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MANUFACTURE OF ELECTRIC LAMPS.

A factory has been fitted up in Bermondsey Street, London, by Messrs. Wright and Mackie, electrical engineers, of Grace-church Street, for the Hammond Electric Light and Power Supply Company, for the purpose of making incan-descent lamps. The factory at Bermondsey Street consists of four floors, having a total are an about 4,800 superficient of four floors, having a total ar we about 4,800 superfield ments. The ground floor is devoted to a store room, and is two headstocks fitted with hollow man-feet. In the basement is an eight horse power semi-fixed the glass-blowing room. In the latter twelve mechanical drels and and the glass tube to be shaped. compound expansive engine, by Marshall and Sons, working glass blowers are arranged, driven by power shafting, which at 180 revolutions per minute, from which the power is also works a series of air compressors for supplying air to ing a fixture and the other capable of traversing the bed by transmitted to a 300-light Ferranti alternate current machine, the blow-pipe flames, and the necessary high pressure air

rent machine and exciter. The Ferranti machine is employed for lighting the building, heating the carbon filaments during the process of exhaustion, and for general experimental purposes, while the Siemens machine is used in the process which deposits carbon in the pores of the fila-ents. The ground floor is devoted to a store room, and

with Siemens exciter, and a 600 volt Siemens alternate cur- for blowing out the bulbs. The machines in this room are manipulated by boys ranging from fourteen to sixteen years of age, who are employed in the various processes of blow-ing bulbs and scaling in the carbon filaments.

The mechanical glass blower, as may be seen in Fig. 1 in the engraving, is very similar in construction to a lathe, but The manufiels revolve synchronously, the one headstock be-(Continued on page 404.)



1. Glass blowing machine.—2. Bending the fiber —3 The fiber after carbonization.—4. The carbon flament connected with metal electrodes.—5. Tube from which bulbs are blown.—6. A pair of bulbs as produced by the glass blowing machine.—7. Inserting the carbon in the bulb.—8. Sealing the bulb.—9. Bulb ready for exhaustion.—10. Exhausting and sealing the bulbs.—11. The complete lamp.

WRIGHT AND MACKIE'S MACHINERY FOR MAKING INCANDESCENT ELECTRIC LAMPS.

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AN INTERESTING PATENT OFFICE QUESTION.

The applicant for a patent usually intrusts the management of his business before the Patent Office to'a competent agent who acts under the authority of an ordinary power of attorney, which is filed with the Commissioner of Patents. It frequently happens, for reasons satisfactory to the applicant, that he desires to change his attorney, and heretofore it has only been necessary to file with the commissioner a re-

vocation of the original power with substitution of the new. The Commissioner of Patents has lately made a new rule which provides in substance that the Patent Office will not in future recognize any change of attorneys during the pendency of the case, unless reasons satisfactory to the commissioner are first presented to him. The commissioner thinks the new rule is necessary in order to facilitate the business of the Patent Office, as it saves the office the trouble of looking back to see if any change of attorney has been made, etc.

Several applications have been made to the commissioner for change of attorneyship, in which the applicants have represented to the commissioner, as reasons, that they were not satisfied with the manner in which their original attorney was managing their matters; or, for reasons personal to themselves, they could not consent to leave their business any longer in such attorney's hands. These reasons have not been accepted by the commissioner, and he has declined to permit the desired change of attorneyship.

On the other hand, when the applicant has stated as reasons for desiring to change attorneys, that his original agent has mismanaged the case or neglected it, or is unable further to prosecute it, then the new power has been received and the new attorney recognized; the original attorney not being allowed to be heard or defend himself against these imputations.

In other words, the only way at present by which an applicant for a patent may secure a change of attorneys is to file with the Commissioner of Patents an ex parte statement specially derogatory and damaging to the original attorney, if not libelous.

It has been specially objected to the Commissioner of Patents that he had no authority under the statute to make a rule that is inconsistent with law; that a firemen. rule which restricts the right to constitute and revoke powers of attorney is inconsistent with law; that it is a canon of elementary law that every power of attorney may be revoked at will, unless coupled with an interest; that the rule in question is mischievous because it encroaches upon private rights; that it is void because it is an attempt to legislate by one of the executive departments; that it is dangerous because, as seems probable, the courts will not recogissioner's outhority to prohibit a provocation c nize the cold a power of attorney; and if the Patent Office should grant a patent upon amendments made by an agent whose power had been revoked by notice to the commissioner, the validity of such patent might be questioned.

In reply to these objections and to request that he would cite the law for his anthority for upholding the rule, the Commissioner of Patents states that the rule was adopted after fullconsultation with the Secretary of the Interior, and since its adoption has been sustained by him on an appeal; furthermore, he, the commissioner, is of opinion that it is within his power and that of the Secretary of the Interior to say upon what grounds powers of attorney may be revoked and new powers filed. Here the matter rests, the commissioner not having given his special view as to the law of the matter.

CALIPERS AND FIXED GAUGES.

For fine work in the machine shop the old fashioned bow calipers are going out of date and are being superseded by more reliable gauges. Calipers may still be useful for gauging coarse work and making comparisons of relative sizes of considerable difference; but the growing demand for exact work and increasing adoption of unvarying standards of sizes in the shops, are fast driving out all adjustable gauges and particularly the unreliable calipers.

There are two elements of uncertainty and inaccuracy in calipers-the screw adjustment and the length and comparative weakness of the bows. The slightest touch is sufficient to start the "butterfly" nut on the screw, and the nut and screw are never threaded with sufficient accuracy to prevent backlash. Besides this, the riveted end of the screw allows of more or less play, imperceptible, it may be, just at that but all previous efforts to obtain a photograph by substitutpoint, but causing a serious mismeasurement at the points ing a camera for the observer's eye have entirely failed. The difficulties were over come by the use of a powerful Siemens electric lamp, supplied by a dynamo machine. By means of the bows-the points where the accuracy is demanded. Then the bows themselves are so slender as to "give" quite readily under even a slight pressure. As all measurements of this light some excellent photographs were obtained of by calipers, or similar gauges, are determined by the sense the laryngoscopic image. The patient in each case was Herr Behnke, at whose instance the experiments were made. of feeling and not by sight, it is obvious that the utmost rigidity is necessary in the measuring implement. This Improved Buildings in New York. rigidity is impossible in a pair of calipers. In place of this implement, which is adapted to any and The character of the buildings now being erected in New York city differs greatly from those which have been built all variations of diameters between certain fixed limits, the best shops are adopting solid tool steel gauges of standard for the last twenty years, not alone in style and the tendency sizes varying by fractions of an inch as on the ordinary to extreme height, but in excellence of material and of workmanship. The day of brown stone veneers and brick shells rule, sixty fourths and thirty-seconds, or by thousandths of an inch, five-thousandths usually. The gauges are horsehas gone, and capitalists are putting money into buildings shoe shaped jaws with parallel faces ground to one fiftyin the evident belief that it is real estate. Good building stone, granite or limestone, and hard burned bricks are used thousandth of an inch for exactness, and furnished with instead of iron for the outside walls, rolled iron beams take handles convenient for lathe use or for bench use, the hanthe place of timber and plank for floor supports, and celludle for the lathe gauge being in line with the parallel jaws, and that for the bench gauge being at right angles to their | lar tile or porous clay blocks take the place of studding and faces, making it handy for use as a snap gauge. The lath for partitions.

gauges are hardened and then ground to finish size. The limit of exactness of these solid gauges is fixed at one fiftythousandth of an inch, as that has been found to be the limit of sensibility in the experienced workman's fingers; a skillful workman can detect errors in measurement by feeling up to that almost insignificant fraction of an inch.

Such delicacy of measurement is not practicable with calipers, nor can a much lower limit of accuracy be assured by the calipers. When, therefore, first class shops permit no fits to pass which do not come up to the standard of one four-thousandth or one five-thousandth of an inch it is manifest that some gauge of greater accuracy than the spring calipers is required.

HIGH BUILDINGS AND FIRES.

The increasing tendency of land owners and builders in large cities to utilize the ground area as much as possible by erecting lofty buildings, requires some commensurate means to prevent fires and to stay their progress. Our best steam fire engines are wonderful improvements du the old time hand engines, and they can force an inbroken stream of water in round, solid column for a considerable distance from the nozzle, unless exposed to a high wind or the direct heat of a raging fire. But these adverse conditions often exist and turn the water column into diffused spray, or dissipate it into mist or vapor, when most of its effective force is lost.

Recent experiments, however, suggest that if the force of the engine could be exerted on a confined column of water rising vertically to the roof, sufficient power would remain in the impulse from the engine to deliver streams of solid water over the area of any ordinary city building. A steam fire engine was recently tested which threw water 156 feet horizontally from a one inch nozzle attached to a 21/4 inch hose running 2,700 feet on a level and 200 feet above the engine. In this instance a very large column of water was made to deliver a moderately small column at a great height above the engine; but by the employment of two or more engines on the same hose, by means of the two-way or the four-way butt, a result may be reached which will place the roofs of the highest buildings under the control of the

This can be effected by a fixed stand pipe attached to the building so as to be easily reached by the firemen from the street. This stand pipe is, in effect, a prolongation of the ordinary engine hose, and the nozzle, with a convenient length of handling hose, may be attached to the top of the pipe, or to an opening on any floor.

Incubation of the Ostrich.

Some will sit throughout with the most solicitous maternal instinct; . . . others manifest such anxiety that, when the hen has been a little late in taking her morning turn upon the nest, the male has gone out, and, hunting her up, has kicked her to the nest in a most ungentlemanly manner. Some are very affectionate over their young, others the reverse; thus do individuals differ even among ostriches. As a rule the cock bird forms the nest, sits the longest, and takes the burden of the work of hatching and rearing. Contrary to what has been currently understood, and what is still stated even in recent colonial accounts, the cock bird sits at night. In this peculiarity, the London Field thinks the hand of Providence may be seen, for the worst enemies of the nest appear at night, and the cock, being stronger and braver, is better able to resist them; moreover, the same authority concludes that, the feathers of the cock being black, night-sitting does not expose him to the exhaustion from the sun's rays which would ensue if he sat during the day; while at the same time the gray feathers of the female are less conspicuous while she sits during the day.

Photographing the Vocal Organs.

Some attempts have been made in London to photograph the human vocal organs in the act of singing. The principal object was to obtain a picture of the ligaments known as the vocal cords, which are situated at the top of the larynx. These can be viewed in the laryngoscope, a small mirror, which when placed at the back of the throat serves at once to reflect light upon the membranes, and to form an image of them visible to the observer. With the aid of this instrument numerous observations have been made upon singers, and much valuable information has been collected,

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Contents.

(Illustrated articles are marked with an asterisk.)

An honest job	Kremlin at Moscow
Aspects of the planets for July. 401	Lake Winnipeg. discharge of 106
Athletic electrician, an	Lanterns. improvements in* 406
Austral, the raising of* 402	Liquefaction of nitrogen 408
Baldness 403	Manufacture of electric lamps* 404
Blind stop, new* 408	Mechanical equivalent of heat 402
Bridle attachment* 408	Napkin holden novel* 408
Business and personal 409	New books and publications 409
Calipers and fixed gauges 400	New secrebary* 408
Case hardening 403	Notes and queries 409
Cash desk, improved* 408	Paper and envelope package* 408
Cementing belts 406	Patent orphan asylum 406
Chiccory as a vegetable 407	Photographing the vocal organs. 400
Cocoa and chocolate 405	Pilgrim, the new steamer* 402
College of New Jersey 408	Plow clevis* 408
Combined gas and elect. light 403	Providing iron with bronze 401
Cotton press, improved* 406	Purification of petroleum benzine 405
Decisiona relating to patents 404	Radiation of silver 408
Electric lamps, manufacture of*. 399	Railway bracket girder* 403
Elevated railways of New York. 407	Raising of the Austral* 402
Engine, two wheeled, portable*. 403	Refuse of furnaces for building., 404
Fisher's improved lantern* 406	Safety wall for jails* 403
Gospel trumpet, the 404	Scaled hardness for metals 404
High buildings and fires 400	Scintillation of stars 405
Improved buildings in New York. 400	Shoebill, the*
Improved walls for jails* 403	Solar eclipse, reports of recent 401
Incubation of the ostrich 400	Trial of compressed air car 404
Index of inventions 410	Varnish for foundry patterns 405
Ingram's cotton press* 409	Wine terments 401
Interesting patent question 400	Without a rival 403
International Exhib. at Nice 408	Zinc coating for iron 406

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 391,

For the Week ending June 30, 1883.

Price 10 cents. For sale by all newsdealers.

PAG	łE
I. ENGINEERING.—The Great Garabit Bridge, France, with dimensions, description, and two engravings. 6 Forbes' Rigs for War Ships, as presented to the Boston Branch of the Naval Institute.—With eight illustrations	31 192 132 135 135
II. DECORATIVE ART.—Sketches from the Furniture Exhibition, London.—Numerous figures	36 36 37



Photomicrography without a Microscope or Microscopic Objective.—1 figure Laboratory Filter Press for Retaining the most Finely Divid Precipitates.—By JERVIS EYRE FOAKES.—Several figures Artificial Fuel Photographic Action Studied Spectroscopically	ec- 6238 ed 6238 6238 6239
IV. ELECTRICITY AND MAGNETISM.—De Combettes's Rheostat 1 figure. Exhibition of Accumulators in the Halls of the Society d'E couragement, Paris.—1 iliustration. Deviations of the Compass on Iron Vessels.—How caused a how prevented. The Motions of Camphor upon Water and Mercury.—3 figures Electric Flannel.	6239 2n- 6239 nd 6239 6240 6240
V. MEDICINE AND HYGIENE.—The Cerebral Origin of Dental L cay Cereal Foods from what we Eat and what We Drink.—By Dr. T. CUZNER.—White flour.—Dark flour.—Best flour.—Bread makin —Yeast.—Fungl.—2 figures.	0e- 6240 A. ng. 6241
 VI. NATURAL HISTORY.—India-rubber—Caoutchouc	6242 ta- 6242 or 83,

Scientific American.

REPORTS OF THE RECENT SOLAR ECLIPSE.

The members of the astronomical expedition sent out to the Caroline Islands last March, by the National Academy of Sciences, to observe the total solar eclipse of May 6, have o'clock in the evening, Venus being 1° 18' north. On the arrived at San Francisco, Cal. A party of five observers morning of the 8th and 9th they will be nearer each other sent by the French government arrived at about the same time as the American party, and made simultaneous observa- effort it will cost to be present at the exhibition. After tions at the Islands.

During the time of the eclipse the weather was not entirely favorable, thin clouds and a hazy atmosphere some- rival. The close conjunction of Venus with Jupiter on the what interfering with continuous observation. But all four 26th, one of the brilliant events of the month, has been recontacts were observed, and the entire period of totality was ferred to. utilized. The spectroscopic observations by Dr. Hastings with a 60° prism attached to a 614 inch equatorial were in- is 22° 4 north, and her diameter is 108". teresting. By placing two reflecting prisms in front of the slit, the spectrum from two opposite sides of the limb could the morning; on the 31st, she rises about a quarter before 4 be brought into juxtaposition and examined simultaneously. o'clock. This was used to observe the appearance of the 1,474 coronal line on the eastern and western limbs of the sun and to note is morning star until the 29th, and evening star the rest of the changes as the eclipse progressed.

At the beginning of totality, the 1,474 line on the eastern limb was bright and extended about 12' from the sun's edge, the sun. His high northern declination makes this the while on the western limb it was faint and only about 4' in most favorable opportunity during the year for observing length. As the eclipse advanced this inequality vanished; him as morning star, and his vicinity to Venus affords a the lines became sensibly equal in height and brightness at sure means of detecting his fitful presence, so brilliantly mid-eclipse, while at the close of totality the conditions at beautiful and so different from that of every other planet the beginning were reversed, the line on the western limb that once seen, the impression is never lost. We have seen being the longer and brighter. Dr. Hastings regards this him as a brilliant white star resembling Sirius, a delicate observation as conclusive proof that the outer corona is mainly a phenomenon of diffraction, since this change was many times greater than any due to the moon's motion are both traveling in the same direction, eastward toward the alone.

The bright hydrogen and magnesium lines were seen, and fore the most beautiful. Dr. Hastings noted the dark D lines. The relative heights and brightness of the coronal rings, C, D, and 1,474, were estimated. Mr. Preston noted radial polarization. The ing star is ended, and passing behind the sun, he reappears chromosphere was unusually quiescent and the prominences on his eastern side as evening star to repeat the same ceasefew. The corona was bright and was characterized by five well defined streamers, which were sketched by Dr. Dixon. The azimuths of the shadow fringes at the beginning and love to follow his steps. end of totality were obtained and their distances estimated.

The radiation observations showed that the receipt of heat by the earth from any source was almost wholly checked.

No intra-Mercurial planets were discovered, the search being conducted by Professor Holden, of the American party, and by two of the French expedition.

ASPECTS OF THE PLANETS FOR JULY. JUPITER

is evening star until the 5th, and then morning star for the rest of the month. The giant planet is a busy member of the solar community during July, as the monthly record shows. He figures as chief actor in four of its principal incidents. He is in conjunction with the sun, in conjunction with the moon, in conjunction with Mercury, and in conjunction with Venus. On the 5th, at 10 o'clock in the morning, he is in conjunction with the sun, one of the grand epochs of his course. He rises and sets with the sun, and is entirely hidden in his rays; passing behind him and reappearing on his western side, he commences his course as morning star. Before the month closes he will be visible, in the northeast, shortly before sunrise. While we are sorry to miss his superb presence in the evening sky, we shall find compensation for the loss in the beautiful appearance he will present in the summer mornings, increasing all the time in size and brilliancy. For our big brother will be traveling toward us and growing brighter until he reaches opposition next January.

Jupiter is in conjunction with Mercury on the 20th at 4 o'clock in the morning, being thirty-two minutes south. The planets cross each other on the celestial track, Jupiter traveling west and Mercury traveling east. The planets rise about 4 o'clock, but are too near the sun to be visible. observers thus missing the sight of the largest and the smallest planet when just as far apart as the average diameter of the moon. On the 26th, at 8 o'clock in the morning, Jupiter is in conjunction with Venus, passing ten minutes south at the nearest point of approach. The planets will be near enough to be worth looking after when they rise not far from half past 3 o'clock, an hour and a quarter before sunrise. Observers must look for them in the northeast, about three degrees north of the sunrise point.

The right ascension of Jupiter is 6 h. 53 m., his declination is 22° 57' north, and his diameter is 30.4''.

degree south of the sunrise point, and will serve as a guide to Mercury, between two and three degrees farther south. The same planets are in conjunction on the 8th, at 11 than at the previous conjunction, and will reward the the second conjunction Venus lags behind, and at the end of the month is sixteen degrees behind her fleeter footed

The right ascension of Venus is 5 h. 5 m., her declination

Venus rises on the 1st a few minutes after 3 o'clock in

MERCURY

the month. On the 2d, at 2 o'clock in the morning, he reaches his greatest western elongation, being 21° 39' west of rose colored star unlike any other, and a bright golden star, more fiery than any of his companions. Mercury and Venus sun, but the swiftest of the planets reaches the goal long be

On the 29th, at 6 o'clock in the evening, Mercury is in superior conjunction with the sun. His short role of mornless course, varied by the incidents that make his pathway round the sun an unending source of pleasure to those who

The right ascension of Mercury is 5 h. 8 m., his declination is 19° 40' north, and his diameter is 7.2'.

Mercury rises on the 1st about a quarter after 3 o'clock in the morning; on the 31st, he sets about half past 7 o'clock in the evening.

SATURN

is morning star, and an interesting object for observation in the small hours of the night, rising before 1 o'clock at the close of the month. Observers will welcome the ringed planet as his footsteps tend toward the nearest approach to the earth, fighte will take on a more splendin appearance than he has done for nearly thirty years. His widely open rings, his high northern declination, and his approaching perihelion form specially favorable conditions for observation. These conditions will culminate in 1885. Therefore every student of the stars should make Saturn a special theme for investigation during this year and the two succeeding years, for nearly a whole generation of observers | jelly, and again heated until the jelly begins to decompose. will pass from the earth before the conditions are repeated.

Saturn marks his course in July with but one incident, his conjunction with Mars on the morning of the 20th. The nearest approach is at 8 o'clock, when Saturn is 1° 28' south. The planets rise on that morning soon after 1 o'clock. They must be looked for in the northeast, where the morning stars congregate. Saturn is a little more than a degree south of the sunrise point, and Mars a quarter of a degree north of it. Saturn will be easily found, and his ruddy neighbor will shine a short distance to the north.

The right ascension of Saturn is 4 h. 12 m., his declination is 19° 19' north, and his diameter is 15.8."

Saturn rises on the 1st, not far from half past2 o'clock in the morning; on the 31st, he rises at half past 12 o'clock.

MARS

is morning star. His course is devoid of events, save his conjunction with Saturn, whom he seemingly allows to overtake and pass him, just as he allowed Neptune to do the same thing in June, though the three planets are all traveling toward opposition.

The right ascension of Mars is 3 h. 25 m., his declination is 18° 6' north, and his diameter is 5.2".

1 o'clock.

Uranus sets on the 1st, at 11 o'clock in the evening; on the 31st he sets shortly after nine o'clock.

THE MOON.

The July moon fulls on the 19th, at forty seven minutes after 10 o'clock in the evening. The waning moon is in conjunction with Saturn on the 1st, at seven minutes before 6 o'clock in the evening. Crescent and planet are at that time only twenty-two minutes apart and invisible. The conjunction gives another proof of the proximity of the moon's path to that of Saturn. In some portions of the globe, between latitudes 14° north and 43° south, the conjunction will be an occultation, making the fourth occultation of Saturn that has occurred during the year. The moon is again in conjunction with Saturn on the 29th, at 5 o'clock in the morning, being forty-four minutes north. This conjunction is an occultation in some portions of terrestrial territory between latitudes 7° and 70° south, mak ing the fifth occultation of Saturn during the year.

The old moon is in conjunction with Venus and Mercury on the 2d, being only seventeen minutes south of Mercury. But the conjunctions take place in the afternoon, when the sunlight renders them invisible, and when the planets rise the next morning the moon will have sped several degrees on her eastward course. On the 4th the moon is at her nearest point to Jupiter, on the 9th to Uranus, on the 28th to Neptune, and on the 29th to Mars.

New Method for Providing Iron with Bronze Colored Oxide Coatings.

All bronzing or browning methods, known at present, obtained by moistening iron with acid, copper, or iron solutions, permitting them to dry in air, brushing off the rust formed in this manner, and repeating the operation several times, only produce a more or less light or dark red brown rust coating upon iron articles. Barff's process as well, as also the heating of iron articles in superheated aqueous vapor, only causes an iron protoxide layer upon iron. These last mentioned two methods have the further defect that the protoxide of iron layer peels off in a short time, whereby rust is invited.

Iron articles are easily coppered or brassed by dipping in copper solutions, or else coppered or brassed by the galvanic method; these coatings also scale off after a short time, especially if the iron surface was not thoroughly cleaned, when exposed to the influence of moist air. By the following process it is easy to provide iron articles with a handsome bronze colored protoxide coating; it resists the influence of humidity pretty well, and besides this, the operator has it in his power to produce any desired bronze color in a simple manner.

The cleansed and scoured articles are exposed to the vapors of a neated mixture of concentrated hydrochloric and nitric acids (1 and 1) for from two to five minutes; and then, without unnecessarily touching them, heated to a temperature of 300° to 350°. The heating is continued until the bronze color becomes visible upon the articles. After they have been cooled, they are rubbed over with petroleum After cooling, the article is anew rubbed over with petroleum jelly. If now the vapors from a mixture of concentrated hydrochloric and nitric acids are permitted to operate upon the iron article, light red brown tones are obtained. However, if acetic acid is mixed to the mentioned two acids, and the vapors permitted to operate upon the iron, oxide coatings are obtained, possessing a handsome bronze yellow color. All gradations of colors from dark red brown to light red brown, or from light bronze'yellow to dark brown yellow, are produced by varying the mixtures of the acids.

I have in this manner coated T-rods, 1.5 meters long, for iron boxes, with such oxide layers, and to day, after ten months, during which time they were continuously exposed to the influence of the air of my laboratory, constantly laden with acid vapors, they do not betray the slightest traces of change.-Prof. Dr. J. Oser, in Dingler's Polyt. Journal.

Wine Ferments.

The researches initiated by M. Pasteur upon the alcoholic ferments promise to have an important influence, not only upon beer brewing, but upon the apparently less artificially conducted process of fermentation that goes on in the production of wine. It seems quite probable that the quality Mars rises on the 1st about a quarter before 2 o'clock in of the wine of any year is as much affected by the particuthe morning; on the 31st, he rises a few minutes before | lar mould which predominates during the fermentation as by the amount of sunshine or rain during the growth of the grapes, or even the passage of a comet through the sky. In Germany it is already the practice to sterilize the must and then to sow it with some selected ferment, a process favorable to the elimination of various "false" ferments (species of Dematii) that are common to the surface of the grape and other fruit, while the custom in some southern countries of decanting the must as soon as the first foaming appears may have the same effect. In a recent communication (Comptes Rendus, xcvi., 1369) M. Le Bel incidentally remarks that last year none of the grape collection with which he had to do underwent fermentation influenced by what Pasteur considers to be the true wine ferment, Saccharomyces ellipsoides, Rees, but was all fermented by S. pastorianus. M. Le Bel also states that a natural must yields a larger proportion of the higher alcohols than a solution of sugar fermented with the same ferment, and as the higher alcohols are more injurious to health than ordinary alcohol, it would appear that a beer made partly from sugar is quite as wholesome as one made solely from malt.

Jupiter sets on the 1st not far from half past7 o'clock in the evening; on the 31st, he rises about half past 3 o'clock in the morning.

VENUS

is morning star. The interesting incidents in her progress are her near vicinity to Mercury in the first part of the a few minutes after 3 o'clock, and Mercury completes month, and her near vicinity to Jupiter in the last part of the month. The morning sky is alive with these charming wanderers in the celestial depths, whose movements give all traveling far north. life to the monotonous solemnity of the fixed stars and add the element of variety to the study of the heavens. It is ition is 16° 10' north, and his diameter is 2.5". seldom that the same planets are in conjunction twice during the same month, but such is the case with Venus and Mercury. On the 3d, at 11 o'clock in the evening. Venus is o'clock in the evening. in conjunction with Mercury, being 2° 3' north. On the morning of the 4th they will be near each other, and the is evening star, traveling on an uninterrupted course toexhibition will be of the first order, the planets rising soon ward conjunction. after 3 o'clock. The observer must look for them in the northeast. Venus will be readily recognized about half a tion is 4° 44' north, and his diameter is 3 5".

NEPTUNE

is morning star. Though invisible, he is now the first of the morning stars to make his appearance. Mars comes next in order, rising at a quarter before 2 o'clock. Saturn follows at half past 2 o'clock. Venus puts in an appearance the list after an interval of ten minutes. It is interesting to watch the rising of so many planets so near each other, and

The right ascension of Neptune is 3 h. 13 m., his declina-

Neptune rises on the 1st, about half past 1 o'clock in the morning; on the 31st, he rises soon after half past 11

URANUS

The right ascension of Uranus is 11 h. 23 m., his declina-

RAISING OF THE AUSTRAL.

Our readers will remember that in November last year nformation was received of the sudden sinking of the Ausal in Sydney Harbor. From the inquiry held at Sydney, it appears that the vessel was lying without cargo on board, and that the water ballast provided for steadying her under such circumstances had been removed from the double bottom of the vessel, and that she was being coaled. The coal ports were wide open, and coal was placed too much on one

board side were brought under the level of the water. Before the state of matters was noticed a large quantity of water had entered the bunkers. The vessel gave a sudden lurch, filled, and went down in about a quarter of an hour from the time when the alarm was given.

As a matter of interest we give an illustration from *Engineering*, showing the method adopted for raising her. The managers of the Orient Company, to whose line the Austral belongs, consulted Mr. John Standfield (of the firm of Clark & Standfield), and have been guided by his advice throughout. The operation was carried out by Mr. Twill, the company's manager at Sydney, assisted by Mr. George Eldridge, the company's naval architect, who was sent specially to Sydney to take charge of the work. The vessel was lying on her bilge with a list of 13 degrees to starboard, as shown in the sketch, the greatest depth being about 51 feet aft.

Considerable experience and study of the conditions of raising sunken ships led Mr. Standfield to at once decide that the safest and quickest, and

also the cheapest method of refloating the Austral, would be by pumping out the water from her, thus restoring buoyancy directly to the vessel herself, and avoiding the use of any external means of lifting.

It was at first proposed to close the openings in the vessel by means of divers, and to surround such openings as the engine and boiler hatches, and the cabins, saloons, charthouses, etc., by cofferdams, having water-tight connection to the decks, and after providing air pipes to every watertight chamber to pump the water out of the vessel. Owing, however, to the want of a sufficient number of skilled divers, this arrangement was modified, as here shown. The sides of the vessel were continued above the water level by means of a cofferdan 410 feet long, and having a depth of 27 feet; this was provided with one water-tight transverse bulkhead amidships, thus dividing the entire structure into two watertight compartments, facilitating control during the operation of raising. This cofferdam was formed of vertical timber frames, equally placed at short intervals apart; each pair of frames was supported by a transverse strut, the weight of which was taken by two small vertical struts which were secured longitudinally by walings.

The outer skin of the cofferdam was formed by longitudinal planks about 4 inches in thickness, and was made watertight by a covering of sheets of canvas tacked on the plank- guished guests were

ing, and extending some distance below the lower edge so that the pressure of the water could accommodate it to the hull of the ves sel; this made an effectual watertight joint between the cofferdam and the vessel. The framing of the cof-2 付付付付 ferdam was secured 1 11 1 to the hull by means of bolts passed through the scuttle lights and through oak toggles on the inside, and similarly to other toggles or stringers passing behind the stanchions of the promenade deck. The whole of this work was fully preand spiking in position. The skin planking was prepared in sections consisting of four or five planks 16 feet long, which were weighted and lowered in position by small craft alongside, as shown, and were secured to the framing by spikes. A number of centrifugal pumps were fixed over the forehold and over the afterhold, in the ordinary manner, and as the pumping rapidly proceeded, the vessel came nearly upright, and before the main deck was awash she the furnaces to other parts of the ship. The machinery is commenced to rise. This was on the 28th of February, and

bottom; part of the cofferdam was then removed, and the chines. Our engraving gives a general idea of the exterior pumps were lowered and placed more advantageously for completing the operation. Steam to some of the pumps was supplied through a flexible hose from a steamer alongside.

Mechanical Equivalent of Heat.

Prof. A. Bartoli has recently found the value of 428.4 kilogrammeters (771.12 ft. lb.) for the mechanical equivalent side of the vessel, so that some of her port sills on the star- into which he introduced a known quantity of mercury at working under a maximum steam pressure of 50 pounds to



RAISING OF THE STEAMSHIP AUSTRAL.

a pressure accurately determined and at the temperature of grim is Edison's, and consists of 912 lamps, one "L" and freezing water. The interior diameter of the tube was so two "K" dynamos, with a capacity of 11,382 candle power, small, and the length so great, that the mercury, on its exit and two Armington & Sims engines, one 81% x 10 "B" enfrom the tube, had scarcely any velocity. Keeping the temperature of the tube at the freezing point by means of ice, namos. Steam is furnished by a special boiler of 150 horse he measured the quantity of ice melted, and thus estimated power, with 80 pounds pressure, and in case of necessity the quantity of heat developed.-Riv. Sci. Industr.

THE STEAMER PILGRIM.

In the SCIENTIFIC AMERICAN for July 8, 1882, we gave illustrations of the process of forging the great shafts of the and was lately thrown

open to public inspection. On the 18th of June a trial trip took place in the harbor of New York, on which occasion the members of the press, the Mayors of New York and Brooklyn, and a large company of distin-



appearance of the vessel.

The principal dimensions of the Pilgrim are as follows: Length on deck, 390 feet; on the 11 foot load line, 375 feet; beam of the hull proper, 50 feet; beam over guards, 876 feet; depth of hold proper, 18.6 feet; depth from floor to top of dome, 60 feet; tonnage, about 3,500 registered tons.

Her motive power consists of a vertical beam engine, with of heat, by the following method: He used a steel tube a cylinder 110 inches in diameter, stroke of pistow 14 feet

> the square inch. She has 12 boilers made of steel, having a tensile strength of 62,000 pounds to the square inch. These boilers are in "nests" of three each, making four separate structures, developing in all 5,500 horse power. The main shafts are 26 inches in diam eter in the journals; the paddle wheels are 41 feet in diameter, weighing 85 tons each without the shaft: the walking beam weighs 33 tons, the cylinder 30 tons, bed plate 30 tons, and the condenser 60 tons. The strain on the center pin of the walking beam will be 625 tons. The entire steam machinery (with water in the boilers) will weigh 1.363 tons.

The hull is built on the longitudinal bracket system throughout; that is, she is a ship within a ship, and has 103 water tight compartments. It would be impossible to sink her by staving in her bottom. Twenty-five feet from her stem is the water tight collision bulkhead, fifty feet abaft the stem is another bulkhead, and thirty feet forward of her stern is another bulkhead, all of iron.

The electrical "plant" on the Pil-

gine, and one 91/2 x 12 "C" engine, belted direct to the dyconnections can be made with the main or donkey boilers. The dynamos can be used together or separately, and are regulated by the Edison automatic regulator.

The grand saloon is illuminated by one magnificent electrolier of 36 lights and two electroliers of 27 lights each, large steamer. Pilgrim, at the celebrated works of John each electrolier having four tiers of lights, each tier being Roach & Company. This grand vessel is now complete, controlled by a separate switch, and each electrolier being supplied from two

separate sections of conductors.

The dynamo room is situated in the forward part of the boat, and is 30 feet long and 40 feet wide. Each room in the boat has its individual electric light and electric call bell. The ladies' parlor is 70 feet long and the width of the boat (excepting the guards), and contains 33 staterooms and 6 alcove passage ways to the guards, each alcove having a slat blind door, so that those for whom extra beds are made up on the parlor floor are entirely inclosed from intrusion. The parlor is a most luxuriantly fitted up apart.





THE NEW STEAMER PILGRIM-NEW YORK AND FALL RIVER LINE.

ment.

The grand saloon is the largest and finest steamboat saloon in the world, being 320 feet in length. Its dome roof is 20.6 feet

pared on shore to the required dimensions ready for bolting invited. The Pilgrim is a marvel of perfection and elegance from the saloon deck, and is 280 feet long. The sides of the in every department—a veritable floating palace. The latest saloon are 9.3 feet high, and of the gallery 6.7 feet high. achievements of science and art, so far as they are to-day This grand apartment will hold, with its gallery balcony, her practically available for improved navigation, are realized allowance of 1,400 passengers, without crowding, a gatherin the Pilgrim. The iron hull is made double, and has over ing which would require over 23 ordinary railway cars to one hundred water tight compartments. It is claimed that seat. The staterooms are models of comfort, with spring the vessel will not sink. The boilers are inclosed in iron beds, the best of hair mattresses, feather pillows, and spotapartments, and it is believed that fire cannot spread from less bed linen, lace and damask curtains, etc. The Pilgrim belongs to the Old Colony Steamboat Company, of which of the latest and most reliable character. Steam steering Mr. Charles F. Choate is the president. Her captain is on the following day, as she rose, she was towed into Neu- gear is employed. The illumination by electricity is of the Benjamin M. Simmons. Hull and machinery built by John tral Bay, into a secure position in shallow water with a level most brilliant description, and is furnished by Edison ma. Roach & Company,

Combined Gas and Electrical Light.

M. Somzee has made another attempt to produce a cheap and brilliant light by the combination of gas and electricity. The arrangement comprises an ordinary gas flame, fitted with a curved metallic rod passing through the flame, provided with means for preventing overheating under the action of the electric current, which is taken from a secondary battery. It is claimed, in a notice of the arrangement given in the Journal de l'Eclairage au Gaz, that under these conditions the illuminating power is considerably augmented in proportion to the additional expense. The light is also said to be white, and much cooler in respect of radiation than a corresponding light from gas alone; the relative proportion of luminous and heat rays being completely changed. What is supposed to render this combination practicable is | lings. the fact that the platinum does not require a great intensity of current, and that "one or two small elements will suffice to supply an ordinary light, and make it give four or five times more light at a cost three times less than gas." These are nearly the same data of cost and illuminating power as those to which the public have been made accustomed by electricians. It is a novelty, however, to find gas introduced into the combination in this fashion. According as the intensity of the current is increased or diminished, the flame may be rendered more luminous or hotter as the case may be, so that the arrangement is "capable of furnishing all gradations, from the brilliant flame to the most calorific radiations." Here, it is evident, is a gas stove and lighthouse in one, and only needing a reliable secondary battery to be capable of use for either purpose.

.... A RAILWAY BRACKET GIRDER.

On the New York, West Shore. and Buffalo Railway, at Cozzen's, the road runs along the bank of the Hudson River at an elevation of only a few feet above the surface of the water, and hills of solid rock dip into the river, forming only an insignificant shore.

The line of the road was such that excavating in the side of the hill to the distance needed was out of the question. To overcome these difficulties, says the Railroad Gazette, the bracket shown in the engraving was decided upon. This consists of two rigidly connected plate girders placed 1 foot 10 inches between centers and having a length of 35 feet. The web is $\frac{5}{8}$ inch thick, stiffened with angle irons 5 by $3\frac{1}{2}$ by 1/2 inch. The ends of this twin girder rest on masonry, as illustrated. Not quite one-third of the girder projects over the water. The trusses for the long span bridge over the bay (span, 134 feet 9 inches) rest on this girder, one at each end as indicated at A A'. The stringers, C C C, are supported on brackets, D D D, the ties being laid as shown. The cross section through X Y shows this arrangement, and also the supports for the plate girder comprising the short bridge, which is 89 feet 11% inches long. There are two of these longitudinal girders placed about 8 feet apart, and upon which the outer track runs until it reaches land some 50 feet from the twin girders.

The outer support of the twin girders is so located relative to the outer track that the moving load of a train on this track is just balanced over the edge of the masonry, and does not, therefore, affect the stability of the structure. In order, however, to guard against all contingencies, the girder pleted the water flowing from the ones first cut would deluge is secured to the rock at regular intervals by bolts 9 feet the building and give notice. long, shown at E E E. The cross section, V W, shows the method of fastening these bolts to the girder. The bolts are held in the rock by splitting the lower ends and driving ranged in the guard's room, which will indicate a diminuthem upon feather wedges of steel, the spreading thus caused it on of pressure whenever the water commences to escape divary vertical boiler be the bottom of the firebox is closed

IMPROVED WALL FOR JAILS AND TREASURE VAULTS.

The annexed engraving shows an improvement in the construction of walls designed to prevent prisoners from escaping from jail, and to protect treasure vaults from the attack of burglars. The improvement consists in lining the wall with or incorporating in it a network of water pipes supplied by water under pressure from the city mains or other suitable supply, so that any attempt at cutting through the pipes will result in the flooding of the building, giving notice to the guard of the attempt before it can be successful. A system of water pipes forming the sides of the cell or chamber consists of pipes placed about ten inches apart, parallel to each other, and crossing each other at right angles and connected at the point of crossing by cross coup-



MCLEAN'S SAFETY WALL FOR JAILS AND TREASURE VAULTS.

This system of pipes has two or more sources of supply at the corners, and the pipes may be made to cover the side walls of the cell or chamber, the ceiling, the floor, or all of them, or it may be made simply to protect the windows as a grating. The provision thus made effectually prevents jail delivery, or the breaking into treasure vaults. as at least four pipes each of an inch diameter will have to be cut to effect a passage, and before this work can be com-

For enabling the guard to know when an attempt is being made to saw through the pipes, a pressure gauge is ar-

> through a sawed pipe. In cold weather the water in the pipes can be slightly warmed, so as to avoid freezing and at the same time impart a sufficient degree of warmth to the iail. This invention has been patented by Mr.Samuel M. McLean, of Modisto, Cal.

Case Hardening.

Probably no better method of case hardening can be employed than that of packing the article to be

Baldness,

In an article recently contributed to the Gesundheit-a paper, as its name imports, devoted to sanitary subjects-Professor Reclam, a German Gelehrter, makes some timely and useful observations on the subject of baldness. After describing, in a vein of pleasantry, the vast array of bare polls which may be seen any evening in the pit of a theater or the body of a lecture-room, he discusses the causes of baldness. He does not think, as is sometimes said, that loss of hair is the result either of impaired health or of much study. The strongest men are often bareheaded, and German professors, who are nothing if not studious, are distinguished above all men by the profusion of their locks. On the other hand, soldiers and postilions, who wear heavy helmets and leather caps, and wear them a good deal, are frequently as bald as billiard balls. From these facts Herr Reclam draws the conclusion that baldness comes chiefly of the artificial determination of blood to the head, and to the heat and perspiration thence arising. The result is a relaxed condition of the scalp and loss of hair. If the skin of the head be kept in a healthy state, contends the professor, the hair will not fall off. To keep it healthy, the head-covering should be light and porous, the head kept clean by washings with water, and the hair cut short. The nostrums vended as hair restorers, and on which a fabulous amount of money is wasted by the ignorant for the benefit of quacks, he denounced as worse than useless. In ninety-nine cases out of a hundred they are worse than useless. Cleanliness and cold water are the sole trustworthy specifics; but when once the hair roots are destroyed, not all the oil of Macassar, the bear's grease of Siberia, nor the cantharides of Spain will woo back the vanished locks.

Without a Rival.

The SCIENTIFIC AMERICAN, published by Munn & Co., New York city, is without a rival as a scientific paper, and to mechanics it is simply invaluable. Thus says the Glasgow, Ky., Weekly Times, to which it adds: We honestly believe any mechanic would derive information from a year's reading of the SCIENTIFIC AMERICAN which any amount of money could not buy elsewhere. Some of our enterprising mechanics, we hope, the editor adds, will try the experiment of reading this really valuable and practical journal one year, and they would never give it up.

Good advice, Mr. Times, and now, at the commencement of a new volume, which begins next week, is a good time for not only your citizens, but for lovers of science, practical mechanics, and others throughout the land who are not already subscribers to commence taking the paper.

TWO WREELED PORTABLE ENGINE.

The illustration shows the engine by Mr. E. S. Hindley, in the position it occupies when at work, the two shafts being raised in the air out of the way, and the engine being fixed by means of the three adjustable stays shown, these holding it firmly. Under these conditions the boiler occupies, as will be seen, a diagonal position, the tubes rising slightly toward the smokebox, and the firebars being horizontal. The water line is shown by the dotted line, from which it will be seen that the tubes are entirely covered by water. This arrangement of boiler has the advantage, says Engineering, of being free from any flat heating surface on which deposit can lodge, while it also affords facilities for the collection of mud, etc., below the firebox, where it can be readily blown off or cleaned out. What would in an or-





BRACKET GIRDER FOR NEW YORK WEST SHORE AND BUFFALO RAILWAY.

hardened in a box or crucible with the carbonizing materials - ground bone or animal charcoalluting the vessel tight, and exposing it for several hours to a red heat. In



TWO-WHEELED PORTABLE ENGINE.

bearing firmly against the sides of the holes and preventing large establishments where case hardening is a daily duty by a neat casting fitted with firehole and ashpit doors, as any liability of drawing. The holes were then carefully filled with Portland cement, and it may be stated in this connection that the spaces beneath the girders and also between them will be filled with concrete in order to exclude all water which might spray up from the river.

The rock has been cut away as shown at the right of the engraving and a strut inserted. This is a square column (cross section, S T), having interior dimensions of 16 by 18 inches, and exterior of 2 feet 5 inches by 2 feet 7 inches, with plates 1 inch thick. The length is 5 feet 9 inches. To make a perfect fit a slightly tapering plate was driven in at the top, after which the bolts were screwed up.

ovens and special appliances are always at hand. But when shown. The gauge glass fittings and gauge cock are fitted there is only one piece to be treated, and the necessity for to the side of the boiler, as indicated in dotted lines. case hardening occurs only occasionally, a simpler method may serve. It is well to keep on hand, for this purpose, a powdered mixture of prussiate of potash and bone black or animal charcoal, in equal proportions by quantity. This may be applied to the red hot iron, either as a powder, or as a paste made with oil or even mixed with water.

ASTORIA, Oregon, is making very rapid progress. It has 24 salmon packing concerns within its limits, employing 5,000 people.

The engine, which is complete in itself-it having a castiron bed plate taking all strains due to working-is mounted diagonally on the top of the boiler as shown, the cylinder casting containing the stop valve and also carrying the two safety valves as illustrated. The whole design is neatly worked out.

The engine is mounted on two large wrought iron wheels, which enable it to be readily transported over rough roads, while it is, of course, very handy to turn and shift about in a limited space.

MANUFACTURE OF ELECTRIC LAMPS. (Continued from first page.)

means of a hand-wheel, rack, and pinion. The machine is also supplied with a blow-pipe attached to a sliding saddle lars, says that, independently of the glass-blowing invenand suitable values actuated by a treadle, k, for the admission of air to the mandrels.

The operation of blowing the bulbs is as follows: The boy takes a piece of glass tube nine inches long and threefourths inch in diameter, and having griped each end in the chuck provided on the mandrels, starts the machine and brings the flame of the blow-pipe to bear upon the middle of the length of tube, which, being softened, is drawn out into a small tube, thus forming two "pump stems." The flame is then made to play on the original tube between its extreme end and the drawn-out "pump stem." This part being softened, is blown out to the shape required, and the operation is repeated at the other end of the tube, thereby making two bulbs from the single tube. The admission of the air, the direction and force of the blow-pipe, the approach and recession of the mandrels, so as to lengthen or shorten the bulb, are movements all readily controlled by the boy operator, who is able on an average to model from 250 to 300 bulbs complete per diem. By a succession of somewhat similar processes the whole of the glasswork in the incandescent lamp is finished. A boy blows the bulb, a boy fixes the two platinum electrodes by a bead of glass, and a boy inserts the mounted filament into the end of the finished bulb, thus preparing the lamp for pumping and sealing off, which is done upstairs.

The preparation of the filaments is carried on in an upper room, Fig. 2. Almost any kind of tough vegetable fiber will serve, the inventor having a special process for densifying and giving it a metallic luster. The fiber actually employed appears to be a species of grass, not unlike the coarse, wiry specimen which often grows by the seaside. A length of this grass is bent by a boy round a metal mould into the proper helical form, Fig. 3. The fibers on their moulds are then gently heated, thereby fixing their shape. The filaments thus formed are afterward placed in a crucible, filled up with plumbago, from whence they are transferred to a Fletcher furnace, where they are exposed to great heat. This carbonizes them, and they are then sent into the mounting room, where they are fixed, as shown in Fig. 4, upon the platinum electrodes which have been prepared for as a lubricant for the slide valves and pistons of the driving them. The mounting is a secret process, but it mainly consists in sticking the filament ends into the hollow of the small spirals turned on the upper ends of the platinum electrodes, and cementing them with a special cement. The filaments thus mounted are then "flashed" in a special liquid, which forms and deposits carbon in their pores, creating, it is claimed, a dense elastic carbon having a bright metallic luster.

The proper resistance is first estimated by the light given out by other lamps in circuit with the filaments and checked by a Wheatstone bridge, Thus finished off, the mounted filaments are then taken down to the glass blowing room, where they are inserted in the bulbs, and sealed as shown in Fig. 8. The lamp is next taken to the pumping room, Fig. 10, where there are a series of mechanical mercury pumps, each capable of exhausting twelve lamps at a time. For this work only two men are employed, for by setting the lamps in groups in different stages of exhaustion, one man can attend to the exhaustion of a large number of lamps, sealing off the completed lamps and supplying fresh ones, as the pump continues to act of itself. A clear view of the pumps and the exhausting frames is given in the engraving. The mercury reservoirs are raised and lowered automatically by straps from power shafting, and the velocity of movement is adjusted by means of a half moon pulley, which allows the reservoir to move slowly at the beginning and end of its up and down range. The lamps are attached to spiral springs, which pull them upward as they are sealed off, and thus facilitate the act of sealing. The power shaftwith the mercury reservoir. The lamps are supported on

The mercury pump is an improvement devised by Messrs. it is very liable to decay, and its greatest drawback is that Wright and Mackie on the ordinary Geissler pump, and ob- it is very porous, and thus not only absorbs some of the viates the necessity of taking out a stopper to let the air wort and beer, but its pores, cracks, and fissures form restescape. The valves of the air pump are, in fact, automatic ing places for the innumerable minute organisms which are also, and thus the entire arrangement is self-acting. The always present in wort and beer, and which there propagate degree of exhaustion can be estimated by the height of the and develop to an alarming extent, and are not easily demercury column, and is from one millionth to one and tached or destroyed by any mechanical means or chemical trician, was robbed by two thieves on a night train near a half millionth of an atmosphere. The whole of the work agents. Brewers have therefore, occasionally, endeavored Dieppe, France, in 1881. Mr. Maxim has kept a lookout of the factory is regulated by piecework, and it is stated to replace wood by some more suitable material; stone is for the robbers, and on the evening of June 5 he discovered used sometimes in the north of England; slate, in spite of its them at Rouen. One of them escaped on an outgoing train, that by the means described the manufacture of incandefirst cost, which is considerable, is fast growing into favor, but Mr. Maxim chased and caught the other as he was about scent lamps is very greatly reduced in cost, and the rate of production increased. It seems remarkable that the primitive practice of blowing glass are its expense, the difficulty of obtaining it in sufficiently large sheets of the requisite strength, and its excesglass by the mere aid of human lungs has not long ago been superseded by a directly mechanical method. The progress of sive liability to fracture. We have lately seen advertised a material called "toughened glass," and such a material tention, the train was stopped, and Mr. Maxim took his electric lighting has at length applied a stimulus which will would seem to lend itself to the requirements of the brewer; prisoner to the station and delivered him to the authorities. evidently terminate the rude and unsatisfactory operations of the human glass-blower. The electric light in the incanif large sheets of it cannot be obtained at a moderate expense, tablets of a moderate size might be glazed together in a prisoner conversed freely with me, and said that if I would descent form has created a demand for a species of lamp which makes a heavy call on the resources of the glassblowing workshops. The time has arrived when machinery less cement. Fermenting squares, racking vats, yeast stilis absolutely required to supersede the tedious and clumsy lions, and other utensils made of such a material would not a question of money with me, but a matter of principle. system hitherto adopted, and it is eminently satisfactory to seem to meet all the requirements of the brewer, and would Upon being taken before the Chief of Police he pleaded find that inventive genius has already achieved success in certainly be preferable to any other material, with the ex-guilty, and will probably soon be brought to Paris for senthis direction. The mechanical glass-blower is also capable ception perhaps of slate, in the matter of cleanliness.

of being applied to other processes besides that which we have thus described.

The Engineer, to which we are indebted for our particution, the Wright and Mackie lamp is itself a success. The filament is said to be remarkably durable, and capable of bearing a strong current. Experiments which we have seen in proof of this have been satisfactory. The carbon filaments on that occasion were obtained from the leaf-stalks of the cocoa-nut palm.

Trial of a Compressed Air Car.

The direct application of compressed air to the driving of tramcars was successfully demonstrated lately in London to a large party of gentlemen interested in such matters, by the British Mekarski Air Engine Company. The Mekarski engine is no novelty as an independent engine, in which form it has already done good work in tramway hauling in this country. It is, however, as combined with a tramcar that it is new in England, although in this form it has been working tramway traffic successfully at Nantes, in France, for the last four years. The engine house is situate at the depot of the London Street Tramways Company in the Camden road, Holloway, and contains two 20 horse power engines, with compressing cylinders, air receivers, and store tanks for a reserve of compressed air at a pressure of 450 pounds per square inch; steam being supplied to the compressing engines by two double flued Lancashire boilers. The car is one of the ordinary cars of the London Street Tramways Company (who are the first to adopt the system) adapted for working on the Mekarski principle. The car has two pairs of wheels, one pair being used for driving and being connected with the working cylinders, which are $5\frac{1}{2}$ inches in diameter, with a 10 inch stroke, and in which the compressed air is used. This air is stored in a reservoir placed under the body of the car, and in passing thence to the cylinders it is conducted through boiling water and steam at 60 pounds per square inch, carried in a vessel called a hot pot. This vessel is charged at the depot during the time occupied in charging the reservoir on the car with compressed air. This application of heat not only causes an expansion of the air, but prevents the formation of snow in the cylinders and at the exhaust. The moisture picked up also acts engines. The working pressure varies from 120 pounds down to 50 pounds per square inch, the variation being regulated by a special valve which gives the driver a means of minutely adjusting the pressure, and of perfectly controlling the engine, and consequently the vehicle. A hot pot is placed at each end of the car, on the platform, and the driver and conductor have at present to change ends at the close of each run. By adopting a triangle at each end of the line, however, the cars in future will be reversed, so that in adapting the other cars of the company, as is intended, a hot pot will be placed at one end only, and thus expense will be saved. The car is fitted with the ordinary driver's foot brake, besides which there is a powerful air pressure brake for use in emergencies, which will bring the car up in a distance slightly exceeding its own length. No noise whatever is made by the exhaust air from the engines, nor is there any steam visible, nor the smell of fire or engine lubricants. The car runs smoothly and well, as was demonstrated at the trial which was made upon the company's line, which runs the whole length of the Caledonian road, be tween Holloway road and King's Cross. The length is two miles, and it has several steep gradients and sharp curves on its course. The journey to King's Cross and back was accomplished in excellent time, and was in other respects a success. It is intended to fit the remaining cars on this line upon the Mekarski principle, and so by degrees to supersede the present horse traction.-London Times.

... Toughened Glass for Brewery Utensils.

ing carrying the half moon pulleys lifts the mercury reser-On account of its comparative cheapness, the ease with voirs and lets them down by a rope connected with the which it is worked, and its elastic and unbreakable nature, pulleys. An India-rubber tube connects the pump vessel wood continues to be the material of which brewery utensils are most generally made. There are, however, says the short upright tubes or stems to undergo exhaustion. Brewers' Guardian, many and very grave objections to wood;

Correspondence.

The Gospel Trumpet.

To the Editor of the Scientific American :

You publish, on page 373, an article and illustration, Making the Deaf to Hear." In the Presbyterian church here has been a "gospel trumpet" since 1873, which is entirely concealed and works as well as that shown. The tunnel is in the front of the pulpit desk, in the cushion, and runs down under the floor, with branches to several different pews, ending in flexible tubes which coil up in the ends of the pews when not in use, which tubes terminate in hard rubber ear pieces for placing in the ear. The same arrangement was originally a number of years in the old Presbyterian church, now torn down. The apparatus I believe was invented by a man in New Brunswick, N. J., who was paid a royalty for use in said church.

It gives good satisfaction, and the sittings are often borrowed for the old and feeble.

CHAS. F. RICHARDSON.

Freehold, N. J., June 15, 1883.

DECISIONS RELATING TO PATENTS. By the Commissioner of Patents.

STARR AND PEYTON VS. FARMER.-ELECTRIC LIGHT. In the interference between the application of Moses G. Farmer, filed October 11, 1881, and the application of Starr and Peyton, filed January 9, 1882, Held that, Starr and Peyton having failed to show any invention prior to the time when Farmer had matured his right to the patent by duly filing an application in the United States Patent Office in accordance with the law, Farmer is adjudged the prior inventor.

When an inventor has duly filed an application for a patent, exhibiting by means of drawings, models, and written descriptions the nature and scope of a hitherto unknown invention, and has made oath that the said invention is original with himself, and that to the best of his knowledge and belief he is the first inventor thereof, he has perfected his right to a patent, and one who would then seek to arrest the issue of such patent on the ground that he has a prior right to the invention must show that he had before that time matured his right to the invention, or that he had before that time an inchoate right, which has since been perfected, so as to relate back to a time anterior to such application.

The filing of an application under the formalities prescribed by the patent law is in itself visible proof of the existence of the things or inventions therein shown and described, and when accompanied by the oath that the applicant is the true and original inventor of such invention or discovery is prima facie proof that such applicant is entitled to a patent for such invention.

It is not a valid defense to a patent granted in compliance with the forms of law to show that the invention has never been reduced to practice.

Scale of Hardness for Metals.

Gollner gives the following numerical scale for the hardness of metals, ranging over 18 degrees:

Pure soft lead 1.
Pure tin 2.
Pure hard lead
Soft tempered copper 4.
Pure soft copper (cast) 5.
Soft Babbitt metal (having copper 85, tin 10, zinc 5) 6.
Tempered cast iron
Fibrous wrought iron 8.
Fine grained, light gray cast iron
Strengthened cast iron (01 turnings) 10.
Soft iron (with 0.15 of carbon) 11.
Untempered steel (with 0 45 carbon)
" (with 0.96 carbon)
Crucible steel, tempered and drawn to blue
" " drawn violet or orange 15.
" " drawn straw color16.
Hard bronze for bearings
Cast crucible steel of glassy hardness

Pointed cylinders are made from each of the metals of this scale, and these points are used for testing the hardness of other metals. In making the trial they are weighted with 11 pounds for example, and drawn over the polished surface of the other metal a certain number of times, say six.-Techn. Blaetter.

An Athletic Electrician.

Maxim of New York the well known elec Mr. Hiram S.

and glass has also been recommended. The objections to to board the moving train. Together the struggling men were carried into a tunnel, Mr. Maxim clinging with one arm to the car, his hand through a window, and holding the thief with the other hand. The struggle attracted at-Mr. Maxim said: "On the way to the police station the suitable framework by means of some insoluble and odor- refrain from accusing him he would refund my money and payall expenses I had been put to. I told him that it was tence."

Cocoa and Chocolate.

M. Boussingault, a member of the French Institute, contributes an interesting paper on cocoa and chocolate to the Annales de Physique et de Chimie, of which the following forms a part.

The cocoa tree flourishes in the warm countries of America, but at the time of the conquest it was cultivated only in Mexico, Guatemala, and Nicaragua, where the inhabitants were of Toltec and Aztec origin. It was from these localities, under the reign of Montezuma, that the Spaniards transplanted this tree to the shores of the Canaries and the Philippine Islands, and thence to Venezuela and into the Antilles. A drink called "chocolatl," which was in general use there, was made from the seeds of the fruit reduced to a paste.

It is a fact well known to planters that it is necessary, as far as possible, to plant the cocoa tree on a virgin soil: a blunder has frequently been committed by doing otherwise. This tree requires a rich, deep, and moist soil, and warm weather. Nothing is more inviting than a cleared forest, having a slope that permits of irrigation. But all the important plantations present a common aspect; they are met with in warm, sheltered regions, at a short distance from the sea, or near a torrent on the banks of a river. The cultivation of the cocoa tree ceases to be profitable when the mean temperature falls to 24° C. (75° Fahr.).

The tree rarely blooms before the age of thirty months. The planters pluck these first flowers and do not let them bear fruit until the fourth year, and that under the most favorable climatic influence, when the mean temperature is from 27° to 28° C. (80° to 82° Fahr.).

The blossom is very small, and out of all proportion to the size of the fruit. I measured one bud that was only 4 mm. (one-sixth inch) long. The flesh colored corolla had ten petals surrounding five stamens of a silver whiteness. They are not isolated, but collected in bouquets, surrounding the trunk at all heights, and on the principal branches; they are even seen on the woody roots that creep on the surface of the ground. The interval from the time the flowers fall until the fruit matures is about four months. The fruit is long and slightly curved, being divided into five lobes. Its length is nearly ten inches, its greatest diameter near the point of attachment is three to four inches, and it weighs ten to sixteen ounces. The color varies from greenish white to a reddish violet; the pericarp is furrowed by longitudinal ribs. Within the flesh or pulp is white, pink, and tart; it usually contains twenty-five kernels, which are white and oily, and when dry have a brown color on the surface. There are two principal harvests in a year, but in a large grove they are gathered every day, and it is not uncommon to see a tree bearing both flowers and fruit at the same time. After breaking the shell the seeds are removed with a piece of wood rounded at one end, and then exposed to the sun; in the evening they are collected in a heap under a shed. It is manifest that an active fermentation is going on which would prove injurious if allowed to increase, because the fresh cocoa when heaped up heats very much; so in the morning they are spread out again in the air.

The cultivation of the cocoa tree requires but few men, for one man can take care of a thousand trees. What they dread the most are the sudden changes, even in favorable weather; if there comes a shower, the fruit falls off, but the principal occupation of the majordomo is to defend the fruit against ravages of animals (monkeys, deer, and parrots).

The genus of the cocoa (Theobroma) belongs to the family of the Butyriaceae; it embraces several species, the most important of which is the Theobroma cacao, the characters of which vary according to the province.

Cocoa is decorticated by roasting at a gentle heat. In the roasting operation this bean, like the coffee, acquires a peculiar odor due to an infinitesimal quantity of a volatile principle. To this the chocolate owes its aroma.

The cocoa-bean is rich in nutritive principles; besides a large quantity of fatty-like butter, it contains nitrogenous substances like albumen and caseine, also theobromine, and compounds of ternary character. These constituents necessarily vary in quantity with the source.

The decorticated beans, when deprived of the germ, contain, according to M. L'Hote, in one hundred parts:

Province	Water.	Butter.	Ash.	'n.	Albumen.
Guayaquil	·· 6 [·] 50	40.10	3.75	2.38	14.9
Martinique	7.50	41.20	2.75	2.25	14.2
Guayra	7.00	35.96	4.00	2·18	136
Maraguan (roast	ed) 4.20	45.80	2.75	2.25	13.7

tannin, mineral substances (phosphoric acid, potash, lime, magnesia, silica, traces of iron).

Cocoa beans, when decorticated, slightly roasted, and separated from the germs by culling, are the base of choco late, the use of which is so widespread at the present day. It is not necessary to describe its preparation. Suffice it to say that it is obtained by grinding between cylinders kept at a certain temperature a mixture of cocoa beans from different sources of the aromatic varieties, and more or less unctuous. When the mass is sufficiently softened, sugar is gradually introduced in such a manner as to maintain the softness of the material. The grinding is accomplished by means of cylinders or cones revolving at different velocities on a granite platform; the paste is then made to fall into tin moulds.

The sugar added to the cocoa increases the nutritive quality of the mixture; it is evidently one of the most prompt reparative aliments.

The Mexicans prepare a pâte of cocoa which they call chocolatl, in which they put a little corn flour, some vanilla, and allspice.

P. Gili asserts, on the authority of a passage in the Monarquia Indiana, published by Torquemada, that the Aztecs made the infusion of chocolatl with cold water.

Even in the sixteenth century travelers differed greatly in their opinions regarding this substance.

Acosta thought its value had been overestimated. Humboldt remarked that this opinion reminded him of the prediction made about the use of coffee. On the other hand, Fernando Cortes perhaps exaggerated its value; after drinking a cup of it he wrote that a person could make a journey without any other nourishment. Nevertheless, I will admit that in an expedition to a great distance, where it is imperatively necessary to reduce the weight of the rations, chocolate offers undeniable advantages, as I have frequently had occasion to notice.

In France the new beverage had its partisans and enemies. It is known that Mme. De Sevigne, in a letter addressed to her daughter, said: "I have been trying to accustom myself to the use of chocolate; day before yesterday I took it to help digest my dinner, and at the end of a good supper, and yesterday I took it for nourishment, so as to enable me to fast till evening, and it accomplished everything I desired, and besides that I found it agreeable, and it acts as intended."

Chocolate possesses one essential quality in that it contains a very large proportion of nutritive matter in a small volume. Humboldt recalls what has been said with reason, that in Africa rice, gum, and butter enable men to cross the desert; he adds that in the New World chocolate and corn meal render the plateaus of the Andes and the vast uninhabited forests accessible to man.

The manufacture of chocolate has made great progress in Europe. In examining the products of the principal establishments we arrive at this conclusion-that, when properly prepared, chocolate contains nothing but cocoa and sugar.

(The author here gives analyses made in the Conservatoire des Arts et Metiers of the different chocolates made in Paris and in Spain.) It is well known that the amount of sugar varies.

The cocoas of Soconusco and Caracas are the most highly of its lower price and good quality when carefully preserved.

The development of the chocolate industry in France can be seen in a document of M. Marie, which shows that the importation in 1860 was 10,354,517 lb., and in 1881 it orange color, and can then be used for painting the pathad reached 26,798,745.

In its combination of albumen, fat, and sugar and the presence of phosphates, cocoa and chocolate resemble milk, the type, according to Proust, of the whole diet that nourishes and sustains man.

The emulsion of chocolate necessarily varies in consistence according to the volume of water used in preparing it. They generally take five times the weight of the chocolate, and that is the proportion used for assay.

Hence 579 grains of the cake chocolate would yield 3,420 grains of emulsion, in which are contained:

Albumen	0 gi 0	rains.
Sugar	0	44 J
Salts, phosphates, etc 16)	61

and the second	
Sugar	
Butter	
Albumen	
Phosphates and salts	
Other matter.	
	1000

Each man receives sixty grammes (two oz.) of this chocolate per day, in which there are twelve grammes of sugar, twenty-six grammes of butter, and six of albumen.

It is a useful addition to the ration formed of beef slightly salted and dried in the air (tasajo), of rice, of corn biscuit, or of cassava muffins.

We will close with certain remarks made about chocolate at the International Exhibition of Great Britain.

It has been remarked that when man reaches a certain state of civilization he frequently associates with the vegetable food that sustains him some fermented beverage. Wine taken in proper quantity favors the digestion of these aliments, excites the memory, exalts the imagination, and develops a sentiment of ease and comfort without giving rise to that grievous reaction frequently occasioned by the abuse of alcoholic liquors.

It is a curious fact that different races of men separated by long distances and *never* having had any communication with each other, prepare stimulating drinks from certain plants-tea in China, mate in Paraguay, cocoa in Mexico, and coca in Peru: using at one time the leaves, at another the seeds of plants that have no botanical resemblance, but, in spite of this difference, exert the same effect upon the nervous system and on digestion. In fact, there are substances in these plants that have the constitution of alkaloids and are endowed with similar properties.

In the leaves of tea and of mate and in the seeds of coffee it is caffeine; in the leaves of coca is is coceine; and in the seeds of cocoa it is theobromine. But the Chinese, the Arabs, the Indians of Paraguay, the Incas, and the Aztecs were all under the influence of the same agent when they took their habitual drink, which custom is so widespread among all nations.

The infusions of tea, mate, coffee, and coca are not, of course, to be considered as food. The amount of solid matter in them is very slight, and their effects are due only to their alkaloids.

This is not true of chocolate, which is at the same time a complete food and an active excitant, since it approaches in composition that model food, the milk. In fact, we have seen that in cocoa there is some leguminous, some albumen, associated with fat, a mylaceous matter, and sugar to sustain respiratory combustion, and finally phosphates, which are the basis of the bones, and then-what milk does not havetheobromine and a delicate aroma. Reasted, ground, and mixed with sugar, cocoa becomes chocolate, the nutritive properties of which astonished the Spanish soldier that invaded Mexico.

Varnish for Foundry Patterns and Machinery.

A varnish has been patented in Germany for the above purpose, which, it is claimed, (we do not know how justly), dries as soon as put on, gives the patterns a smooth surface, thus insuring an easy slip out of the mould, and which prevents the pattern from warping, shrinking, or swelling, and is quite impervious to moisture. This varnish is prepared in the following manner: 30 lb. of shellac, 10 lb. esteemed; that of Guayaquil is much in demand on account Manila copal, and 10 lb. of Zanzibar copal are placed in a vessel, which is heated externally by steam, and stirred during four to six hours, after which 150 parts of the finest potato spirit are added, and the whole heated during four hours to 87° C. This liquid is dyed by the addition of terns. When used for painting and glazing machinery, it consists of 35 lb. of shellac, 5 lb. of Manila copal, 10 lb. of Zanzibar copal, and 150 lb. of spirit.

Purification of Petroleum Benzin.

The disagreeable odor of petroleum benzin is, according to the experiments of Fred. Grazer, not removed by percolation through wood or animal charcoal, or by treatment with carbonate of sodium or lead carbonate. Agitation with potassium plumbate removed a portion of the odor, but satisfactory results were obtained by using two ounces of potassium bichromate, twelve ounces of water and three ounces of sulphuric acid, and when cool agitating with this a pint of benzin; finally, washing with water, is necessary. A very useful method for disguising the remaining odor is to shake the product with a portion of cologne water and setting aside for two or three weeks, when it may be decanted; the odor of the perfume will predominate.-Proc. Cal. Phar. Soc.

Caraque 4.20 51.3	60 40.0 2.16 13.5
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(The albumen is calculated from the nitrogen in excess of that in the theobromine, the former containing sixteen per cent, the latter thirty-one per cent of nitrogen.)

The cocoa bean, cleaned but not roasted, contains in one hundred parts:

	Payen.	Mitscherlich.	Boussingault
Butter	48 to 50	45 to 49	53.3
Albumen	21 to 20	13 to 18	12.9
Theobromine	4 to 3	1•2 to 1•5	2.4
Starch and glucose	11 to 10	14 to 18	6.2
Cellulose	3 to 2	6.0	9.1
Mineral subst	3 to 4	3.2	4 •0 [*]
Water	10 to 12	6•3	11.6
	100100	09.6	100
	100100	92 0	100

Analyses show that the principles contained in the seeds of the cocoa are as follows:

Fatty matter, butter, albumen, theobromine, starch, glucose, gum, cellulose, tartaric acid free or combined. follows:

500 In 3,420 grains of cow's milk there are contained:

Albumen	136	grains
Butter	150	"
Milk sugar	150	**
Salts, phosphates, etc	. 27	**

It will be seen that milk is richer in nitrogenous matter it contains less sugar, and butter in the same proportion. A chocolate in which there is less sugar gives a beverage that approaches milk in composition.

463

In all the chocolates analyzed the weight of the sugar wa equal to and sometimes greater than that of the cocoa.

The large proportion of sugar necessarily diminishes the nutritive value of the products. But in Central America, when they organize a river expedition or traverse the forests,

they prepare chocolate for provision with eighty parts of

Seintillation of Stars.

M. Ch. Montigny, observing for many years at Brussels, has noticed, as previous observers have done, that the scintillation of stars is much increased during the occurrence of an aurora. He has noticed, further, that every aurora produces immediately its effects upon the scintillation, that stars in the north are most affected, and that the influence of the phenomenon is most marked for the stars which are observed across the upper regions of the air. Magnetic disturbances also, even when accompanied by no aurora visible at Brussels. increase the scintillation to a marked extent. On two occasions during July, 1881, the effect of magnetic disturbances was observed with no aurora visible in Brussels, or even, so coccoa to twenty of coarse sugar, the composition being as | far as can be learned, in any part of Denmark.-Comptee Rendus.

Cementing Belts.

An ordinary cement for leather belting is wheat flour boiled in oil of turpentine; but the ends must be secured by rivets or it is not reliable. The Milling World is our authority for saying that a better cement is made by soaking six ounces best glue in one pint of ale, then boil, add one and a half ounces of boiled linseed oil, and stir well. Another prescription is to take dissolved glue in the form as the cabinet makers use it, and add tannic acid till creamy and ropy. Make the leather surfaces to be united rough, apply the cement hot, let it cool and dry under pressure, and it will not need riveting.

For rubber belting, take pure rubber in thin slices, two ounces, dissolve in one pound bisulphide of carbon; this is a good cement, but if kept thickens very soon. In order to prevent this, add a solution of pure rubber, resin, and oil of turpentine, made thus: Melt one ounce of rubber, add half an ounce of powdered resin; when melted, add gradually three or four ounces of turpentine and stir well. When the two solutions are united, the hardening of the compound is prevented, and a cement obtained especially adapted for gluing rubber surfaces together.

Zinc Coating for Iron.

Attention has recently again been drawn to MM. Neugean and Delaite's process of protecting iron surfaces against rust. A very fine powder of metallic zinc is mixed with oil and a siccative, and applied to the iron by means of an ordinary brush. In many cases one coat is sufficient; two coats are at any rate guaranteed to secure a protection against the corrosive action of the atmosphere as well as of sea water. The zinc coating gives the iron a steel gray appearance, and it does not interfere with subsequent painting. MM. Neugean and Delaite received a diploma at the Paris Electric Exhibition of 1881, and now recommend their process for iron structures, bridges, lamp posts, etc., and also for iron ships. If this process really affords the protection it claims, nothing need be said in recommendation of it, since it can hardly be surpassed in simplicity and cheapness, and is capable of application in cases where galvanizing, the Bower Barffe, and similar processes, would hardly be practicable. A good mixture, of which only the necessary quantity ought to be prepared, consists of 8 parts by weight of zinc, 71 of oil, and 2 of a siccative.

IMPROVED COTTON PRESS.

This a simple, cheap, and efficient device for working a cotton press by hand or power. The novel features consist rims on the levers. This construction maintains uniformity prongs of the spring. As the spring is fastened to the tube once discharged itself into the Mississippi on the south in-

of leverage, while the connection between the levers and the follower is such as to increase the leverage as the resistance increases.

The case is vertical, and the top of the front and back sides terminate a little above the top of the main frame, while the other sides extend farther up to serve for guides to the bar of the follower, this bar being connected to the follower by rods so that the follower may be swung away from over the case, to allow the case to be filled. The follower is suspended by a cord from a small windlass at the top of the press. The cross bar of the follower is connected at each end by a rod with one end of a rock lever which is pivoted in the frame, and has a segmental rim to which a working cord or band is attached. This cord is connected to a windlass shaft journaled in the main frame, and to which the power is applied by the worm wheel, worm, and hand wheel. The shaft of the rock lever extends from side to side of the press, and has both of the working levers connected to it for working them alike.

The doors for opening the case at the lower end for the discharge of the pressed bales are pivoted to the bed frame, and secured, when shut, by bars. While the leverage of the power as applied by the ropes is uniform, that of the levers on the follower increases as the resistance increases by the varying angle of the rods with the centers of the rock levers, thus enabling great pressure to be applied to the bales by means of hand power.

IMPROVEMENT IN LANTERNS.

The improved lantern shown in the engraving has been patented by Mr. G. F. Fisher, of St. John, New Brunswick.

The object of the invention is to facilitate lighting the lantern, and to render it more durable.

A cylindrical cap, open at the bottom, is held by the funnel tube connecting with the side tubes of a lantern in such a manner that the upper end of the glass globe can readily pass within the cap. The cap is provided on one side with a longitudinal slot through which projects the upper free end of a spring which is fastened to one of the side tubes.



FISHER'S IMPROVED LANTERN.

The spring strip is provided at its upper end with two prongs projecting toward the interior of the cap. The globe is provided at the upper end with an annular bead or ridge, and rests at the bottom on a perforated circular metal plate in the usual manner. When the globe is lowered, the lower prong of the spring rests upon its upper edge and holds it in place. When the lantern is to be lighted, the upper end of the spring strip is withdrawn from the cap, when the globe then can be raised sufficiently to permit passing a match be essentially of a pair of rock levers located at the sides of a tween the lower edge of the globe and the plate to the vertical case to work the follower, the power being applied burner. The globe can be held in a raised position by reto them from a windlass by ropes working on segmental leasing the spring when the ridge or bead is above the

An Honest Job.

It ought not to be a cause of surprise or gratulation that an examination of the accounts of the great bridge discloses neither stealing nor dishonesty; but inasmuch as this great work scarcely has a parallel in this respect in the annals of modern "jobs," it would be unfair to withhold the highest encomiums from the officials who have done their whole duty to the public honestly and squarely.

For many months the experts have been at work checking off bills against accounts, examining contracts, and thoroughly overhauling the work from the foundations of the bridge to its opening. The experts had to consider the real estate used for bridge purposes, the cost and amount of material, and the cost and distribution of labor. Their work is now done, and their report will be presented to the Mayors this week. It appears that the experts have reached the conclusion that the bridge has been honestly and economically built; that considering the magnitude of the work the mistakes made have been singularly few in number and small in extent, and that the books have been remarkably well kept. The magnitude of the task may be understood from a single instance. Every one of 50,000 bills has been gone over, item by item; every figure on the books has been carefully checked off, and every contract has been scrupulously examined. That no errors should have been found was not to be expected. A few trifling mistakes in addition are reported, but they are insignificant. Several contracts were found to have been changed, but the variations from the original figures are reported to have been carefully noted down and explained. A little item, for example, of half a cent a pound for iron was observed: the engineer responsible for it was immediately called upon for an explanation. He made it at once; corrugated iron had been substituted for the material originally provided, but, as he showed, the cost of the higher priced material by the pound was more than offset by the smaller amount needed, and the bill was therefore reduced by the change. This is a typical instance, and the closest scrutiny failed to show a single suspicious or unaccountable variation.

Such a report, of course, is a final answer to thoughtless and malicious scandal. It will be accepted by the people of New York and Brooklyn as a compliment to themselves as communities that a great public work, begun at a time when society was greatly demoralized and unexampled frauds were in progress all over the country, was carried to completion without the improper expenditure of a dollar.

Former Discharge of Lake Winnipeg.

Recent exploration and leveling show that the surmise of General G. K. Warren, to the effect that Lake Winnipeg

> stead of Hudson's Bay on the east, is correct. Mr. J. D. Dana, the well known geologist, in a paper in the American Journal of Science, fully discusses the evidence, and shows that the change was due not to a barrier of ice or earth, but to a change of level over a wide area. The geological facts he adduces point to the following succession of events:

The lake deposits being underlaid by unstratified drift show that before the great lake existed, a glacier had moved southward over that region and deposited moranic material. The high level prairie on either side of the lake region and of the Minnesota valley is made up of this unstratified drift; but the generally level surface in the part next the lake valley and the stratification in the material show that the floods from the melting ice leveled it. This period of floods was followed by the era of the great lake, that is to say, of quiet waters and gentle deposits, with a slow discharge over the Lake Traverse region, which appears to have been brought about by a diminution in the slope of the general surface, which was part of a great change of slope which went on, as Genral Warren has explained, until the land was reduced to its present inclination and the stream to its present courses.

The construction of the press is such that with the exception of a few bolts and rods it can be made of wood by an ordinary mechanic. This invention has been patented by Mr. William B. Ingram. For

INGRAM'S COTTON PRESS.

Patent Orphan Asylum.

One of the curious departments of the railway exhibition at Chicago has been dubbed "The Orphan Asylum." It consists of a large number of exhibits, mostly models of inventions, which were sent by unknown persons or were left to the tender mercies of the commissioners, with no one in charge of them. A great many of the orphans are car-couplers, and a great

further particulars address Cox & Ingram, Lilesville, N. C. | in such a manner that it will not be affected by the heat, the | many more have been classified under that head for want of

MR. SAMUEL E. NUTTING, of Iron Ridge, Wis., is the patentee of an improved seal lock, which is so constructed that the locking bolt may secure the door of the car. A thin metal strip or wire passes through slots in the hasp, and through the locking bolt and the hollow cylinder, hold ing them all securely in place. The ordinary seal with the name of the station or other device stamped thereon is used. | cided on, and some are now in course of construction.

terns of the usual construction, in which the globe holding spring is above the globe, exposed to the heat of the burner.

THE extent of the coking coal region in Pennsylvania is inscribed with the words: "Thou shalt not kill." estimated at 69,673 acres, and the number of coke ovens at 10,050. In addition, the section of 3,000 more has been de-

lantern is made much more durable than the tubular lan- an explanation to show what they really are. One inventor who arrived late was indignant at finding his " patent protective helmet" put down as a parlor-car spittoon. Another draws attention to a life-saving device by means of a placard

> ----THE production of coal in Germany in 1881 is returned at 48,688,000 tons, as compared with 46,973,000 tons in 1880.

The Elevated Railways of New York.

Whatever may be said about monopoly, high fares, and watered stock, there is no local system of railways in the world that furnishes such admirable facilities for passenger transportation as the four lines of elevated roads in the city of New York. Since the trains commenced running on the two lines on the west side, nearly six years ago, the traffic has steadily increased, until in the earlier and later hours of the day it is equal to the capacity of the trains, which run at intervals as short as safety will permit. The number of passengers carried on all the lines, comprising 32 miles of road, during the half year ending March 31, was over 46,000,000, and the whole number for the current year will probably fall but little short of 100,0.0,000. There can be no stronger evidence than this of the nature of the service rendered by these roads, not only to the vast population of the city proper, but to immense throngs of people from the suburban towns on every side, who come and go every day, and at all hours of the day. The development of local passenger travel in the city within these few years has been of the lower, and its tip is furnished with a large hook, lated.-From Brehm's Animal Life. tremendous. The time will never come when its rapid which is well suited for tearing to pieces the substances on transit facilities will be less than they now are, at least not

of the crumbling piers of the Great Bridge to do a little sketching. It is even now a serious question how long these elevated structures, with all the trains that can be moved upon them, will be sufficient for the requirements of travel over and above the capacities of the present surface roads. It has taken forty years for the city to outgrow the capacity of the Croton Aqueduct, and it is possible that in less time than that the present surface and elevated lines will be supplemented by a half dozen underground roads, in order to meet the growing demand for urban transportation.

The fares on the elevated roads are five cents during three hours in the morning and evening, which is the same as on the surface roads; and were it not that the cars on both are at such times equally crowded, it might be said that passengers have their choice between the two. The superiority of the former, however, is an ample compensation for the ten cent fares during the rest of the day. The speed of the trains, the capacious, easy riding cars, well warmed and lighted, the freedom from obstruction, comfortable stations and waiting rooms, with gate and platform men charged with duties conducive to the safety and convenience of passengers, all contrast strongly with the absence of these most desirable things in the ordinary street car service. There is also a time schedule for all distances, which is adhered to with regularity and precision, and the average distance which a passenger is carried is five times what it is on the horse cars.-Nat. Car Builder.

Chiccory as a Vegetable.

In Holland, Belgium, and the Grand Duchy of Luxemburg, the Cichorium intybus, or common chiccory, is improved by cultivation, and eaten as a vegetable, being called in Flemish "witteloof" (white leaf), like the allied plant endive. It is very agreeable to the palate and highly nutritious; it is said also to possess tonic properties. This plant is especially valuable, as it comes in during the first four months of the year, when other vegetables are scarce. The following directions for its cultivation are summarized from a contribution by M. Paris to the Belgian Journal of Practical Agriculture. In October, a bed is made in a light, sandy soil,

dry rather than damp, four or five feet wide, and of a broad and long wings, and a short tuft of feathers at the gold, for indeed it is more like a shrine than a canopy. depth proportionate to the quantity of chiccory that it back of the head.

use from one end, but carefully, so as not to break them. Every twelve or fifteen days a fresh portion of the bed is heated, its size depending on the consumption, and this goes on until the month of April, when the plants sprout without forcing. They are cooked like sea kale, that is to say, boiled till tender, and served with gravy or white sauce. The chiccory is chiefly eaten with fowl and white meats, and is especially recommended to invalids and convalescents. In Brussels, the plant, deprived of refuse, is sold for about 2d. or 21/2d. per pound in January.

THE SHOEBILL.

The Shoebill (Balaniceps rex), a singular African bird, is a representative of the family Balænicipidæ. It has a thick neck and large head, and a huge bill, which from its resemblance in size and shape to a shoe has gained for it the title of Shoebill.

of the beak, the edges of the upper mandible overhang those which the bird feeds." It has very long legs and large until some New Zealand artist shall perch himself on one feet, whose long toes are provided with powerful nails,

and rests its heavy head on its crop. When flying it draws in its neck. It makes a loud, rattling, cracking sound with its bill, which puts one in mind of the clatter of the storks. Its nourishment consists principally of fish, and it is often seen standing up to its breast in water, and thrusting its powerful bill suddenly under the water, in the same manner as herons do, in order to capture the fish. Petherick asserts that the shoebill catches and eats water snakes, and that it also feeds on the intestines of dead animals, the carcasses of which they easily rip open with the strong hook of their upper bill.

Their breeding time is in the rainy season, during the months of July and August, and the spot chosen for their nest is in the reeds immediately on the water's edge, or on some small, elevated, dry spot entirely surrounded by water. It builds from the dry stalks of the swamp, plants, sod, and mud, a very firm nest almost a meter in height. Heuchlin Wood says: "The bill is enormously expanded at each side says the eggs are comparatively small, about eighty millimeters long and fifty-five thick; the shell is finely granu-

The Kremlin.

The ancient palaces of the Czar at Moscow, known as the

THE SHOEBILL.

is desired to force. The surface of this bed, to the depth | The general color of the plumage is a beautiful ash-gray; which are the arms of the Emperor of All the Russias. of four or five inches, is thrown to either side; and the the edges of the large feathers are bordered with light gray. The throne is supported by the gold griffins of the house The eye is bright yellow, the bill horn color, the foot black. of Romanoff, fringed with black, gold, and silver, the col Young birds are a rusty, brownish gray. The length of ors of the imperial standard. Enormous gilt chandeliers, each supporting thousands of wax lights, the wicks of is considerably smaller. These giant birds of the morass, acwhich are all connected so as to light up simultaneously, hang from the roof and fall with weblike grace. Imagicording to the observations of Heuchlin and Schweinfurth, nation can picture them ablaze and fill the glorious palace live by pairs or in scattered companies—as far as possible distant from all human settlements, in the huge, almost imwith the splendors of royalty, courtiers, and the fairest penetrable morasses of the White Nile and some of its dames. tributaries, between the fifth and eighth degrees of north latitude. It has not been observed around the other waters In melting coarse gold, blow the fire to a great heat and stir the metal with a stick of carbon, or the long stem of a of inner Africa. Usually this bird is seen standing fishing in the pools, in the midst of these swamps. It is very shy and tobacco pipe, to prevent honey-combing. If steel or iron cautious, and at the approach of man it rises with a loud filings get into gold while melting, throw in a piece of saltpeter the size of a walnut; it will attract the iron or steel rustling noise, and flies low over the reeds, which soon hide from the gold into the flux; or, sublimate of mercury will If it becomes frightened by the report of a gun, it rises destroy the iron or steel. To cause gold to roll well, melt with a good heat, add a tablespoonful of sal ammoniac and charcoal, equal quantities, both pulverized, stir up well, put on the cover for two ininutes, and pour.-The

Kremlin, are probably the most gorgeous examples of man's capacity to adorn and beautify that exist on the face of the globe. A New York Herald correspondent says: A walk through the halls of the Kremlin as prepared for the imperial pageant reveals splendors almost impossible to describe. To talk of them as reception rooms suggests nothing of the lavish beauty of decoration and the imperial splendor of the different halls and saloons. Every fresco has been restored, every carving regilded. All the embroideries, brocades, and tapestries have been especially made for the occasion. Baron Kohne had the direction of all the heraldic decoration. His taste in everything that concerns antiquity, ceremonials, and the science of imperial display is evident, from the great golden throne and draperies, over which the black eagle is seen in flight, down to the tabards of the heralds and the badges of the pursuivants.

In the Banquet Hall the embroidered cloth, which surrounds the lower tier and falls to the raised dais on which the buffet stands, is of crimson velvet, and is covered with the most elaborate embroidery of Byzantine design in colors and three tones in gold. This table cover and the carpet, which covers the floor of the halls, about seventy feet square, are the work of nuns, whose signatures are found in it, worked in Slav characters. In the right corner rises a throne of carved black oak, its roof supported, for it is almost a building in itself, by four pillars and raised on three steps. The whole is covered with crimson plush, backed with draperies of cloth of gold and ermine. A small table, which is also covered with crimson plush, stands before the imperial seats.

The floor of the Hall St. Alexandre is probably the finest piece of marqueterie known. Every kind of colored wood is used to produce the most intricate patterns of scroll and flower.

The Throne Room: so much magnificence is displayed in this floor, that one is scarcely prepared for the rich display which meets the spectator in the Throne Room or Salle Saint Andre. Architecture and decoration combine the severity of a Gothic abbey with the marvels of the Renaissance, a resplendent shrine. At the far end of the hall rises a shrine in

It has gold draperies on a silver and gold background, on

The chicsubsoil turned over nine or ten inches deep. cory roots are pulled up, and the tops cut off, leaving only an inch above the root. A cross trench is then made the male bird is a hundred and forty centimeters. The female in one end of the bed, and the roots are planted therein upright, close together, so as to form a row two or three inches wide. The soil is then banked up against this compact row of plants, leaving only the leaves projecting. Another row is planted from two to four inches distant from the former, and so on, until the whole bed is planted. All the surface soil that was before taken off and thrown on either side, is then replaced; and, when it has somewhat settled and sunk, four or five inches more of light rich earth are thrown over, so as to cover the roots with about nine inches of soil. When it is desired to bring the chiccory on, that end of the bed which is to be taken first is covered with eighteen or twenty it from sight. inches of fresh stable manure, well pressed down so as to heat. An equable temperature is maintained, either by add- high in the air, circles and hovers around for a long time, ing more fresh manure, or by employing a straw covering. and will not return to the water as long as it suspects the The young shoots, white and tender, soon force their way presence of men. It is seldom seen on the banks of rivers. through the layer of earth, and may then be taken up for When walking it carries its body in a horizontal position, Jewelers' Journal.

RECENT INVENTIONS. Improved Cash Desk.

This is an elevated desk used with the mechanical cash carrier system now in vogue; and it consists of a contrivance of the stairs for entering and leaving it, to slide under St. Louis, Mo. it when not required for use, as shown in the engraving, and to be shifted from under it for use, as shown in dotted lines.

Means are provided by which the occupant of the desk may conveniently shift the stairs as required, the object being to economize floor space in the store. In case a circular stair is used it may be arranged to swing on a pivot, or, if preferred, it may be made to slide the same as the other. In this case, when the stairs swing, the rails attached to the floor of the desk, and on which the stairs are

to correspond with the direction of the movements of the stairs. Any suitable jointed or flexible hand rail adapted to be folded down and set up readily may be applied to the This useful invention has been patented by Mr. Andrew stairs. This invention has been patented by Mr. James Fanning, of 15 Becket Street, Salem, Mass.

Paper and Envelope Package.

The engraving shows a novel paper and envelope package recently patented by Mr. Samuel J. Spurgeon, of Liberty, Mo. This package is designed as a convenience for travelers and others who require stationery in compact and convenient form. A series of sheets, A, of writing or note paper are united at one corner by an eyelet, B, and by means of the eyelet the covering sheet, C, is held on the package. This covering sheet is of

the size of the sheets of writing paper, with an additional flap, D, having one edge cut diagonally. The width of the flap, D, at the widest end is equal to the width of the sheets, A. The flap, D, is gummed along the diagonal edge on the inner surface. The writer writes on the

sheets, and then folds them over the eyelet in such a manner that the covering sheet is folded over the eyelet. The covering sheet, C, is creased at the base of the flap, D, and is folded over the uppermost sheet, the gummed edge and corner of the flap are moistened, and the flap, D, is folded over the lowest sheet, A, to which it adheres, and the corner, E, is folded over the uppermost sheet, A, to which it also adheres, thereby holding the package closed. The stamp can be gummed on the corner, E, or on the edge as a further security

Bridle Attachment.

This invention relates to an attachment to bridles, to be used therewith with bits or not, as desired; and it consists of a contrivance of nose clamping strap having end rings

through which pass the ends of a chin strap connected by rein straps passing through rings of a head strap of the attachment, which is connected with the crown strap of the bridle, the invention comprising also a connection of the martingale straps with the rings of the nose clamping straps, whereby the attachment may be used for both driving and riding, to powerfully check up the horse when required, and also to prevent rearing and

plunging of the animal by producing a pressure on his nostrils to cut off his breath. Mr. John C. Massey, of Round Mountain, Texas, is the patentee of this invention.

New Secretary.

supporting it inside the secretary when not in use. This the moment when solidification begins along the margin of authors add that they have since liquefied carbon monoxide

which supports the desk when the latter is let down into position for writing. The desk when folded up closes the front of the upper part of the secretary. This invention has been patented by Mr. J. C. Pardue, of Parson Street, West

Plow Clevis.

This is an improved device for hitching the team to the clevis, the object being to prevent the hitching device from dropping out of the notch in the clevis head, by which the pitch of the draught of the plow is regulated. The inven-

tor uses either a hook or an eye and a small clevis for hitching the team to the notched head of the main clevis, connecting the hook or eye to clevis by a bolt. The hook or eye is made with a grooved and inclined butt extension sufficiently long to

bear on head of the main clevis, and prevent the hook or eye suspended, will be circular and small clevis from swinging downward and falling out of the notch in which it may be set, so that when once set in position the device will not fall down and require resetting. Patton, of New Orleans, La, P. O. Box 2689.

Novel Napkin Holder.

The annexed engraving shows a very compact and portable napkin holder that may be conveniently applied, and

will hold the napkin in the most desirable position. The device, as will be seen by the engraving, is capable of being folded one part over the other, so as to be readily carried in the pocket, and when unfolded it hooks over the collar, and its extended arms receive the napkin in the spring clips at the end, as shown in Fig. 1. Fig. 2 shows the holder made of wire without joints. Fig. 3 shows the folding holder detached from the napkin, and Fig. 4 shows

the holder folded up. These holders are neatly plated and finished. For further particulars address Mr. A. Fruth, No. 1212 Washington Avenue, St. Louis, Mo.

New Blind Stop.

This is a novel device by which blind slats may be swung on their pivots, so as to open or close to the extent desired. One end of each slat is slotted either by grooving the wood or applying a metal band or ferrule, and in a slot of the stile

> alongside of the pivots is arranged a bar with a series of stud pins one for each slat, the pins projecting into the slots of the slats, so that they will be opened and closed by sliding the bar up and down. The bar is provided with a knob connected to it by a thumb screw projecting out through a slot in the front of the stile. The knob is arranged to screw up tightly against the side of the blind stile, to clamp the bar fast and lock the slats in the desired position. To permit the slats to be adjusted or removed from the frame of the blind without taking the frame,

one of the stiles of the blind is rabbeted and provided with a strip secured removably by screw. This invention has been patented by Mr. Charles F. Vandervoort, of Corpus Christi, Texas.

Radiation of Silver.

At the Congress of Electricians in 1881, the author proposed as an absolute standard of light the radiation emitted by a square centimeter of melting platinum. He has since made certain experiments with silver. Liquid silver, at a temperature higher than its melting-point, being allowed to cool, it is observed at first that the radiation decreases more

THE COLLEGE OF NEW JERSEY.

The 137th annual commencement of the College of New Jersey at Princeton has been celebrated during the past week, and the last twelve months of the career of this institution have been marked by such conspicuous changes and such encouraging promises for the future, that the exercises of this year have been rendered more than usually interesting. Last year at this time the college was rejoicing over the completion and formal dedication of the new Marquand Chapel, with its graceful minaret and richly stained windows. This year, although a visitor to the campus would notice no material external change, within the college walls he would find vast improvements.

The Halsted Observatory no longer rears its graceful dome an empty shell, but now can boast of the largest refracting telescope of any college in the country-an illustration of which we gave our readers last autumn, and a full description from the pen of Professor Young accompanied the engraving. The establishment of an art school, which for a long time has had a potential existence in the minds of some of the friends of the college, is at length likely to become a reality, and \$60,000 have already been subscribed from the estate of the late Frederick Marguand for this purpose; and further, on condition that a suitable fireproof building be erected for the school, Mr. William Prime, of New York, has promised his collection of pottery, than which there is no finer and more complete in this country. A more recent innovation, however, and one which has been most energetically carried out by the president, is the founding of a school of philosophy. Princeton has always maintained such a prominent position in this department of science, that it seems peculiarly appropriate in her to strive still further to broaden her fields of study in this direction. For the suitable endowment of this branch \$200,000 are needed, and of this amount \$150,000 has already been subscribed, by Mrs. Robert L. Stuart, of this city, the living representative of that family which has already done so much for the theological seminary and college at Princeton. Four new chairs will be needed for this department, one of which will be held by the venerable Doctor McCosh, the present incumbent of the presidential chair.

In spite of all this advancement there is one matter for regret, and that is the loss of Mr. McMaster, who is about to resign his present position at Princeton for a more important chair at the University of Pennsylvania. It seems a pity that, after so many years of persevering, silent, almost secret labor upon his history of the people of the United States, which has so suddenly and without any warning brought him into such prominence and distinction, now he should be permitted to leave the scene of his trial and triumph without any adequate effort being made on the part of the authorities to prevent his breaking his connection with the college.

The only other specially notable event of the year is the resignation of Dr. McCosh from the presidency. Fortunately the acceptance of this resignation and the choosing of a successor have been indefinitely postponed by the appointment of Dr. Murray as dean of the faculty. By this arrangement Dr. McCosh will be relieved of a good many of the business details of the college, which will enable him to devote more time to his professional duties. On the whole, the college seems to be in a more prosperous condition than at any time since its founding in 1746.

Liquefaction of Nitrogen.

Having liquefied oxygen in a complete manner, we proceeded to nitrogen. This gas, cooled in a glass tube down to -136° and submitted to a pressure of 150 atmospheres, still remained gaseous, and nothing could be seen in the tube. If suddenly released, there is in the whole tube a tumultuous ebullition comparable only with the ebullition of liquefied carbonic acid in a Natterer's glass tube, when plunged into water at a temperature a little higher than the critical point of carbonic acid. But if the release is effected slowly, and if the pressure while being reduced is not allowed to go beyond fifty atmospheres, the nitrogen is completely liquefied, presenting a very distinct meniscus, and evaporating rapidly. Thus nitrogen only remains for a few seconds in the static condition of stable liquids. In order to keep it longer in this state, a temperature would be required lower than the minimum hitherto produced. Such a temperature the The secretary shown in the engraving is provided with a or less rapidly, according to the construction of the vessel authors are seeking to obtain. Liquid nitrogen is colorless novel device for holding a book in front of a writer, and for containing the melted metal. The decrease slackens, and at and transparent, like oxygen and carbon dioxide. The

holder consists of two rods bent into a peculiar shape, so the vessel, a small increase is produced. The liquid forms in the same manner, obtaining a colorless liquid, which that when the crank attached to one of them is turned, the then in the midst of the soldified portion a kind of pool, the shows a distinct meniscus. -S. Wroblewski and K. Olszewski. book is placed in an inclined position convenient for read- shores of which gradually advance, and during all this

ing, reference, or copying. phase of the phenomenon the radiation of the liquid part Another movement of the remains constant. When the solidification reaches the crank will place the book center there is a slight increase, followed by a rapid dein a horizontal position in crease. Silver yields thus a fixed secondary standard, which the secretary, where it will will be very useful in all spectro-photometric measurements, remain until again want- where the absolute intensity of the radiations is in general ed. The space beneath of little moment.-J. Violle. the book holder is triangu-

lar and is fitted with suit-AN Indiana lumberman asks the Northwestern Lumberable receptacles for writ- man: What will prevent heavy ash and oak from checking? ing utensils, etc. The To which the editor replies: The ends of hardwood logs for sides of the space around export are covered with a coat of paint to prevent them the book holder may be from checking, and the same treatment would be applicable fitted with pigeon holes to logs or timber not for export. To prevent the sides of

for the reception of papers, etc. The lower part of the plank from checking they should be properly piled and prosecretary is divided into compartments, and there is a drawer | tected from the rays of the sun.

An international exhibition of manufactures, fine arts, and agriculture, under the patronage and auspices of the French government, the municipality, the general council of the Department, and the Chamber of Commerce will be held at Nice, France, from the 1st of December, 1883, until May 1st, 1884.

A jury composed of about fifty of the leading representatives of science, industry, agriculture, and commerce, both in France and abroad, will award the various prizes, which will consist of diplomas of honor, gold, silver, and bronze medals, and honorable mentions.

No more attractive location could have been selected for this exhibition than the city of Nice, with its cool yet semitropical climate, and with the advantages of its hotel accommodation unsurpassed by any town in France.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion ; about eight words to a line. Advertisements must be received at publication office as early as Thursdag morning to appear in next issue

Wanted to sell on commission on the road.-Engine and Boiler Supplies. Box 127, Painesville, O.

Walrus Leather, Nickel Anodes, Turkey Emery, Pu mice Stone and Composition. Greene, Tweed & Co., N.Y Inventors having patents allowed address Lewis F. Brous, Patent Attorney, Frankford, Pa.

For Sale,-State Rights of a valuable invention. Address P. J. Winn, 800 Marshall Street, Richmond, Va.

For Sale.-Half Seal Lock patent. Noticed on another page. S. E. Nutting, Iron Ridge, Wis. A Valuable Patent Right for sale. Address D. Dowd,

La Rue, Ohio. Popular Scientific Works,

15 cents each. Catalogue free

J. Fitzgerald, 20 Lafayette Place, N.Y. The Lehigh Valley Emery Wheel Co., Lehighton, Pa., sell a new Stove Plate Grinder, with transverse motion,

and an Automatic Planer Knife Grinder, with a cup wheel. Cuts and descriptions sent upon application. Free.-My Fish Hook Extractor free to every one sending me a subscriber to this paper, Floating Minnow Bucket Circular. T. W. Rudolph, Box 2838, St. Louis,

Mo. Blake's Patent Belt Studs. Best & strongest fastening for Leather & Rubber Belts. Greene, Tweed & Co., N.Y

Wanted .- Water closet castings to make. We do good work. Sample casting sent if desired. Lehigh Stove and Manufacturing Company, Lehighton, Pa.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling. see Frisbie's ad. p. 364. For Mill Mach'y & Mill Furnishing, see illus. adv. p.364.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 366. Contracts taken to manuf. small goods in sheet or

cast brass, steel, or iron. Estimates given on receipt of model. H. C. Goodrich, 66 to 72 Ogden Place, Chicago.

Brush Electric Arc Lights and Storage Batteries. Twenty thousand Arc Lights already sold. Our largest machine gives 65 Arc Lights with 35 horse power. Our Storage Battery is the only practical one in the market. Brush Electric Co., Cleveland, O.

Curtis Pressure Regulator and Steam Trap. See p.349. Lightning Screw Plates, Labor-saving Tools, p. 248.

Engines, 10 to 50 horse power, complete, with govern or, \$250 to \$550. Satisfaction guaranteed. More than eight hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

Best Squaring Shears, Tinners', and Canners' Tools at Niagara Stamping and Tool Company, Buffalo, N. Y.

Stenographers, type-writers, clerks, and copyists may be obtained free of charge at the Young Women's Chris-tian Association, 7 East 15th Street, New York.

Lathes 14 in. swing, with and without back gears and screw. J. Birkenhead, Mansfield, Mass Five foot planers, with modern improvements. Geo

S. Lincoln & Co., Phœnix Iron Works, Hartford, Conn. The Best.-The Dueber Watch Case.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN Patent Agency, 261 Broadway, New York.

Farley's Directories of the Metal Workers, Hardware Trade, and Mines of the United States. Price \$3.00 each. Farley, Paul & Baker, 530 Market Street, Phila.

Improved Skinner Portable Engines. Erie, Pa Guild & Garrison's Steam Pump Works, Brooklyn, R. Y. Steam Pumping Machinery of every description. Send for catalogue.

Nickel Plating .- Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Lists 29, 30 & 31, describing 4,000 new and 2d-hand Ma chines, ready for distribution. State just what machines, wanted. Forsaith & Co., Manchester, N. H., & N. Y. city. "Abbe" Bolt Forging Machines and "Palmer" Power

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Send for Monthly Machinery List to the George Place Machinery Company

121 Chambers and 103 Reade Streets, New York.

25" Lathes of the best design. G. A. Ohl & Co. East Newark, N. J.

"How to Keep Boilers Clean." Book sent free by James F. Hotchkiss, 84 John St., New York.

Wanted.-Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven. Conn.

Water purified for all purposes, from household supplies to those of largest cities, by the improved filters manufactured by the Newark Filtering Co., 177 Com-

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien, M'f'rs, 23d St., above Race, Phila., Pa

Drop Forgings of Iron or Steel. See adv., page 397. Steam Pumps. See adv. Smith. Vaile & Co., p. 382. Machine Diamonds, J. Dickinson, 64 Nassau St., N.Y. Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York, 50,000 Emerson's Hand Book of Saws. New Edition. Free. Address Emerson, Smith & Co., Beaver Falls, Pa. Eagle Anvils, 10 cents per pound. Fully warranted. Gould & Eberhardt's Machinists' Tools. See adv.,p. 398. Barrel, Key, Hogshead, Stave Mach'y. See adv. p.398. Combined Concentric and Eccentric Universal and Independent Jaw Chucks. The Pratt & Whitney Co., Hart ford, Conn.

Catechism of the Locomotive, 625 pages, 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N.Y. C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 397

For best low price Planer and Matcher. and latest improved Sash, Door, and Blin: Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co.,430 Washington Ave., Phil.Pa.

The Sweetland Chuck. See illus. adv., p. 398. Catalogues free.-Scientific Books, 100 pages; Electri-

cal Books, 14 pages. E. & F. N. Spon, 35 Murray St., N. Y. Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

NEW BOOKS AND PUBLICATIONS.

LABOR AND CAPITAL. By Edward Kellogg edited by his daughter, Mary Kellogg Putnam. Lovell's Library Series. John W. Lovell & Co., 14 and 16 Vesey Street, New York.

This is a revision and republication of a book published as long ago as 1848, which was at once acknowledged as a text book or reference volume by thinkers on financial matters. The author, a rich and prosperous merchant, was a man of deep perception, and evidently foresaw, to a certain extent, the financial embarrassments that occurred in the succeeding thirty years. His predictions have become fact, and his theories have been largely embodied into prin ciples.

INQUIRIES INTO HUMAN FACULTY AND ITS DEVELOPMENT. By Francis Galto F.R.S. Macmillan & Co., New York. Galton,

The object of this volume is to show the possibility of improving the human race by means that act through heredity-the application of the principles of evolution to the generation of human life and the development of human character. The author has used photography successfully in a unique manner, to show the generic likeness of individuals in a family and in community, the results being wonderfully surprising, as in a composite likeness made from twenty or thirty pictures from as many subjects. Not the least interesting portion of the book is the record of evidences of change in the race by slow moving influences, that work so gradually as not to be noticed until presented through the perspective of centuries.

THE PHONOGRAPHIC DICTIONARY, CONTAIN-ING THE OUTLINES OF MORE THAN 30,000 WORDS IN REPORTING FORM. By Ben Pitman and Jerome B. Howard. Phonographic Institute, Cincinnati, Ohio.

A book of 230 pages, for desk or pocket use, contain ing the phonographic word forms and their significations, arranged in double columns alphabetically, related words being in juxtaposition. The clear type on smooth, thick paper gives additional value to the volume.

REPORT OF THE BUREAU OF STATISTICS OF LABOR AND INDUSTRIES OF NEW JER-SEY. W. S. Sharp Printing Company, Trenton, N. J.

This volume treats on the wages of workmen and workwomen, on combinations and societies of working people, building and loan associations, agriculture manufactures, and the fisheries. The chapters on the carp and the oyster are particularly interesting. From the latter we learn that the ancient Romans had an objection to oyster eating at certain seasons, like our custom of rejecting them in the R-less months

THE NATURAL CURE OF DISEASE: ORIGINA TION AND PREVENTION OF SICKNESS; A HEALTH MANUAL FOR THE PEOPLE. By C. E. Page, M.D. New York: Fowler and Wells, 753 Broadway.

The author explains how health may be enjoyed by the use of natural means, as opposed to artificial systems. His theory is sustained by examples, which gives a special value to the book.

there." In his preface the author says that the letters, which are the basis of the volume, were written " without continued thought on any one subject, presenting topic rather than thought," and he disclaims the merit of consistency in regard to the side of the question he may take. Thevolume contains a steel engraved portrait of the author.

TOBACCO: ITS EFFECTS ON THE HUMAN SYS-TEM, PHYSICAL, INTELLECTUAL, AND MORAL. By Dr. Wm. A. Alcott; notes and additions by Nelson Sizer. New York: Fowler and Wells, 753 Broadway.

This is a republication of a well known treatise, with additions and examples which make it applicable to

the cigarette-smoking lads of the present day. Some of the cases of cure of the habit of tobacco using are quite interesting.

PRACTICAL GUIDE TO SCENE PAINTING AND PAINTING IN DISTEMPER. By F. Lloyds. Illustrated by the author. New York: Jesse Haney and Co., 10 Spruce Street.

THE MATERIALS OF ENGINEERING. PART II. IRON AND STEEL. By Professor Robert Thurston, Professor of Engineering at the Stevens Institute of Technology. New York: John Wiley & Sons, 15 Astor Place, New York.

This comprehensive book gives a general description of the metals, the production of iron and of steel, their manufacture to forms, tests of their relative strength, and the absolute qualities of iron and steel as shown by various tests. The book is well illustrated and is valuable for reference and authority.

THE LIFE OF SIR WILLIAM E. LOGAN, FIRST DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA. By Bernard J. Harrington, B.A., Ph.D. New York: John Wiley and Sons.

The subject of this memoir is well known to geolo gists in this and other countries. Probably the basin of the St. Lawrence and the country of upper Maine are better known from his reports than from anything and everything that had preceded them, although previous to beginning his survey in 1842, Murchison had completed his "Silurian system" and Sedgwick had published his classification of the Cambrian rocks. The volume of nearly 450 octavo pages is enriched by a steel plate portrait of Sir William and a number of engravings. The body of the narrative of his explorations is in his own words, and the attractiveness is largely due to his piquant style.

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unles accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest should remit from \$1 to \$5, according to the subject as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLE MENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) G. W. B. asks: 1. Can the dynamo electric machine, SUPPLEMENT No. 161, be used as an electric motor? A. Yes. 2. If so, what alterations would be necessary in its construction? A. It is necessary to readjust the commutator.

(2) S. E. N.-The expression soft as used by you is somewhat vague, as it may be meant to include the properties of malleability and ductility. Lead ranks sixth among the list of the former and ninth as regards the ductility. On the mineralogical scale of hardness lead is 15, with 1 being represented by talc and 10 by the diamond. Certain of the elements, such as mercury and gallium, are softer. Again, lead itself varies according to its purity, and it is softest HOW TO GET ON IN THE WORLD, AS DEMON- when most pure. In metallurgical works it is generally treated to a so-called "softening" process of alternate in a mould until a desired state of purity is reached.

and 800 strokes per minute? A. About one-fourth horse ower. 3. Also the same at 600 strokes per minute? About five-sixteenths horse power

(5) J. A. S. writes: I have a saw mill, and have not power enough to run all of my machinery. Could I increase the power by adding one more boiler and carrying the same amount of steam on the two as I would on one. My engine is 40 horse power and my boiler 30 horse power. A. If you add another boiler, and can alter the connecting gearing between the engine and mill so as to increase the speed of the engine say 25 per cent, your power will be increased in the same proportion.

(6) J. C. M. writes: I have a good sized row boat which I should like to rig up for sailing. It sails well enough before the wind, but not having a center board. I can't tack: to cut through the keel would weaken the boat too much; what can I do? A. Put a "lee board" on each side.

(7) H. W. N. asks: Will you state what is he proper distance for fire space between grate bars and bottom of boiler for a wood burning furnace for a 20 horse power boiler, 42 inches diameter and 8 feet long, with 54 tubes? It was made for coal, and the grate bars are only about 18 inches from boiler now. Some contend that it is right now, others claim it is wrong. Please put us and others right in the matter. With good hickory wood at \$3.00 per cord and anthracite coal at \$6.00 per ton, which is the cheapest steam generator? Can you give an exact rule for determining the length of inch pipe necessary for heating work shops in different departments so as to have uniform heat at 76° to 86° Fah. where rooms vary from 12 feet by 14 feet to 30 feet by 32 feet and 30 feet by 70 feet, 8 foot, 9 foot, and 12 foot ceilings ! Can power be transferred from a dynamo three miles over any kind of cable, with loss of only 33 per cent? A. The height of fire chamber-18 inches-is too low for a wood fired boiler of 42 inches diameter. For hard wood, 24 inches will do; 28 inches is better. Good dry hickory at \$3 per cord is cheaper than anthracite at \$6 perton. A cord weighs 4,000 to 5,000 pounds, and its evaporative power is about 50 per cent of coal per pound weight, making their values equal at equal prices. For heating shops with 1 inch pipe, one foot 1 inch pipe to 40 cubic feet of space in small rooms. Large rooms, 1 to 50 is good practice. If the rooms are close, a little less. If many windows or skylights, add 5 or 10 per cent, as you may judge. The loss in transmission of power by dynamos in actual practice is more than 33 per cent.

(8) C. H. D. writes: I noticed in SCIEN-TIFIC AMERICAN, No. 19, dated May 12, 1883, an item relating to quarter and bastard sawed yellow pine. Please explain what is meant by both of these terms, as I never heard them applied. A. " Bastard sawed " lumber is the ordinary sawing, and used only to distinguish it from special names. "Quarter sawing" iscutting the log in 4 quarters and then, sawing corner wise, or at 45° to the quarter cuts. When the cuts are across the annual rings the boards keep their shape best, that is, do not warp. When the cut is at right angles to the above, or with or partially parallel to the rings, it will have a tendency to warp, but is preferred for its figure and beauty of grain when used for furniture or finished interiors.

(9) E. W. S.-The only difference in the pressure of different parts of a boiler is due to the hydrostatic weight or pressure of the water. Above the water line the pressure is equal to the steam pressure At 27 inches below the water line there is about 1 pound more pressure than is indicated by a correct steam

(10) F. P. L.—For chemical barometer:

Camphor	21⁄2	drachms
Alcohol	. 11	**
Water	. 9	**
Seltnotor	20	**

66

Dissolve the camphor in the alcohol, the salts in the ater, and mix the solutions together.

(11) J. C. S.-Glass may be etched with hydrofluoric acid; see SCIENTIFIC AMERICAN SUPPLE-MENT, No. 313, for details of manipulation. Steel is generally etched with a solution consisting of nitric acid 1 part, acetic acid 1 part, water 3 parts.

(12) M. E. M. writes: I read an article in SCIENTIFIC AMERICAN of May 5, concerning "Utilization of Diseased Potatoes." It was stated that the water in which the potato was cooked was a violent poison. This lead me to inquire whether or not the water in which any potato is cooked is wholesome? Now that Paris green is so generally used, may not all potatoes be slightly diseased? It is the custom of many housekeepers to use the water in which potatoes are boiled for making bread, generally mashing some of the potato also and putting into the flour. Is this a deleterious practice? A. The very poisonous alkaloid solanine is contained in the potato, and is extracted by treating the potato with acidulated water. Hence the

merce St., Newark, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill. For Power & Economy, Alcott's Turbine, Mt.Holly, N.J.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street, P. O. Box 3083, New York city, Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y. Drop Forgings. Billings & Spencer Co. See adv., p. 382. See New American File Co.'s Advertisement, p. 372. Woodwork'g Mach'y. Rollstone Mach. Co., Adv., p. 382.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works. Drinker St., Philadelphia, Pa.

Supplement Catalogue.-Persons in pursuit of information on any special engineering mechanical, or scien tific subject, can have catalogue of contents of the Sci-ENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physisal science. Address Munn & Co., Publishers, New York. | energies it has its uses. The writer has evidently "been 1 1 of the bore, 134 stroke, 40 pounds pressure in boiler, | much less.

STRATED BY THE LIFE OF WILLIAM COBBETT; WITH COBBETT'S ENGLISH GRAMMAR. By Robert Waters. New York: James W. Pratt, 75 Fulton Street.

The life of William Cobbett will always be attractive. From plowboy to member of parliament, from private soldier to famous author, are extremes of possibilities that will always interest the young. Cobbett's grammar, which comprises one-half of the volume under consideration, and consists of a series of lessons under the guise of letters, is not excelled as a text book for teaching the principles of English grammar and the proper use of the language. This portion of the volume makes the book especially valuable.

EXTRACTS FROM CHORDAL'S LETTERS, ORIGI NALLY PUBLISHED IN THE American Machinist. New York: John Wiley å Sons.

This volume contains shop criticism, shop philosophy, shop talk, and outside moralizing in queer juxtaposition. As an attempt to interest the worker and stimulate his

(3) C. W. & Co. ask: Can you give a receipt for cleaning and removing leather belting which has become soft and useless from oil? A. If the belting is not brittle or rotten, a thorough wiping off of the excess of oil and scraping the face with a sharp boat made five miles per hour, she could not hold her tool to take off the gummy matter, and finally wiping the inside with a little naphtha or gasoline upon a cloth, will generally restore the belt. The pulley should be cleaned also; then you can increase the efficiency of the belting by rubbing the inside with a piece of beeswax. Only a little should be applied. If the belting

has become weak and rotten, it should be thrown away. (4) L. C. S. asks: 1. What would be the proper rated horse power of a balanced valve engine, cylinder 3 inches bore and 3½ inches stroke, pressure in boiler 60 pounds, strokes per minute 400? A. About power each cylinder; but if the boiler pressure is 75 three-fourths horse power. 2. Also a cylinder with

use of water in which potatoes have been cooked is not advisable.

(13) T. J. H. asks why it is that a boat that runs five miles an hour in dead water, can run more than ten miles an hour in a stream that flows at the rate of five miles an hour? I know you say it can be done, but I can't understand how it is. A. Because, when running with the current, the boat is running "down hill," and gravity aids in propulsion. So if the position against a five mile current, or if the boat made seven miles per hour in still water, she could not make two miles per hour against a five mile current,

(14) V. B. writes: Please give the horse power of a Worthington duplex steam pump of the following dimensions: diameter steam cylinder, 20 inches; length of stroke, 15 inches; number of strokes per single piston, 72 strokes per minute; steam pressure, 75 pounds per square inch. A. If your average pressure pounds, the average pressure on the piston is probably

Scientific American

INDEX OF INVENTIONS	Dental plates Evans
For which Letters Patent of the United	Deodorizing pe Diamonds in s
	E. Foerster Ditcher tile F
June 12, 1883,	Dividers, para
AND EACH BEARING THAT DATE.	Door bolt, C. C. Door hanger,
[See note at end of list about copies of these patents.]	Dredge for she Dressing case,
Alarm. See Railway alarm.	Drill or reamen
Animal trap. J. H.Brubaker	Egg carrier, J.
Amalgamator, A. H. Bliss	Electric condu Electic light, J
Auger, J. Swan	Eelectric mach
Axle box, car, G. W. Sweeney	Electric machi
Baby jumper and swing, M. M. Raymond 279,432	Electric wires
Banjo, H. McCord	Johnstone Electrode for
Bed, spring. C. D. Rodebaugh	Elevator. See End gate. Scha
Bell. bicycle, E. M. Senseney	Engine. See
Bell. door, W. S. Foster	Epaulette, Cra
Berth, sleeping car, A. Davis	Evaporator. S Feather splitt
Blind slats, metallic pivot for window, B. F. Hall., 279,379	Hoffman .
Board. See Dash board. Stove board. Boiler. See Steam boiler. Vertical multitubular	Feeder for ste
boiler. Boiler setting and furnace, steam, T. R. Butman. 279,331	Felting machin Fence post. E.
Bolt. See Door bolt.	Fence wires, n
Boot, felt, J. C. File	Fences, electri
Bottle stopper, H. B. Anderson	Fertilizers fro
Bottle stopper, S. S. Newton	phatic, C. S File, bill or let
Box. See Axle box. Journal box.	Filter, J. A. Cr
Boxes, die for stamping and embossing, W. H.	Firearm, maga
Allen	Fire escape, C
Bran duster, Hogeboom & Smith 279,387 Brick hardening fire I. Handerson 279 161	Fire escape, C.
Bridle bit, L. S. Longcor	Fire place, H.
Broom holder, E. G. Eyster	Fishing tackle,
Buckle, G. N. Freer	Fountain. See N
Buckle. E. L. Packer	Fuel compositi
Burglar alarm circuit closer, W. C. Fisher 279,483	Furnace lining
Button, G. P. Farmer (r)	Gage. See Wa
Button, separable, W. N. Rowe 279,279 Cuddy, or canister, G. Lillibridge, 279,261	Game table. A Garment. circu
Caloric engine, J. Buckett	Gate. See End
Candies, process of and apparatus for the manu-	Gland, Park &
facture of dipped, J. P. A. Williams 279,209 Cane, machine for crushing and disintegrating	Glass, furnace Little
sugar, A. Ferron	Glass, imitatio
Car coupiling, T. H. Ambrose	Glucose, conve
Car coupling, C. E. Appell	Governor, cott
Car coupling, J. N. Best	Grain binder, Grain binder,
Car coupling, H. C. Bradley	Grain binder,
Car coupling, J. H. Depew	Grain separato
Car coupling, E. C. Galentine	Grate, T. C. Jo Griddle or pan
Car coupling, Scott & Talmage	Grindstone ho Guard. See Ca
Car coupling, J. Wood	Hair, grapevin
Car door, grain, F. L. Kirkbride	Hanger. See
Nichols	Harrow, J. H. Harvesters, sh
Car propulsion, street, R. F. Bridewell 279,325	Williams Hat bodies, etc
Car, stock, J. Dixey	C. W. Glov
Car, stock, H. C. Hicks	Heater. See 1
Carbon plates, manufacture of porous, C. H. Koyl 279,400 Card. ornamental. J. Lane	Heater, Johns Hoisting appar
Carrier. See coal and ore carrier. Egg carrier.	Hoisting mach
Cartridge shells, machine for capping, Orcutt &	holder. Re
Richards	Hoop planer, (
Case. See Dressing case. Pencil case. Show case. Toilet case. Toilet set case.	Hops, preservi Horse canopy,
Caster, trunk, Kitt & Schmadel 279,397	Horseshoe, O.
Chains, manufacture of ornamental, D.D. Codding 279,340	Huller. See F
Chair. See camp chair. Reclining chair. Churn, Schoch & Bolender	Indicator. Se Inhaler, L. W.
Cigar machine, R. A. Bright, Jr 279,125 Clamp. See 'Frace loop clamp.	Injector, air, H Ironing appare
Clock, calendar, B. Franklin	Ironing machi
Clocks, electro magnetic motor for, H. Grau 279,239 Closets, apparatus for operating self-flushing, T.	Jewelry, H. M.
Prosser	Joint. See Un Journal box, J
rial upon. J. Tregurtha	Kettle stand, Knitting mach
troyd	Harvey

	_	
ental plates, apparatus for forming, W. W.		Nume
Evans	279,365 279 195	Nut l
iamonds in steel saw teeth, bits, etc., inserting,	210,100	Oilfr
E. Foerster	279,369	l fr
vividers, parallel, J. B. Tetley	279,460	Ore c
oor bolt, C. Clark	279.334	Organ
redge for shell fish, A. F. Friend	279,373	Pan o
ressing case, Eisenmann & Kock	279,233	Panta
Douglas	279,360	Paper
gg carrier, J. L. Stevens	279,199	Paper
lectric conductor, J. W. Rogers	279,189 279,224	Paper
electric machine, dynamo, R. E. Ball	279,476	Pape
lectric machine, dynamo, N. H. Edgerton lectric machines, armature for dynamo, Knowles	279,362	Paper
& [de]	279,399	Peat,
lectric wires, underground conduit for, W. H.	279 202	Penci
lectrode for secondary batteries, N. C. Cookson.	279,346	Perm
levator. See Power elevator.	970 444	Piano
ngine. See Caloric engine. Naphtha engine.	~10,111	Pipe.
Pumping engine. Steam engine.	070 400	Pipe of
vaporator. See sugar evaporator.	219,480	Plant
eather splitting and grinding machine, A. D.	070 000	Plant
eed water heater for locomotives. H. Heaton	279,386 279,383	Plant
eeder for steam boilers, water, H. Sullings	279,458	Platfo
elting machine, W. Keenan	279.393 279.440	Plow, Plow.
ence wires, machine for applying barbs to, J. B.		Plow,
Cline	279,339	Plum
Brainerd	279,322	Post.
ertilizers from basic iron slag, obtaining phos-	970 445	Power
ile, bill or letter, J. M. Keep	279.170	pr
lter, J. A. Crocker	279,226	Print
rearm, breech-loading, R. L. Brewer	279.324 279.242	Print
ire escape, Creecy & Burns	279,348	Pump
ire escape, C. C. Griswold	279,150	Pump
re escape, T. W. Ricker	279,175	Pump
re place, H. Rembert	279,433	Ŵ
shing stake, D B. Tiffany	279,508	Pump
ountain. See Printing press ink fountain.	~10,200	Rack.
rame. See Numeral frame.	070 450	Railw
urnace. See Recuperative furnace.	279,479	Ranw
urnace linings and fire brick, compound for, J.		Railw
Henderson	279,160	Railw Railw
ame table. Arff & Bornholdt	279,313	in
arment, circular outer, T. D. Barter	279,211	Railw
irder and beam, P. H. Jackson	279,249	Recu
and, Park & Graham	279,499	Refri
Little	279,254	Rein
lass, imitation stained, E. E. Oudin	279,423	Respi
lass roof, W. Ward	279,465	Revol
old washer, Betts & Wilson	279,122	Roast
overnor, cotton gin feed, J. D. Flannagan	279.367	Roller
rain binder, C. Whitney	279,309	Saddle
rain binder, Williams & Dunstedter	279,210	Saddl
rain screen, J. D. Belton	279,215	Saw, s
rate, T. C. Joy	279,250	Saw s
riddle or pan lubricator, J. Potter	279,181	Saw ta
uard. See Carving fork guard.		Scrap
air, grapevine, H. Hufnagel	279.389	Po
anger. See Door hanger.	~10,011	Scree
arrow, J. H. Romkey	279,437	Screet
Williams	279,300	Screw
at bodies, etc., machine for felting and sizing,		B1
C. W. Glover	279,376 279,343	Seat.
eater. See Feed water heater.		Sewin
eater, Johnson & Buerkel	279.486	Sewin
oisting machine brake, automatic, W. W. Wythe	279,304	Sewin
older. See Broom holder. Paper bag and twine	Ì	B
ook. See Snap hook. Suspension hook.		Sewin
oop planer, O. R. Olsen	279,496	Sheet
ops, preserving, F. A. Bruns	279,127 279,139	Sheet
orseshoe, O. M. Chase	279,223	la
orseshoe calk, G. W. Martin	279,408	Shing
ndicator. See Station indicator.		Shoe
haler, L. W. Nevius	279,265	Shoe
oning apparatus, I. D. Warner	279,269 279,293	Signa
coning machine, Z. C. Smith	279,514	Single
ack. See boot and shoe holding jack.	270.951	Skate
piut. See Universal joint.	#1 7, 391	Skate
ournal box, J. Thomas	279,461	Skate
nitting machine feed guide attachment. P. f.	419,238	Slate.
	1	

Numeral frame, R. T. Martin	279,263 Sto	01
Nut lock, C. H. Preston	279.182 Sto 279,299 Sto) 1) 1
Dil from seed and manufacture of oil cakes there- from, expressing, Bushell & Haydon	279.330 Sto	יי נ
Dil press mat, hydraulic, Milburn & Latting, Jr Dre concentrating apparatus, C. B. Hitchcock	279,414 Sto 279,164)1
Organ stop action, reed, B. French Package and box cover fastener, S. E. Moore	279,372 Sus 279,417 Sus	Z:
Pan or stove cover lifter, 'I'. S. Haskell	279,153	1
Paper and envelope package, S. J. Spurgeon	279,283 Sus	8]
Paper bag machine, C. B. Stilwell	279,505 Sus 279,505 Swi	3] i1
Paper bags, machine for making, A. Adams Paper boxes, machine for making, B. T. Steber	279,114 Tal 279,285 Tal	b b
Paper or pasteboard, manufacture of, Cummings & Shank	279,350 Tai	b. gr
Paper pail or box, I. W. Hollett	279,244 Tai 279,390	rį J
Pencil case, J. Holland Pendulum compensating. Mills & Mossop	279,388 Tel 279.176 Tel	le
Permutation lock, Whitney & Keith	279,298 Tel	e
Picture exhibitor, Sanderson & Simmons	279,504	f
Pipe cutter, C. C. Walworth.	279.207 Tel	le
Planoscope, W. W. Rupert Planter, R. S. Carr	279,439 279,221 Ter	s rr
Planter check rower, corn, M. Barnes	279,119 Thi 279,241 Thi	i1 11
Plastic paste, Meucci & Deudi Platform. See Window platform.	279,492 Thi Tile	il e
Plow, T. Alleman	279,308 Tin 279.252	6
Plow, E. Wiard.	279.469 Toi	ile
Plumbers' hooks, manufacture of, C. W. Dean	279,228 Tor	m
Power elevator, T. Hill.	279,243 Too	e ot
press. See Box packing press. Cotton and hay press.	Тоу Тоу	π γ,
rinting press face cloth, A. Campbell	279.129 Toy 279,301 Tra	7. 1C
Pruning implement, J. McWilliams	279,413 Tra 279,214 Tra	ic ir
Pump, direct-acting steam, J. E. Sinclair	279,452 Tri	n
with the second	Tru	10
Pumping engine, E. H. Martin	279,407 Tru	10
anch, eyeleting, C. Morrill	219,493 Tru Typ	
tailway alarm, automatic, F. Clifford	279,225 Uni Val	l v
line	279,394 Val 279,463 Val	lv Iv
Railway switch. F. Vanell	279,509 Val	v
ing speed of, J. H. M. Waldorp	279,292	g
Reclining the first R. Adams. J. Sollaroom	279,115 Veg	30
terrigerating car, F. C. Hills	279,163 Ver	hi
Rein holder, D. McGladery	279.295 Ver 279.411 Ver	11 hi
Respirator, H. A. Stewart	279,200 Vel 279,197 Vel	hi hi
tice huller, E. Lischy	279,404 Vel Ver	.0
Roller. See Skate roller. Roofing tile mold, Lane & Woodworth 2	Ver 279,402 Vis	rt e
addle, harness, Bickle & Bridges	79,123 Wa	s t
aw, segment, Connell & Dengler	79,344 Wa	t.
aw swage, W. Kelly	79,251 Wat	te
awing machine, clapboard, H. Taber	279.287 Wes	a a
Pool	279,429 Wh	le lij
craper, road, J. Fleming	79,368 Wir Wii	n
creening and sizing machine, J. Sutton	279,286 Wi1 279,495 Wi1	n
crew threads, machine for swaging, Davis & Blake	279,353 Wii	J
eat. See Vehicle seat. eparator. See Grain separator.	Wir Wir	re re
ewing machine, M. H. Pearson	279,500 Wr	e
ewing machine, button hole, F. W. Cross 2	279,319	c
Blodgett	279.320	12
ewing machine heedle, J. W. Packard	279,498 279,208 Ato)1
neet metal pipe, L. F. Betts (r)	10,339 Disl 279,494 Frii	h n
heet metal pipes, apparatus for marking angu- lar cuts in, W. H. Clark	Pla 279,336 Ray	q p
blingle, roofing, H. A. Jones	279,487 Spo	
shoe last attachment, C. E. Goss	279,377 279,375 279,375	16 17 17
show case, J. W. Fawkes	279,366 Upl	n h
ngman. See Kanway signal. Single tree, J. F. McDaniel	279,410	
kate, P. J. Doherty	279,350 279,220 Bee	e
skate, roller, T. Day	279,138 Cra 279,489	a
kate, roller, parlor, E. B. Mansfield	279,406 Cut 279,457 Lea	;l it
led, F. C. Klipstein	279,256	iı

ve board, A. I. Griggs..... 279,240

 Ill coupling, G. W. Haskell
 279,361

 Ill coupling, D. E. Hull.
 279,246

 Ill loop or tug, Grunder & Moyer.
 279,151

 De machine table, W. F. Leach.
 279,259

 cans, machine for scouring and polishing, F.
 279,222

 let case, L. Wolf.
 279,302

 let set case, H. Pattberg.
 279,273

 nbstones and monuments, device for handling, etc. W. H. Sanders.
 279,211

 icle seat, J. Newman.
 279,266

 icle seat, W. J. Ulrich.
 279,288

 icle side spring, E. Tecktonius
 279,507
 er closet seat, device for covering, M. Bonne-DESIGNS.

TRADE MARKS.

ther, certain kinds and articles of, Page Belt-

	Lamp clostria T T Wood 970 479 970 519	Flod hand T / Done 970 400	Matches, safety, Vulcan Tändsticksfabriks Aktie-
Coal scuttle, H. S. Reynolds 279,502	Lamp, electric, J. J. Wood	Sieu, nanu. J. T. Pope	holeget 10.851
Cock and check valve, steam, J. A. I. Claudon 279,338	Lamp, electric arc, N. H. Edgerton 279,363	Snap nook, W. Bellairs 279,477	Modicinel specific for nours lois Allon & Henhurys 10 249
Coffee mill, F. H. Chapman 279,130	Lamp, electric arc, J. H. Guest 279,152	Soda. apparatus for manufacturing bicarbonate	Borfumore around dontifrice heiroils and analo
Coffee roaster, J. Burns 279,329	Lamp filler and indicator, A. Ring 279,278	of, J. Gandolfo 279,145	renumery, creams, dentifice, nan ons, and analo-
Coffee roaster, G. H. Pfeifer 279,179	Lamp, miner's, E. K. Rollins 279,503	Soda, manufacture of bichromate of, Potter &	gous articles used in tollet preparations, A.
Collar fastening, horse, O. H. Morris 279.177	Lantern, T. Langston	Higgin 279,431	Raynaud 10.352
Comb, P. J. Cullinan 279,227	Letter sheet and envelope, combined, G. R. Lock-	Soldering device, F. F. Ellis 279.234	Pomades, R. Prud'homme 10,349
Composing stick. A. Danziger 279,352	wood 279,405	Sower, phosphate, W. H. Cornford, Jr 279,135	Remedies containing cresylic or carbolic acid for
Compressing plastic and other materials, machine	Level, combination, J. H. Sands 279,443	Spoke tenoning and tapering machine, O. Allen 279.117	diseases of animals, J. P. Barnett 10,343
for. Hemje & Brecht 279.384	Lifter. See Pan or stove cover lifter.	Spout, sap, M. J. Stark 279,284	Remedy for diseases of the liver, J. J. & W. H.
Confectionery, etc., machine for molding or shap-	Light. See Electric light.	Spring, See Vehicle side spring.	Tobin 10,350
ing, O. R. Chase	Lock. See Alarm lock. Nut lock. Permutation	Stamp, branding, S. E. Adamson	Rubber compound used for steam packing and
Confectionery, etc. machine for molding, shap-	lock.	Stand. See Kettle stand.	like purposes, India. J. H. Cheever 10.345
ing, and combining, O. R. Chase 279,133	Lubricator See Axle lubricator.	Station indicator, E.S. Boynton 279,478	
Corkscrew, T. M. Strait	Lubricator, J. M. Battin, Jr.,	Station indicator, G. F. Robertson 279,436	A printed copy of the specification and drawing of
Corkscrews to bottles, attaching, J. E. Berlien 279,216	Map. educational, W. R. Norris 279,268	Steam. apparatus for reheating exhaust, L. Hus-	any patent in the foregoing list, also of any patent
Cornice. window curtain. C. Eberly 279.232	Mat. See Oil press mat.	sey 279 247	issued since 1866. will be furnished from this office for 25
Corset. M. P. Bray	Measuring electric currents, apparatus for, S. L.	Steam boiler, W. R. Kirk 279,395, 279,396	cents. In ordering please state the number and date
Corset, F. D. Cooke	Fox 279,371	Steam engine, superheating, J. E. Sinclair 279,453	of the patent desired, and remit to Munn & Co., 261
Cotton and hay press. H. M. Meetze 279.174	Mechanical movement. J. S. Sackett 279,441	Steamer and evaporator, stock food, Farrar & Bow-	Broadway, New York. We also furnish copies of patents
Coupling. See Car coupling. Thill coupling.	Medicine, veterinary, W. Huffman 279,166	man	granted prior to 1866; but at increased cost, as the
Coupling for bell cords, etc., G. W. Nock 279267	Metal shearing machine, Arnold & Morrill 279,314	Steel by the open hearth process, manufacture of,	specifications, not being printed, must be copied by
Crib, folding, C. S. Comins	Mill. See Coffee mill. Windmill.	W. A. O. Wuth 279,473	hand.
Cultivator, J. H. Hoober 279.245	Mixing machine, J. Burns 279,328	Stone breaker and crusher, P. W. Gates 279,147	Canadian Patents may now be obtained by the
Cultivator, orchard, Richardson & Enderson 279,277	Mold. See Roofing tile mold.	Stone breaking and crushing machine, P. W.	inventors for any of the inventions named in the fore-
Cut-off valve gear, C. E. Kimball 279.253	Motion, device for converting. S. O. Campbell 279,513	Gates 279,146	going list, at a cost of \$40 each. For full instructions
Cutter. See Pine cutter.	Nail driving machine, portable, S. Perry 279,427	Stone dressing tool, H. A. Kimball 279,488	address Munn & Co., 261 Broadway, New York. Other
Dashboard, L. E. McKinnon 279.412	Naphtha engine, F. W. Ofeldt 279,270	Stopper. See Bottle stopper.	foreign patents may also be obtained.

ILLUSTRATIONS.	Gauge, McCullough's 57 Gauge, pressure, for test app 374	Shavings, appar. to feed	Atlas of the world, Mitchell's 130 Atlantic near N. Amer. coast 196	Chair, reclining	Electric fire batteries
	Glass blowing machine	Shield for shirt studs	Aurora, an artificial	Chemical experiments, new,	Electric lamps, manufacture of
A	Goods, examining, machine 226 Gopher attach. to cultivators 217 Gopher, pouched	Shoebill, the	Austral, sinking of the	Chemistry of clockery 135 Chemistry of elect. accumulators 38 Chess-player, automaton *108	Electric light in surgery
Æolian harp, the	Governor, isometric	Statue of Liberty, erection	Aztec remains, Colorado 7	Chloroform, hint on use of	Electric lighting on Arizona
Air compressor, double cylind. 2/5 Air extractor, Thomson's	Guard for safe locks	Steamer Pilgrim, new	Barrassa furnese Hill's *960	Chlorine as plant food 247 Chlorophyl in animals 52	Electric railway, Ireland 24 Electric street car
Aleurometer, Bolland's 214 Archer fish, the 199 Artille y experiments at Spezia. 79	н	Still, ammonia, for gas works 98 Stovepipe fastener, Huttinger's. 212 Stoves, heating, Kilshow's 201	Baga and twineb older	Child, hairy, from Borneo	Electric transmiss. power 262 Electric units of measurem't 201 Electric wire, silico copper 18
Austral, raising of 402 Axle, vehicle, Maroney's 105	Hammer, Bailey's	Stoves, oil, cocking attach	Bag holder, Nelson's	Chimney flues and fireplaces 373 Chimneys, size of	Electric wires, susp., perils 16 Electric wires, underground*134 Electrician, an athletic
Bag-holder Alderman's 200	Harrow, Thronson's	Swing, Young's	Baldness	Christian era, the	Electrical Exhibition, Vienna 96 Electrical machine, Wimshurst's *71 Electricity as motive power 385
Bag-holder, Dinkle's	Hat holder, Lindsey's 198 Head-block, saw mill	T	Balloons, propuls by electricity.*143 Ballooning, perils of	Churches, ventilation	Electricity, bleaching by 177 Electricity, dyeing by 166 Electricity, effect on perves
Balloons, propul. by electricity. 143 Battery, galvanic, Parkhurst's 5	Heater and oven, Lindsay's 377 Heater, culinary, Benson's 360 Heater, feed water 179	Telephone, Bennett	Barb fence patents, overthrown. 368 Bark, paper from	City of Fall River, steamer	Electricity, fishing by
Bear-pit, Jardin des Plantes 55 Bill and letter file, Adams' 57 Blacking attachment, Wood's 185	Heating water, apparatus	Telephone, receiver, Rels 136 Telephone, receiving, Dailey's 73 Telescope, great Russian 207	Battery electric light	Civil engineers, American	Electricity in printing presses
Blind stop, new	Hose nozzle, Öyston's	Tellurian, Spicer's	Battery, secondary, new	Cloth from nettle	Electricity, propuls. balloons by .*143 Electricity, stopping engines 120
Bottle stopper, Jewett's	I Ice machine. Giffard's 47	Throat complaints, app. for 21 Thile coupling, Beebe's 114 Tire for wheels, improved 6	Batteries, fire, electrical	Clothing, what does it weigh ? 137 Coal, anthracite, first use 55	Electrolytic studies
Bridge, Brooklyn, accident 353 Bridge, Brooklyn, opening 319 Bridge, Brooklyn, roadway 340	Ice machine, Windhausen 4 Ice machine, Perkins'	Tombstone, impr., Mould's 232 Tool cabinet, new	Beans, corn, and pumpkins 167 Beard, George M	Coal, Arizona	Electro-pulverizer, Mane's*246 Elephant, instantan. photog*9
Bridge, Brooklyn, station	Insects, flesh-eating	Toy money safe, Hotchkiss' 150 Trace-buckle, Butler's,	Belt widths	Coal dust explosions	Elevated roads, now cared for 2/2 Elevator, Goddard's
Ruggy bow-spring, new	J	Traction wheel, Gilbert's 248 Transplanter, Spitznass' 169 Transplanting instrument	Benzoic sulphinide, new comp. 178 Bee, the, as a worker	Cocoa and chocolate	Elevator, railway, hydraulic *178 Elixirs, cochineal color for
Butter-case, new	Jack, wagon, Furman's	Trap, animal, Turley's	Bees. 544 Beer, tonic	Coffee and tea from guano 280 Coffee and tea from guano 21 Coffee, artificial	Emery wheel, McLauglin's*377 Employes, old, consideration for. 336 Emulsions, gelatine, new
C	Jail wall, improved 403	Tricycles, improved	Beetle, elm-leaf	Coffee plantation, Brazilian	Emulsions, photo., formulæ 3 Enameling photo prints,
Cable stopper, Lynch's	Key fastener, Tolman's 114	Truck, hand, Sloan's	Binder, cotton bale, Burr's*344 Bioplasm doctrine, the	Coin, smallest in world	Engine, cut-off, Lambertville *82 Engine, diffusion
Car coupling, Barber's	L	Turning tool, hand, new	Birds and telegraph wires 121 Black, aniline, why turns green. 212 Blacking attachment. Wood's*185	Coke and its products	Engine, milling
Car coupling, Graver's	Lamp, exclignisher, new	Twist drifts, snarpening mach 54	Blast of 130,000 tons	Colors, anlline, adulteration	Engines stopped by electricity 120 Engine, the Peerless
Cars, scale, revolving	Letter and bill file, Adams' 57 Leveling instrument, Peters' 105	Umbrellas, Lockling's 51	Blind stop, new*408 Blowers and forges, Buffalo*175 Blood duct for lambs 25	Coloring matters, vegetable	Engine, vertical, Cox's
Carrier forcoal, Cross'	Library, Horatio Lyon 295 Lid for pots, Conneely's 312 Light, magnesia, new 166	V Vehicle axle, Maronev's	Blue, laundry, disinfective	Columns, iron, solid and hollow . 177 College of New Jersey	Engineers, civil, American 57 Engineer, locomotive, oldest
Cash de [*] k, improved	Log-setting app., Schoffeld's 19 Lock for sliding doors	Vise, compound power 19 Vise, pipe, Beard's 137	Boiler explosions, cause	Comet, new, discovery of 149 Comet of 1883, first	Engineer's prophecies, marine 198 Engineers, surgical instruction 199 Engineers
Cephalometer, Brown's 25 Chair, invalid, Koenig's	Lock, nut, Waddill's 169 Locks, safe, guard for 217 Locomotives, old	Waren her state new (1	Bi lefurnaces, hot air for 209 Boilers and steam engines, early. 177 Boilers ato steam boy to fire	Comet of 1882, orbit	Ensilage and hay, chemistry 36 Eosine treatment gelat. plates 328
Chess player, automaton 103 Child, hairy, from Borneo 247 Coaling ships, apparatus 111	Locomotive, Peter Cooper's 224 Locust, giant 375 Lubricator for dynamos 89	Walls, embossing, Harding proc 66 War ship Lepanto	Bordeaux red, new color	Comets of 1883	Eryspens, remedy for 146 Ethylene in refrigerating 181 Evaporator, sugar, new*217
Cog link for chains, Aydelott's 73 Coin scale, postal, June's 71 Conductivity of sound, exper 263	M	Watch-crystal globe	Bosom stretcher, Gibson's	Concrete, hardening	Excavator, a large
Cork br' ding machine, Chennet's. 326 Corn planter, McDaniel's. 169 Corn planter, Bobinson's 40	Manhole packing	Water, carbonated, appar 306 Water heater, Webster's 354	Book cleaning	Cooking attach. for oil stoves*344 Cooper, Peter	Exhibition, electr., Vienna 185 Exhibition, fish, London 101
Corn planter, Voorhees'	Mice-gridled trees	Water jar, ornamental	Brandy, falsification of	Copper-zinc alloy, new	Exhibition, Interna., at Nice 408 Exhibition, railway appliances *384 Experiments, chemical, new 321
Cotton dropper, Michaelis'	Mills, corn, portable	Water traps, influ. storms 371 Wheel tire, improved	Brass, how to lacquer	Cork shavings for vinegar	Exploration in Florida
Cotton press, improved	Mothy sale, toy, notentriss	Windmill, Smith's 130 Woman, half, living 210 Wrench, Bradford's 51	Brewing, microscope in	Corn mills, portable	Explosions, coal dust
Cream from milk, app	Mould, rotary, for casting pipes. 4	Wrench, Giles'	Bridge, Brooklyn, accident*353 Bridge, Brooklyn, drag-rope 305 Bridge, Brooklyn, engine room*340	Corn planter, Robinson's *40 Corn planter, Voorhees	Extinguisher for lamps
Cut-off engine, Lambertville 82 Cut-off, gas, Hoard's	Napkin holder, novel 408	Y Yarn hanking machine	Bridge, Brooklyn, lighting	Corton-bale binder, Burr's*296 Cotton-bale binder, Burr's*344 Cotton chopper Michaelis' *98	Extractor, grease, air, etc., Wass' *87 F
D	Newspaper wrapper, Fay's 393 Nozzle for hose, Oyston's 35		Bridge, iron, over the Yazoo 89 Bridge, N. Y. and Brooklyn	Cotton planter, Patterson's 309 Cotton planter, Patterson's 409	Face powders
Dam, Ottawa River	Nozzie, hre-hose, ward's		Bridle attachment	Cotton seed, note on	Fabrics, textile, measuring app*246 Fangs of the rattlesnake 165 Farm machinery, care of 34
Denector for car windows	Nut-lock, Ford's	Figures preceded by a star (*) refer to illustrated articles.	Buggy bar-spring	Cough, dry, remedy for	Fats, melting point
Doorspring, Barlow's 73 Draught instrument 40	Oil cans, improved 232	A Abacus attachment for slates*180	Building, vigilance necessary 50 Buildings, high, and fires 400 Buildings, improved, in N. York. 400	Cradle and seesaw, Hill's	Fecal matter, treatment 209 Fence, portable, Alden*217 Feed water heater, Hoppes'*179
Dredge for Panama Canal 127 Dredged material, apparatus	Öll-gas áppár., Hirzel's 310 P	Academy, French, prizes	Bulbs, treatment of	Crow and snake	Feet, and proper shoeing 104 Feet, cold, simple cure for 177 Fence post, Smith's*179
Duck with three legs	Pantaloons protector, new	Acid carbonic, and bisulp. carb 386 Acid, salicylic solutions 182 Acid, sulphuric, to stop	Burnes and scalds, soda remedy. 184 Burner, gas, novel 120 Burner, oxyhydrogen, new*118	Culinary heater, Benson's	Fever caused by lemonade 48 Ferric oxalate, action 208 Fiber, vulcanized
E .	Parasols, Lockling's	Acid, sulphurous, in phthisis 33 Acid, uric, synthesis	Burners, gas, Clough	Current, the induced	Fiddle-strings, how made 276 Filaria, surgical operations for. 34 Files, resharpening 129
Electric light in surgery	Pelican, gulling the	Accumulator, an odoriférous 178 Accumulators, elect., chemstry 38 Accumulators in Paris	Butterfly larva, in Jurious 52 Butter-worker, Rigby's *25 Butter-fastening Wiggins' *7	Cutter heads, Shimer's *37	Filter, Hyatt's*192 Filter, Piefke's*259 Filters sponge improved *98
Electric mach., dyna., Gordon's 1 Electrical mach., Wimshurst's 71 Electricity, transmiss, power by, 223	Pile, constant current, new 391 Pile for galvano-cautery 194 Pines mould for gasting	Adirondack wilderness, the 64 Æolian harp, the*119 Æolian harp, how to make	C	Daguerreotype process, the 23	Finical finish
Electro-pulverizer, Mane's 246 Elephant, instantan, photog 9 Elevator, Goddard's	Planter, corn, hand	Aerial navigation	Cabbage worms, how to kill 21	Dairy industry in France 5 Dam, Ottawa River	Fire brigade, citizens'
Elevator, railway, hydraulic 178 Elevators for coaling ships 111 Embossing walls, Harding proc. 66	Plow, rotary, Betancourt's 105 Poke, animal, Thomas'	Air, combust. in coal gas	Cable, electric, Berthaud 180 Cable messages, how received 321 Cable stopper Lynch's *328	Deaf, making hear	Fire extinguisher, alum water a 68 Fire escape, Copeland's*246 Fire escape, Davie'.
Emery wheel, McLauglin's 377 Engine, cut-off, Lambertville 82 Engine, portable, two-wheeled 408	Post-hole boring machine	Air motor, Foster's	Calif weaner, Geissler's	Desks and tables, covering 354 Developer, gelat., restrainer for. 383 Develop rs, photo., new	Fire escape, Jolley's
Engine, the Peerless	Press, power, morgan's 169 Press, printing, Marinoni's 383 Pressure app. for water mains 389 Brotector for chostrical sectors.	Air, purifying, apparatus	Canal, Suez, enlargement	Diastase, influ. temperat. on 135 Dies and taps, hardening 248 Diet, effects of, vs. infection 86	Fire, how it sweeps wood'n house 37 Fire in theaters, protection 85 Fire in theaters, protection 85
Engine, vertical, Taylor	Pulley, Irvine's	Albumen, substitute for	Canes, material and manufact 327 Canvas for photography	Diffusion engine	Fire-place guard, Betts'
Exercising app., Worthington's 339 Extinguisher for lamps	Pulverizer, electro, Mane's 298 Pulverizer, electro, Mane's 246 Pump, Smith & Bigger's 134	Alizarine patents, expiration	Carbonic acid and bisul, carbon	Dimples, how made	Fires, inventions to prevent
Extractor, air, grease, etc., Wass' 87	Punching machine, Berry's 342	Aluminum coated iron	Carbon, disulph, purifying 198 Carbonated water apparatus	Disinfectants, the only sure 151 Disinfection and disinfectants 289 Distillation in vacuum	Fish and insects, new
Fabrics, textile, measuring app 246	Quadricyele for land and water. 374	Amalgamating, substances for 104 America, Central, discovery in 240 American Inst. Mining Frees.	Carbonic oxide in furnaces 199 Carbonic oxide, preparation 149 Carbonic oxide, preparation 148	Docks, dry, Erie Basin	Fishes, stripes of red blood in 105 Fishes, stripes of red blood in 105
Faucet, self-gauging, new 194 Feed water heater, Hoppe's 179 Fence, portable Alden's	Rail chair, Wodiska's	Ammonia from blast-furnaces 279 Ammonia in the air and rain 197 Ammonia still for gas works	Car coupling, Barber's	Doors and shutters, fire-proof 232 Doors, sliding, lock for*232 Drag-rope, Brooklyn Bridge 305	Fishway for the Potomac
Fance nest Smithle	Rail lifter De Bergen's	Ammonia test for 996	Car counling Metz's *105	Drainage and plumbing, house 6	Floride exploration 190

Fence post, Smith's 179	Itali muei, De Deigens ioe	Ammonia, test for 440	Car coupling, metz s	Drainage and prumong, nousers of	Florida, exploration 128
Filter, Piefke's	Rail mill engines 303	Ammonia vapors, antiseptic 33	Carcoupling, Graver's*164	Drainage of houses 8	Florida drainage, etc., progress. 19
Filters, Hyatt's 192, 195	Railroad crane, Farrel Co 183	Ammoniacal liquor, fertilizer 198	Car for transport. of live fish 120	Drawbridge safety switches 153	Flowers, action of poison on 18
Filters, sponge, imp 98	Railroad, Penn., station 287	Aniline black, dyeing with 88	Car signal, new	Drawings, chalk, indel 184	Flowers and insects
Fire brick, manufacture,	Railway, toy, Meier's 40	Aniline colors, adulteration, 65	Car, sleeping, improved	Dredge for Panama canal*127	Flowers, preservation (31)
Fire escape, Copeland's 246	Railway elevator, hydraulic 178	Animal poke, Thomas' *264	Car. street, electric	Dredged material, appar*310	Flour testing, app*214
Fire escape, Davis' 105	Railway signaling, electrical 376	Animal trap, Farley's	Cartraction, cable, Phila,	Driggs, Spencer B 121	Floods in Europe. 65
Fire escape, Jollev's	Rain-water separator, Roberts' 226	Animals as doctors	Cartridge implement, Darling's *360	Drill chuck, making 256	Floods in Ohio Valley 135
Fire escape, Sutphen	Reflector for lamps, Seele's 377	Animals, chlorophyl in	Cartrack Blackman's *135	Drill press as boring Jathe*134	Floods of 1993 great 161
Fire hose, nozzle, Ward's	Refrigerator, Blake's 162	Animals, marine, destruction 165	Car window deflector *201	Drill, rock, Chenot's 243	Floods senitary present ofter 177
Fire place guard Bett's \$5	Ribbon-holder, Mellette's 153	Animals, pelagic, put to sleep 290	Cars passenger fire proof 372	Drills, twist, sharpening mach *54	Floor fromoof Campbell's *50
Fish the paradise 231	Rock drill, Chenot's, 243	Animals pulse of 970	Cars scale revulving *307	Drive well patent, the	Floor freproof new *130
Floor fireproof Campbell's 50		Animals who nover soo day 185	Carriage shop fast work in 90	Divers, how they work 56	Floors neint for 149
Floor fireproof new 130	S I	Anthracito product Ponney] 19	Carrier for coal Cross? *70	Duck with three legs	Floors weekoned by ges pines 398
Flue-ston, Webster's 232	3	Antisentics and vol prod decay 264	Carts hand farm	Dust and germs, atmospheric *355	Flios place whore there are no 997
Flying maching Bayanarski's 87	Gad inon holdon (1	Anta doctmation of	Caro hardoning	Dust in the atmosphere 100	Flues, place where there are not. 221
Foundry ouncile Krioger's 146	Sad-frontholder. Hollowing 251	Ants ther act manage	Cash deals improved \$400	Dye, yellow, from onion neel 6	Fluorescence and chem.org.bod. 246
Emok's works Weyneshoro 150	Sate and lock company, donar's. 551	Ants utilize in borticulture 40	Casacina a holmot	Dyes, latest improvements in 167	Flue-stop, webster s
Emit nielton Simiting 220	Saturator, the cascade	Allus, utiliza, ill liorticulture 49	Cattle billing by electricity 194	Dyeing with aniline flock 88	Flying
Fruit picker, Simkins	Saw, band, Clement's	Apprentices to mechan. trades 304	Callulaid billiand balls	Dynamite 278	Flying machines
Fuel, economizer, Orvis	Saw-hing machine, Roth S 0	Archæological discovery, Asia 121	Centuloid billiard paris	Dynamite nile driving by 183	Flying machine, Baranowski s +61
Furnace, bagasse, Hins	Saw, hand, attachment, winter's. 264	Archæological discov. Mexico 184	Cement for leather (51) 28	Dynamos Jubricator for *20	Fog at sea, sarety in 160
Furnace, cruciple, Flat's	Sawing machine, Olsen's 243	Archer nsh, the 199	Cement for leather 892	Dynamos, rubricator 10105	Forest, a monarch of the 181
Furnace reeu, Allens	Saw mill head-block 66	Arizona, elect. light on	Cement for ore on wood (18) 235		Forges and blowers, Buffalo Co +175
Fuse cutter, Picking's, 312	Saw mill, Taylor's 63	Arlberg tunnel 340	Cement, fire proof (58) 28	E E	Foundation streng thening 312
~	Saw mills, Frick & Co.'s 163	Armatures, the bursting of 240	Cement, glass and metal (32) 267	T	Foundry curola, Kriegar's*146
G	Saws, guide for, Sadler's 344	Armor plate trials, recent 23	Cement, Iron, gas from 360	Ear, removal of objects from 276	Foundry, poisonous vapor in 53
	Scale, coin, postal, June's	Arsenides, formation of 311	Cement, rust, for iron (26) 347	Earth a great magnet 104	Fowls. an internal mite in 241
Galvano-cautery, pile for 194	Science, side show 151, 210	Art, decorative, suggestions*211	Cement, to render air proof 326	Earthquakes and pagodas 68	Foxes, flying, Australia 161
Garments, app. to measure 185	Scoop balance for scales 40	Artesian wells, Colorado 280	Cemetery, prehistoric 296	Eclipse expedition, American 393	Food preservatives 261
Gas cut-off. Hoand's 57	Secretary, new 408	Artesian well, Denver 201	Center-board, Christensen's*312	Eclipse of sun May 6 208	Freckles, removal of 296
Gas engine, New Otto 102	Seeds and galls, jumping 228	Artillery. Engl. and Egyptian 83	Centena ian, a scientific 211	Eclipses of the sun 133	French Academy prizes 352
Gas motor and refrigerator 230	Seed sower, Heady's 115	Artillery experiments at Spezia. *79	Cepholometer, Brown's *25	Eclipse, solar, reports of recent. 401	Fruit, American, for England 121
Gas producer, Dowson's	Seesaw and cradle, Hill's 201	Artist, what is an ? 97	Chalk drawings, indel	Education for mechanics 192	Fruit, evaporation of, 229
Gas works, ammonia still for 98	Sewer-gas trap, Williams' 7	Asbestos balloon, an 102	Channel tunnel machine 11	Electric cable, Berthoud 180	Fruit picker, Simkins'*360
Gate, automatic, Wheeler's 41	Shaft loop, Wagner's 40	Aspects of the planets, March, 129	Chains, cog-link for, new *73	Electric currents, weak 66	Fuel economizer, Orvis'*387
Gate, ornamental 211	Shaft loop, new	Astronomical Soclety, Amer. 64, 367	Chair, invalid, Koenig's*312	Electric discovery, latest 121	Fuel, orange peel 392
		,	, ,		

412

Scientific American.

		Mismuch et al.		Oler Mark	
r ucnsuas	Inventions, age of	Microscope in testing timber 205 Microscope use in brewing	Plants, how to dry	Steep, nints on	Tin plate, crystallizing (57) 28 Tin plate, increasing use
Furnace, crucible. Plat's	Inventions, bogus	Mile, nautical, length	Planter, corn, hand	Shellac, refining	Tinning agents, new
Furnace inings, basic	58, 74, 90, 106, 122, 138, 218, 239, 205, 297, 318, 329, 345, 361, 378, 394. Inventions, electr., 2,000 in year., 136	Mills, corn, portable	Plates, gelatine, eosine treat 325 Plates, gelatine. intensifier	Ship of war, Chinese	11re, wheel, improved
Furnaces, blast, ammonia from 279 Furnaces, boiler, hot air for 209	Inventions, index of 410 Inventions, mechanical, 10, 26, 42,	Miller, a good old	Playfellows, two strange	Ship, wooden, building, Maine 10 Ships, coaling, apparatus	2 Tomato flour
Furniture Exhibition, London 388 Furniture manufacture	53, 14, 50, 106, 122, 135, 154, 110, 160, 202, 218, 233, 249, 265, 281, 297, 313, 329, 345, 361, 378, 394.	Mines, electric motors in	Plow, double shovel	Shoe polishes, novelties	Tools, hand in schools
G	Inventions, miscellaneous, 10, 26, 42, 58, 74, 90, 106, 122, 138, 154, 170, 186, 202, 218, 233, 240, 265, 281, 297	Mineral veins, formation 210 Mineral wealth, Arizona's 195 Minerals mystery of 202	Plumbers, caution to 148 Plumbing and drainage, house	Shot, iron for making	Torpedo boats in collision
Galls and seeds, jumping*228 Galvanic battery, Parkhurst's*5	313, 329, 345, 361, 378, 394. Inventions, new results 164	Mining experts	Poison, rattlesnake, remedy 340 Poisons, action on flowers 48	Signal, car, new	Torpedo the Lay
Galvano-cautery, pile for *194 Galvanoplasty, nickel in	Inventions, railroad	Mint, British, work in	Poke, animal, Thomas'*264 Pole, fence and telegraph *296 Polynhomus, the	Silico-copper electric wire	70y money-safe, Hotchkiss'*150 Toy railway, Meier's*40 Trace-buckle, Butler's *217
Gardening, railroad. 280 Garments, app. to measure*185	*169, *185, *200, *217, *232, *248, *264, *280, *296, *297, *328, *344, *260, *298, *296, *297, *328, *344,	Money safe, toy, Hotchkiss' *150 Molecular vibrations	Polytechnic Institute, Rose 327 Poisons, Chinese	Silver, nitrate, effect on skin 330 Silver, radiation of 400	Traction engine, Nixon's
Gas and coke as heating agents. 146 Gas and elec. light, combined 403	Inventions to prevent fires 148 Inventor, aged, gone	Monument, the Washington 25 Mosquitoes vs. malaria	Pork, Amer., in Europe	Sixty hours in the water	Train, cost of stopping
Gas burner, the Clough	Inventors and inventions 131 Inventors and patents	Mortality of New York city 152 Mortality of Paris 181 Moths, clothes	Post-hole boring machine*166 Posts, setting of, influ	Sky, starlit, February	Trains, electric light on
Gas consumption, Berlin 305 Gas cut-off, Hoard's	Inventors, lack of encour'm't to. 83 Inventors, more work for	Motor, air, Foster's	Potato digger, Dutcher's *22 Potatoes, diseased, utilization 280	Sloth, giant, in Iowa	Tramway, wire rope, automatic. 183 Transfer process. Henoque's 41
Gas flame, light given by 305 Gas for nothing 210	Inventors, the world's	Mould, rotary, to cast pipes *4 Moulding cutter instrument *89	Potatoes, native	Snake bite shock from	Transplanting instrument*169 Trap, animal, Turley's*217
Gas from iron cement	Iron, aluminum coated	Moxa, a. 115 Mucilage, Fecipe for	Power, transmiss. by electr*238 Power vs. hand-drilling	Snake post mortem on	Trays, improved, Vreeland's*377 Tree, oldest in the world
Gas generator, economical 185 Gas, illuminating, Russia 194	Iron, cast, testing	Mungoose, the, in West Indies 178 Museum for merchants	Press, power, Morgan's	Snow balls, storm of	Trees, mice-girdled
Gas mains, new use for	Iron. best paint for	Myriopod, prussic acid in 165	Press, printing, Marinoni's *383 Pressure app. for water mains*339 Printing by electricity	Soap, glycerine, transparent	Tricycle, Columbia
Gas motor and refrigerator*230 Gas, natural. remarkable vein 132 Gas pipes, floors weakened by 828	Iron columns, solid and hollow 177 Iron, effect on digestion 121 Iron for making shot	Noji makara English 900	Printing, photo, process	Societies to promote thrift 65 Society of Arts prizes	Trireme, Athenian
Gas producer Dowson's	Iron, galvanizing (24)	Naphthaline for agricult. uses 228 Napkin holder, novel	Projectiles and guns, modern 341 Protector for electrical conduct.*377	Sola manufacture, improved 121 Solar system, formation 201	Tubes, wrought iron, improved. 99 Tumor, an enormous
Gases, specific heat	Iron, pig, American, 1882	Natural history notes41. 165, 327 Navigation, aerial	Protoplasm	Solder, useful kind of 277 Solder, soldering and brazing 389 Solids, volatilization of 279	Tunnel building, improved
Gate, automatic, Wheeler's *41 Gate, ornamental*211 Gauge, McCullough's	Iron, providing, with bronze 401 Iron, zinc costing for	New Jersey geologist, report 257 Newspaper wrapper, Fay's*393 Nerves, effect electric op 185	Pulverizer, electro, Mane's *246 Pulley, Irvine's	Sounding. Atlantic, deepest 152 Speech, photographing 120 Spinning, cure for 114	Tunnel, Hudson River
Gelatine emulsions, new 259 Gelatine plates, eosine for 328 Colatine plates, interpreter	Isometric governor, the*147 Isovanilline	Nettles, cloth from	Pulley, split. Sanborn's	Spring, door, Barlow's	Turning tool, hand, new *73 Turtle, a large
Geologist, New Jersey, report 257 Germs and dust, atmospheric*355	J	Nitrogen, liquefaction of	Pumps, feed, air extractor	Starch, direct fermentation 3 Starches, tumefaction of	Twist drills, sharpening machine *54 Type, artistic
Germs in water, new test for 115 Gila monster	Jack, wagon, Furman's	Nitro-glycerine, force of	Punching machine, Berry's*342	Stars, scintillation of 405 Station building, C. P. R. R. 51 Statue of Liberty, the	U
Girls should exercise	Jails, safety wall for	Nut arbor, Duffy's*390 Nut lock, Bell's*7	Q	Statue of Liberty, erection*322 Statue of Liberty, placing	Ulcers treatment of
Glass-blowing machine	Jupiter, red spot on	Nut lock, Waddill's *169	Quarrying, progress of 227	Steamboats, Am., sweep the wild 71 Steamers, large, N. Y. and Liver. 385	Use and sale prior to patent 79
Glass-cutting frame, new *73 Glass, drilling	Kangaroo and onossum 165	Oak nicture in heart of 259	R	Steam boilers, how to fire 81 Steam engine, the 242 Steam engine and the telegraph. 84	Valve steam, balanced *40
Glass, plate, manufacture	Kerosene as an insecticide	Obelisk, Central Park181, 203, 229 Ocean waves, height of	Rabbit plague, Australia	Steam expansion, immoderate 35 Steam engines and boilers, early. 177	Valves, steam eng., how finished 81 Vapor, poisonous, in foundry
Glass varnish	Knight, Edward H	Oil blacking for shoes (5)	Railroad crane, Farrel Co*183 Railroad gardening	Steam plowing in Scotland	Varnish for foundry patterns 405 Varnish, water, to make
Glucose in sugar, estimation 217 Glucose, is it wholesome ? 161 Glycerine soap, transparent 37	Krupp's works at Essen	Oil gas apparatus*310 Oil, illuminating, Bakuol	Railroad law, a case of	Steam, specific gravity	Varnishes, colored, for tin 3/4 Varnishes, novelties in 150 Vegetable coloring matters 52
Gold bar, a large	Latels for plants 185	Oil on troubled waters	Railroad, Pennsyl., station*292 Railroad station, C. P. R. R 51 Railroad switch Farks *299	Steamer City of Brussels, loss 84 Steamer City of Fall River*271	Vegetable, medicinal value 359 Vegetable substit. for rennet 165 Vebicle avle Maronev's *105
Gold, float, catching	Lacquer, an elastic	Oils, action of metals on	Railroad, the largest	Steamer, ocean, fast	Vehicle tops, hood for
Gold lace, nickel wire in 105 Gopher attach. to cultivators*217	Laboratories. physical, French. 369 Lake, ancient, California	Opossum and kangaroo 165 Opossum hunting, Australia 69 Ore iron a four mile deposit 96	Rail transportation	Steamship Oregon, new	Ventilation of houses
Gopher, pouched	Lambs, blood diet for	Ores, low grade, working 264 Oregon, steamship, new	Railway appliances, exhibition 384 Railway bracket girder	Steel and cast steel	Vibrations, molecular
Goods, examining, machine*226 Greely Colony relief party	Lamp for loco. head light *291 Lamp, safe safety	Ostrich, incubation of	Railway construction, 1882 149 Railway construction, 1882 244	Steel, case hardening	Vise, compound power
Grindstones	Lamps, electric, manufacture*404 Lamps, oil, Maxim's*296 Lantern, Fisher's *406	Oxygen, burned in hydrogen 69 Oxygen, compound	Railway corporations, duties 69 Railway curves, resistance on 303 Railway, electric, Ireland 24	Steel, hard, sawn with sand 17 Steel, hardening 308	Volta prize, the
Guns and projectiles, modern 341	Lantern illumination*118 Lanterns, improvements in*406	Oysters, Huxleyon	Railway elevator, hydraulic*178 Railway Exposition, Chicago 280,*286 Railway, L. & N. W., steel way*274	Steel, magnetization of	Werron how state now *41
Guns, flint lock 131 Gunpowder engine 4	Loughlin, James, L	P	Raiway propulsion, novel	Steel plates, long	Wagon jack, Furman's
Hard woods for house finishing 391	Laver bread	Paint best for iron	Railway, St. Gothard	Still, a mmonia, for gas works *98 Stock raising, pure bred in	Wall of China, great
Hammer, Balley's *7 Harness loop, Pott's *121 Harness Loop, Pott's *121	Lease, fulfilling covenants in 197 Leaves, dried, as food	Paint for floors	Railway, toy, Meier's	Storms and gales	Walls, baking, old mode 117 Walls, embossing. Harding proc. *66 War ship Lepanto *342
Harp, the Æolian	Lemonade, fever caused by 48 Lemonade sug ar, effervescing 184	Paintings, rebacking of	Railways, street, United States. 21 Railways, underground, Lond 305 Ramie, carding and bleaching 376	Stoves, oilcooking attach 344 Stove-pipe fastener, Huttinger's 212 Strontia beds Sicily *38	Wart and corn cure
Harrow, Thronson's*377 Hat-holder, Lindsey's*198 Hay and ensilage, chemistry 36	Lepanto, the fron-clad	Panama Canal, dredge for*127 Pantaloons protector, new*89 Paper and envelope package*408	Rainfall. Isthmus Panama 386 Rain-water separator. Robert's*226	Studio, perils of	Waste pipes, test for
Hay is king	Letter copying, improvements	Paper bag holder, Kenyon's *137 Paper chimney	Rattlesnake, diamond 259 Rattlesnake, fangs of the 165	Sugar, adulterated, test	Watch-crystal globe
Head-wear protector	Lid for pots, Connelly's*312 Light, carbureted incand. gas 162 Light, elect incand inventor 114	Paper from bark	Ready made house industry 116 Recipes, useful 37	Sugar, Japanese	Watch regulator, Hoffman's *40 Watches cleaned with benzine 215 Water, analysis of
Heart disease, treatment	Light, electric, in surgery*231 Light, electric, on Arlzona*358	Paper, incombustible	Reflector for lamps, Seele's*377 Refraction, measuring, mode 153 Refrigerating, ethylene in 181	Sugar of milk, manufact	Water, boiler feed, softening 162 Water, carbonated, apparatus*306 Water distilled flicture
Heater and oven, Lindsay's	Light given by gas-flame	Papers, wall, and decorations 277 Papier mache, process, new 119	Refrigerator, Blake's*162 Regulator, watch, Hoffman's*40 Reprot, vegetable substitute 11/2	Sulphuric acid, to stop	Water pas from retorts
Heater, feed-water, Hoppes'*179 Heater, water, Webster's*354 Heating and lighting systems *290	Lighting and heating, systems *290 Lighting Brooklyn bridge 129 Lighting by battery	Paradax, a physical	Repulsion, experiment in	Sun, constitution of	Water heating apparatus *22 Water jar, ornamental
Heating by acetate soda	Lighting streets, elect. and gas 256 Lightning conductors	Paralýsis, general	Reticulated struct. living mat 153 Rheumatism, wintergreen oil in. 246 Rhizopoda and infusoria	Sunday in New York city 321 Sunflower, value of 292	Water, maximum density
Hektograph, composition (21) 76 Heteranthera, stamens of 327	Lightning, curious effects of 96 Lightning in January	Parcel post, English	Rhus cotinoides, rediscovery 41 Rice, nutritive property 52 Ribbon holder, Mellette's	Sunflowers, heliotropism in 74 Superintendents, good, mat.for. 171 Surgery, electric light in	Water power of N. Carolina 115 Water rats, none in Ireland 387 Water rights meintained
Heliotropism in sunflowers 41 Heloderma horridum	Lime light, subst. for hydr. in 179 Lime juice for diphtheria 147	Paste, label (18) 362 Patent case, telephone, status. 136 Patent, giving notice of 80	Roads, Macadam	Surgery, successful	Water supply, city and town 130 Water supply, N. Y. increasing 112
Henry, Prof., in bronze 227 Hog disease, remedy	Lock for sliding doors	Patent infringement, damages. 53 Patent law, amend., England 168 Patent Office, past year in 07	Rose Polytechnic Institute 327 Rubber goods, gossamer, infr 372	Switch, rainoad, Fay's	Water supplies, sites 10r 192 Water traps, influ. storms*371 Water, troubled, oil on
Hops, economy in	Lock, nut, Waddill's*169 Locks, safe, guardfor*217	Patent Office surplus fund 127 Patent, paper dummy, invalid 131	Rubber shoe manufacture	system, lack of 386	Water varnish, to make
Horse, selecting a	Locomotive engineer, oldest 180 Locomotive fire boxes, Amer 164	Patent right, failure to develop.	Ruled lines, visibility	■ Tables and desks, covering 354	Waxwing, Bohemian
Hose nozzle, novel *35 House, ready made, industry 116 Houses, apartment. N. Y	Locomotive lamp*291 Locomotive raised from river 342 Locomotive, English	Patented machines, sale Patented machines, sale Patented Patents, pearl, in cloth Potented Patents, artificial alizarine 72	S	Talking head, the *210 Talking 1,000 miles 241 Tannin, estimation of 18	Weeds, lawn, eradicating 393 Wells, artesian, Colorado 280
Houses and homes in N. York 376 Houses, incombustible	Locomotives, fast, Vanderbilt on 35 Log-setting app., Schofield's *19 Logust giant *275	Patents, asst. commissioners 53 Patents, decisions relating to 16,	Sad-iron holder	Tanning appar., Reimer's	Weight, increase by combustion. 69 Whale skeleton for Smithsonian. 280 Wheat for twenty-five years 276
Hood for vehicle tops	Loon, the	Patents, legal construction,	Safes, fire and burg ar proof*356 Safety devices for vessels 196	Tartaric and critic acid, sep 309 Tax reductions. important 161	Wheel tire, improved
Human monkey, Krao 89 Human storage battery 264 Hydraulic silica	Loop. shaft, Wagner's	Patents, inventors and	Sanara Sea, proposed	Taxidermist, Soc. American	White lead maker, pioneer
Hydrogen, absorption	Lubricator for dynamos	Pencil holder, Eybel's*105 Perfume, violet powder	Salt field, new, New York 133 Salt, mfr. at Turk's Island 277 Sand dune remerkable	Tea and coffee from guano 21 Teeth, Russian	Wind, force of the
Hydrophobia, treatment 198	M	Petroleum emgine, Brayton 352	Sandaken Harbor, Borneo 102 Sanitary precautions after floods. 177	Telegraph pole, Brown's	Wine ferments 401 Wines, test for 393 Wintergreen oil for the methods 246
Ice bridge, Niagara,	Machinery, aid to labor	Petroleum benzin, purification 405 Philosopher's boyhood, incid. in. 241	Saw account remarkable 145 Saw, band, Clement's	Telegraph, time by	Wire, nickel, in gold lace 105
Ice machine, Giffard's	Machinery, future of	Phosphate, West Indian 290 Phosphorescence in animals 392 Photo developers, new 56	Saw-fish, use of saw in	Telegraphy in Europe	Wires, electric, underground
Ice plant, the 120	Magnetic field, luminosity 321	Photograph of comet's tail 113	Saw mill, Taylor's	Telephone, decision, import 65	Wires, underground

[JUNE 30, 1883.

Ice machine Giffard's *49	Machinery, future of	Phosphate, West Indian 290	Saw-fish, use of saw in 165	Telegraphy in Europe 185	wire rope tramway, automat. 183
Ice machine Perkins' *34	Magnesium, separation	Phosphorescence in animals 392	Saw, hand, attachment, Winter's, *264	Telephone. Bennett *328	wires, electric, underground*134
Ico machine Windhauson *4	Magnet, the earth a great 104	Photo developers, new 56	Sawing machine, Olsen's*242	Telephone, progress 261	Wires, electr., susp., perils of 16
Ice plant the	Magnetic field, luminosity,	Photograph of comet's tail 113	Saw mill, Taylor's *63	Telephone, decision, import 65	Wires underground
Teo storage for family use 93	Magnetism and heat 227	Photographic emuls., formulæ 3	Saw mills, Frick & Co.'s*163	Telephone, home-made 130	woehler, death and burial 2
Lee trade of New York 134	Magnetism, theory of	Photographic notes	Saw guide for, Sadler's*344	Telephone, inventor of the 245	Wolf, the zebra 113
Illuminating agonts golid 148	Magnetization of iron	Photographic hints and wrinkles 290	Sawyer, W. E., death of	Telephone patent case, status 136	Woman, half, living *210
Infraoria and reigonoda	Magnetization, influ, temperat 33	Photographing the vocal organs, 400	Scalds and hurns, soda remedy, 184	Telephone, problem of the 96	Wood, consumption of 120
Indelible popula (7) 966	Malaria 373	Photographing speech 120	Scale cars, revolving. *307	Tetephone receiver, Rets *136	Wooden vessels, taste, removal. 340
India rubbor ocour carmors 59	Man's invisible foes 360	Photography, canyas for 135	Scale, coin postal June's *71	Telephone, receiving *73	Woodpecker, the*311
Indian holes Lake Goorge 117	Manhole nacking *72	Photography, early history 23	Scales, scoop balance for *40	Telephone, swearing by 209	Woodworking shop, Frick's*163
Indigorition and discosso	Manufactures Amor N Zogland 392	Photo printing process 181	Schooled but not educated 144	Telephone the first *244	Work, don't be afraid of
Indugestion and disease	Manufacturing Interests Amer 165	Photo prints, enameling, 307	Science popular 127	Telephone 650 miles by	Work, good, does t pay? 256
Industries, American	Man who sweers off how to beln 115	Phthisis sulphurous acid in 33	Science side show *151 *910	Tolephonog Derig reid on	Workers, education for 278
Industries, small, importance of	Marbo Vormont 25	Physics without annaratus *963	Seience solomn 985	Telephonie experiments 0	Working people, condition, 1784., 216
Injector, the exhaust	Magdowallig chimeera *215	Pickerel the.	Scott General of England 944	Telephoning long distance 45 161	Worm, cotton, hibernation
Injector, wneeler's	Mason William death of	Picture in heart of oak 256	Scoon balance of conlor \$40	Telephoning long distance a 100	Worm, spruce-tree, ravages 272
101K, DIACK (21)	Matches composition (10) 235	Pictures Louwre how alogned 50	Son of Sahara proposed 204	Tollumon Spicowa *51	Worms, Cabbage, how to kill 21
Ink, black, cheap 161	Matches, composition (19) 200	Pilo constant current now *201	Sea of Sanara, proposed	Tenurian, Spicer's	Worms, Nottingham 194
Ink, copying (35) 547	Matches, composition for (20) 200	Pilo driving by dynamito 189	Sea, salety at, in rog 100	Theatara protoction agat find	World, new, genesis
Ink for marking bales (24) 285	Meat preserved by aqua regia 210	Dile for colyone contony \$104	Seastonness, a cure for	Theaters, protection ag st fire 65	Wrench, Giles'
Ink for printing stamps (20) 314	Meat sale, portable	Diro mbat is a 2	Seaweed, Japanese	Thermometer, balanced	Wrench, pipe, Coleman's *377
Ink, invisible, new	Mechanics' apprentices	Ding Vollow exerting arrest 900	Seals in Long Island Sound 257	Thin coupling, Beebe's	Wringer, the before Congress , 128
Ink, marking, dark blue 296	Mechanical trades, apprent/ces 304	Pine, yenow, quarter sawed 280	Secretary, new	Inrashers, steam 100	the angle is a set of the set of
Ink, writing, concentrated 181	Mechanics, unsuccessful 342	Pipe-vise, bearu's.	Seed sower, Heady's	Throat complaints, app. for +21	v
Insane, care of the 80	Medal of honor 177	Pipes, rotary mould for	Seed tester, a 211	Inunderstorm in New York 505	
Insects and fish, new	Medical ethics, progress 80	Pipes, steam, underground	Seeds and gails, jumping*228	Tides on Bay of Fundy 7	Vecht builden femous 69
Insects and flowers 389	Medicines, patent, Japan 892	Pipes, waste, test for 201	Seesaw and cradie, Hill's*201	Ties, railway, preservation of 9	Vankoo in the South
Insects and plants 241	Messages, cable, now received 321	Pipes, water, steel 155	Senses, easy deception	Timber, preservative treatment. 116	
Insects as food for man 376	Metals, action on oils	Plagues and pestilences 132	Serpent's eggs, composition (14) 91	Timber, American	Yarn nanking machine
Insects, flesh-eating*279	Metals, scale of bardness for 404	Planets, aspects for April 193	Sewer-gas trap, Williams' 47	Timber, spearing for 370	Yeast, preservation
Insecticides, petroleum emuls 3	Meteor in Italy, remarkable 261	Planets, aspects for February 49	Serpents, extermination of 225	Timber, testing, microscope in 70	reast, preserva by cold 252
Intensifier for gel. plates56, 352	Meteorin Mexico 181	Planets, aspects for June 355	Sewing machine, scope of 88	Time, railway, unifor 279	-
Inventions, agricultural, 10, 26, 42,	Meteors 22	Planets, aspects for May 257	Shart loop, Wagner's *40	Time by telegraph	Z Z
58, 74, 90, 106, 138, 154, 170, 186, 202,	Mexico, archeol. discoveries in . 184	Planets, aspects for July 401	Shark, a gigantic	Tin, cans and foods 341	
218, 233, 249, 265, 281, 297, 313, 345,	Mica prisms 197	Plant-100d, chlorine as 247	Shavings, apparatus to feed *34	Tin cans, old, utilized 278	Zebra wolf, the 113
361. 378. 3:4	Micrometer machine, Perraux's. *47	Plants and insects 241	Shears, grubbing, Durham *40	Tin discoveries, Alabama 7	Zopallo fruit 354
	•	•		A CONTRACT OF	

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