manner and at greater peed.
Spectacle Case Holder.-Robert T. Roberts, La Harpe, Ill. This is a simple device or clasp It consists of two lengths of wire to be passed singly around and looped permanentiy upon the case, the wire
being twisted together at the meeting point, and two being twisted together at the meeting point, and two
hooks forming the terminals of a small length of twisted hooks f $f$
wire.
Ink Well.-John Werner, Brooklyn, v. Y. A tube is held in this well and a bucket slides in the tube, a stopper closing the tube and the neck of the
well. A bail pivotally connected with the hucket is cured on the stopar, thebailhaving lue bucket is sein the tube to guide the bucket in its up and down movement. The construction prevents the writer from dipping the pen too far into the ink, which does not evapoate and become thick, and prevents the spilling of the ink if the well is upset.

Fence.-Lorenzo M. Shirtcliff, Lynnville, Ill. This inventor has devised an improved wire
fence with metal channel bar posts, each having a foot fence with metal channel bar posts, each having a foot
flange seated on and attached to an angle-bent anchor plate, another angle anchor plate being attached to the side flange. Diagonal brace bars are also used at the corners, and here is ar blex becks buried at different an-
the brace bar and anchor blo gles. The improvement also comprises nov
stretching devices for the end or corner posts.
Window Guard.-Charles E. Sowaal, New York City. To prevent people from falling through Yoen windows. this inventor has devised a cheap and
strong guard, which is readily applied or removed, and strong guard, which is reaily appped or removed, and
whioh permits of raising or lowering the window with the guard in place. It consists of a frame of pivoted up. rights and cross slats, with diagonal braces having a siliding connection at one end, the frame being normally
not wide enough to reach across the window frame, but by moving the top and bettom of the frame slighty to by moving the top and bottom of the frame slightly to
ward each other, the frame locks itself into the window frame so as to be securely held.
Whiffletree. - Lorenzo D. Brown, Shawnee, ohio. Mhis whiletree bas a bearing ring o its underside, the base plate having a groove to receive
the ring, and an upturned hook on the base plate en gaging one eide of the ring, while an ilide bolt engages the
opposite side. It may be attached to the cross bar of a opposite side. It may be attached to the cross bar of a
vehicle without boring a hole through and thus weakening vehicle without boring $a$ hole through and thus weakening
it, and it is held in place in such a way that it cannot acit, and it is held in place in such a way that it cannot ac-
cidentally get loose. It is mounted to turn very easily,
It tilt and unhitch the traces, thus permitting the horse $t$ go free.
Heater.-Herman Gutschmidt, Jer sey City, N. J. For conveniently and rapidly heating
room by the employment of a lamp this inventor has de vised a simple form of heater in which water is made ho and caused to circulate rapidy m a corrugated shell pre senting large exposed surfaces to the air. The heater
has a series of connected and vertically disposed water circulating compartments, the corrugations taking the place of water-circulating tubes.
Blacking Casing. - Louis Nearing Morris Run, Pa. Thisis i a simple form of casing adapted to contain blacking, a dauber, and a brush, the back of
the brush forming the lid of the casing, and the dauber and a blacking bottle being received in side pockets. The
article may be cheaply made and takes up very little room, so that it may be converiently carried in a valise or tunk.
Detachable Coffin Handle.- Jacob Klar, Rodney, Miss. Each handle bar is, according to this invention, connected by a flexible depending loop
with a flexible carrier strand adapted to be passed unde the coffin, there being a transverse bearing block held in a bight in the strand, to be brought into pusition at the signed to obviate the necessity for permanently affixe signed to
handes.
Note.-Copies of any of the above patents will be furrished by Munn \& Co., for 25 cents each. Please send name of
of this paper.

## NEW BOOKS AND PUBLICATIONS.

Procedings of the international
Electrical Congress held in the
CITY OF Chicaqo. August 21 to 25,
1893. New York: American Insti-
1893. New York: American Insti-
tute of Engineers. 1894 . Pp. xxiv, 488. Price $\$ 3$.

It seems hardy necessary for us to do more than give he title ortis work. The proceedings of the institute tions may be pronounced a sine qua non in every scie tific library. As a matter of course, the present work epresents the highest grade of publication in its ow line. We may note that this volume is largely given up to alternating current work, and thereby the tendency of the day is indicated. The papers are not the only contents of the book, the discussions thereon forming most mportant reading. The paper on the Tesla oscillators
is too brief, but is most welcome as a convenient is too brief, but is most welcome as a convenien
memorandum of the great investigator's most rece

Inebriety or Narcomania: its Eti OLOGY, PATHOLOGY, TREATMENT
AND JURISPRUDENCE. By Norman Kerr. Third edition. Ny New York
Selwin Tait \& Sons. Pp. xxxv, 605 . Price $\$ 3.50$.
This exhaustive monograph represents an encol amount of labor. It reviews the particular subject from the medical standpoint in the first part of the work, and afterward in the medico-legal aspects, the latter, of course, referring to the English court procedure. It sonal traits of inebriates, instances of false arrests and of decisions by magistrates in these cases. A most excellent index is appended, which consists of over twenty pages of fine type, worthy to be instanced as an exam-
ple to authors and publishers of how a scientific book should be mad
our readers.
A Treatise on Industrial PhotoMETRY, WITH SPECIAL APPLICATION
TO ELECTRIC LIGHTING. By A.
Palaz. Authorized translation the French. By George W. Patterson and Merib Rowley Patterson.
pany London: Sampson Low,
Marston \& Company. Limited. 1894. Pp. vii, 322 . Price $\$ 4$.
The astonishing development of photometry has been
brought about largely by the electric light brought about largely by the electric light. This book is very complete, being written in the well known French style of exactness; yet, although France is not an
island, we do find a certain amount of insularity in island, we do find a certain amount of insularity in
its treatment of the subject, some apparatus very exten-
sively used in England and America being entirely
omitted. The indexes seem hardly adequate to the
amount of text. It is possible that upon looking through he book we might find much which the index does no how. We do not find the jet photer photographic process is not given either. The word burner and the proper name "Sugg" do not appear in
the index at all. It woald be impossible to imagine a American author writing on photometry without men ioning Sugg's London Argand gas burner as a standar burner for valuing gas. It is, however, but fair to say ric lighting, which would, of course excuse, to a certain stent, the omission of cas photometry, something whos nclusion in the work would certainly have added much解
he Forest Tree Planter's Mandal apolis, Minn. : The Progressive Age We take especial pleasure in noticing this little pamphlet, which is sent free to all applicants who will remit 4 cents for postage. It gives a popular description of a umber of trees and their availability, tells how to manology, zoology, and the economic and climatic condons of the science of forestry and the local aspect thereof.
Bread From Stones. A new and ra
tional system of land fertilization and physical regeneration. Trans lated from the German. Philadel
phia, Pa. : A. J. Tafel. $1894 . \quad$ Pp
$135 .{ }^{\text {No }}$. This work, translated from the German of Julins Hen nd advocates the use of clean fertilization. In the primeval rocks, it claims, can be found adequate fer tilizers; these rocks being reduced to dust to become a similable by plants or decomposable by the soil influ nces are the fertilizer it recommends. The subject is curious one, and whether its premises are all correct or
not, there is no question that the fine pulverization of ot, there is no question that the fine pulverization he influence of earth acids.

## SCIENTIFIC AMERICAN

BUILDING EDITION
JANUARY, 1895.-(No. 111.) TABLE OF CONTENTS.
. An elegant plate in colors, showing a Colonial cotChas. H. Love, Esq. Two perspective elevations and floor plans. Cost complete $\$ 4,250$. Mr. Ar thur C. Longyear, architect, New York City. pleàsing design.
cently erected for J. O. Noakes, Esq., at Iselin' Park. Two perspective elevations and foor plan Cost $\$ 5,000$ complete. Mr. Manly N. Cutter
architect, New York City. An attractive design. architect, New York Cly. An attractive design. erected for Sylvester Post, Esq. Two perspective evations and floor plans. Messrs. W. S. Knowle pleasing design.
4. A seaside cottage recently erected for C. H. Manning, Esq., at Kennebunkport, Me. Two perand unique design after the "New England" ean-to roof order. Mr. H. P. Clark, architec Boston, Mass.
residence at East Orange, N. J., erected at a cost
of $\$ 7,000$. Architect Mr. W. F. Bower, Newark, of $\$ 7,000$. Architect Mr. W. F. Bower, Ne
N. J. Perspective elevation and floor plans.
N. J. Perspective elevation and Hoor plans. Two perspective elevations and ground plan. A
design of great architectural beauty, treated in he Romanesque style. Mr. J. C. Cady, architect, New York.
residence at Scranton, Pa., erected for E. B.
Sturges, Esq., at a cost of $\$ 5,000$ complete. Archi Sturges, Esq., at a cost of $\$ 5,000$ complete. Archi-
tect Mr. E. G. W. Dietrich, New York City. Perspective elevation and floor plans.
8. A summer residence at Cushing's Island, Me., reperspective elevations and floor plans, also an in erior view. Mr. John C. Stevens, architect, Portland, Me.
home.
New Ye Armory of the Seventy-ifrst Regiment, New York City. Architect Mr. J. R. Thomas, erspective view and floor plans of the fourteen
story Reliance Building Chicago story Reliance Building, Chicago.
iscellaneous contents.-Buff brick popular.-Ceiling and cornice tinting.-Home ground arrangement of plants, illustrated.-Stone dressing by com-
pressed air, illustrated.-Brick dust mortar.-Inpressed air, illustrated.- brick dust mortar.- In -
teresting ruin of cliff dwellers.-Removing the front wall of a warehouse, with sketches.-Improved woodworking machine, illustrated. - Buff
brick in New York.-Ceiling paper.-"Dec-co-re-o," a new material for decorative purposes, il-lustrated.-Improved gutter hangers, illustrated. Draughtsman's supplies, illustrated.
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The best book for electricians and beginners in ele ricity is " Fxperimental Science," by Geo. M. Hopkins. Woven wire brushes.-The Belknap Motor Co., Woven wire brushes.-The Belknap Motor Co., of
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marked or labeled.
(6357) Old Mechanic writes for information with regard to the process of tempering edge tools
called the lead process. Is the steel injured in'the process of heating in lead, and what of the uniformity and toughness of such temper? A. The lead heating process for hard nablishments edois is almost in universal use in alf large eni form control of the proper heat for hardening. By this process the burning of corners and thin edges is prevented by maintaining the temperature of the lead pot at the exact heat for hardening any particular brand of steel.
There is nothing in the contact of the hot lead that will injure the steel, but rather, on the contrary, preserve it from burning or overheating, which is a great draw635) L. D. W.
(6358) L. D. W. writes: To answer a more steam is required to run a given amount of machinery when the exhaust from the engine is used for heating purposes than is required when the exhaust is allowed to escape in the open air? If so, please state what per cent more. A. To use the exhaust steam for
any purpose is economy of the first order. Even if small additional back pressure is made upon the engin No high presure engine exhausting through a pipe to and above the roof is free from back pressure. When a delicate pressure gauge is attached to the exhaust pipe cose the engine, the back pressure in most engines
will be found to be from $1 / 2$ to $11 / 2$ pounds. From the lowest pressure of $1 / 4$ to $1 / 2$ pound, it is a saving to take
the exhaust steam in a direct line from the exhaust port of the steam chest to be used for heating purposes, and, best distribution for facilitating the circulation with the least obstruction, it should not increase the back pressure. There are many examples in and around New York
where a $3 / 4$ inch back pressure has been reduced to 1 nch by the proper lay-out of an exhaust heating system. (6359) D. S. says: I have made violin as described in Scientific American Supplement, No. in the best manner. Please and wish to have it nimished it with, also the kind of varnish to use. A. Dissolve

## Shellac. Mastic.

In 150 parts 95 per cent alcohol which has been colored red with cochineal, or if a darker red is required, add 6 parts Venice turpentine. As this varnish is highly inflammable, use caution as to fire. Find the tone of a piece of wood by direct comparison with similar notes on the piano or any standard instrument. A violin in tone at the proper pitch by a tuning fork is very convenient. Tone of Wood for Same.-Dissolve by heat 2
ounc s amber in oil of turpentine, 5 ounces, and drying inseed oil, 5 ounces. Color with dragon's blood or extract alkanet root. The tone given by a piece of wood depends upon its size, thickness, etc. Therefore, a test
must be comparative. Cut square plates of equal size must be comparative. Cut square plates of equal size and thickness of a known wood and of the wood to be
tried. Place the center of the plate upon end of a cork or spool placed upon a table near the edge. Press the near one of the corners. This will give the lowest note such a plate can produce, or the normal tone. The higher the tone, the better the wood. From the "Sci-
entific American Cyclopedia of Receipts, Notes and
(6360) H. L. S. says : Will you advise me as to the best preparation for filling worm holes in
wood? A. Put any quantity of fine sawdust of the same wood? A. Put any quantity of fine sawdust of the same
kind of wood into an earthen pan, and pour boiling ater on it; stir it well, and let it remain for a week en days, occasionally stirring it; the and it will be of the consistence of pulp or paste ;
ime put it into a coarse cloth and squeeze all the moisture from it. Keep for use, and, when wanted, mix a sufficient quantity of thin glue to make it into a paste; rnb it well into the cracks, or fill up the holes in your work with it. When quite hard and dry, clean the work off, perfection.
(6361) A. J. B. says : Will you please inform me, through the columns of your valuable paper, nimal? A whale is an animal inhabiting the ocean it belongs to the class of mammals, tribe of mutilates and (6362) C. E. McM. writes: 1. I saw some ime ago that a storage battery would give approximately hat mean the entire suface of positive plate? A. A discharge rate of 6 amperes per square foot of positive plate may be allowed. This is per square foot of plate mmersed, not of area. It is one-half the area. 2. I have two storage batteries, 8 plates each, plates $6 \times 7$, and are
pasted with red lead. What would be about the Can I run orce andernal resistance of each with them both? A. For each couple allow two volts, and calculate discharge rate as above. The resistance
may be very much less than the above would givemay be very much less than the above would give-
perhaps 0.01 ohm. Your batteries should be ample
(6363) H. C. L. asks (1) how to make he best kind of batteries to ran sewing machines by ?
A. Practically speaking, you can only use a storage batery. The primary battery is expensive and troublesome How much will it cost per day? A. We cannot give are the rules for calculating the resistance to give electromagnets at various distances from the battery, as in tele-
graphy? A. In general the resistance of the line and battery are made equal. There is no exact rule for what ou ask. 4. How many watts are necessary to run a sewwork done.
(6364) C. G. C. writes: I have an elec-tro-magnet (horse-shoe form), $17 /$ inch between poles; net would I have to use with it to make a satisfactory magneto-electric machine for medical use? A. Use a
or 8 inch machine magnet. 2. In building tall chimmeys for factory use (say 100 feet) is it usual to lessen the size of flue toward the top? A. No. 3. What
is Lapis Calaminaris, and what is its use ? A. Zinc is Lapis Calaminaris, and what is its use? A. Zinc
silicate or calamine, an ore of zinc. 4. From whom silicate or calamine, an ore of zinc. 4. From whom
can I buy the weights and measures of the metric system? Is it probable that the system will before long come into general use in this country? A. Address they will come into general use for many years.
(6365) F. B. C. asks: How many cubic feet of illuminating gas (from gasoline) can be com-
pressed into a vessel containing 10 liquid gallons, at 5 pounds and 10 pounds pressure per cubic inch? A. If a permanent gas is made, then at 5 pounds pressure the 17 gallons. If the gas gallons, and at 10 pounds about 17 gallons. If the gas is partly condensed to a liquid
(6366) M. F. P. asks how gas can be prevented from smoking. A. If the gas is very rich. it
should be burned in small size excavated head burners. Proper burners prevent gas from sinoking. The richer Proper burners prevent gas from snokng. The richer
the gas, the harder it is to overcome this trouble.
(6367) H. I. P. asks for more information about Mr. Vaughan-Sherrin's new electric boat, described in Scientific American Supplement, No.
780ary 24, 1891. A. We have nothing additional to the article referred to.
(6368) T. P. M. says : Will you please give me a good receipt for an oil wood filler, and one that is not an oil filler, for hard woods where a very fine the fields of dynamos and castings of engines, etc as Hard Wood Filler.-Use boiled oil and enough corn starch to make a very thick paste. Add a little japan, and reduce with turpentine. Add no color for white oak; for dark ash and chestnut use a little raw sienna; for walnut, burnt umber and a very little Venetian red; for white of the burnt sienna. Use enough color to cover the white of the starch. Apply with brush and rags. Let
it dry forty-ight hours, or until it is in condition to rub down with No. 0 sandpaper, without much gumming up, and if an extra fine finish is desired, fill again with the same materials, using less oil, but more of japan and turpentine. The second coat will not shrink, it being supported by the first coat. When the second coat is hard, the woodj is ready for finishing in any desired style or to any degree of nicety by following up the
usual methods. This formula is not intended for rosewood, and will not be satisfactory if used for rosewood, and will not be satisfactory if used therefor.
American Wood Filler.-Apply to the wood with a brush the following mixture: Pulverized starch by weight, $3^{\circ}$ parts : heavy spar, 3 parts ; $1 / 2$ part by weight of siccative, with enough turpentine to make the consistency of ordinary varnish. For dark woods add to the siccative umber up to $1 / 2$ part. Rub across the grain wood. Let the wood dry about eight hours, rub with glass paper, then polish and varnish. Composition to Fill Holes in Castings.-1. Dry clay, 6 parts; borax in solution, $11 / 2$ parts. Mix. 2. Make a thick paste of pulverized binoxide of manganese and a strong solution of
.
(6369) R. W. S. asks : 1. With a poten-
candle power incandescent lamps will be lighted, each lamp requiring a voltage of 9 to 12 and amperage 1 to $11 / 2$ ?
A. Ten or eleven. 2. How many 3 candle power lamps, A. Ten or eleven. 2 . How many 3 candle power lamps,
each lamp requiring a voltage of 6 to 7 and amperage 1 to $11 / 2$ ? A. Twenty. 3. What size of pure lead wire will proximately).
(6370) F. C. S. writes : How can I melt stove in a crucible or notss? Can it be done in an ordinar. mould answer to pour it into? A. Glass cannot be manipulated as you specify. A high and prolonged heat is required, and it must be shaped in moulds by blowing or pressing. Plaster of Paris moulds will not answer
(6371) J. E. G. asks : 1. In making a machine as described by Mr. Bonetti in the Scientific american of May 26, 1894, is it necessary to shellac the glass disks, if glass is used? A. Shellac the glass disks. 2. What is mosaic gold that is used to excite the machine and how is it made? A. Bisulphide of tin; it is made by
igniting at a low red heat 12 parts tin, 6 mercury, 6 salamigniting at a low red heat 12 parts tin, 6 mercury, 6 salam
moniac, 7 flowers of sulphur. The "mosaic gold " re mains in the bottom of the crucible. 3. Are the collec tors a set of combs like those on an ordinary Wimshurst machine? A. Yes. 4. Are there any acids that I could depend upon to go through glass to make an inch and a quarter hole, and how must I do it? A. Use a copper or brass tube, with emery powder and turpentine. Ce
ment a cork to the glass for a guide and fix the tube in a carpenter's brace and grind through it. No acid can be used. 5. Is plaster of Paris a non-conductor when thor-
oughly dry and made into moulds? A. It is a very poor one.
(6372) V. M. writes: What is the reason that arc incandescent electric lamps are not in use much
or not at all? A. As a matter of practical lighting, the electric profession has settled upon using the full arc or ful incandescent lamp. The intermediate types do not pr sint the advantages of either extreme type.
(6373) C. H. M. asks whether a Leyden dinary battery. A. The jar or condenser can be charged, but unless the batteryiwere of very high voltage the charge ould be weak
(6374) C. H. P. writes : I would like to know the output in volts and amperes of a 50 light 50 volt
transformer used as a common induction coil, the coarse transformer used as a common induction coil, the coarse
coil connected to a 50 volt circuit with ten 16 candle power 50 volt lamps in series. Primary has 2 layers No4 wire. Secondary $121 / 2$ pounds of No. 14. A. You do not give relative number of turns of wire. It will approximately reproduce the voltage of the primary lighting circuit for which it was constructed, provided it is excited by the secondary alternating current of such a circuit. For amperage divide the voltage by the resistance
(about $21 / 2$ ohms) of the zinc coil.

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## AND EACH BEARING THAT DATE.

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DESIGNS.

## Cake, D. Stewart.te. Carpet, A.M. Rose <br> TRADE MARKS







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