### A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LII.—No. 18.

NEW YORK, MAY 2, 1885.

\$3.20 per Annum, [POSTAGE PREPAID.]

# EXHIBITION OF PUMPING ENGINES BY C. H. DE LAMATER & CO. AT THE NEW ORLEANS EXPOSITION.

The accompanying illustration shows the exhibit of pumping engines manufactured by the De Lamater Iron Works, foot of West 13th Street, New York city. It is particularly noticeable on account of showing the great variety of pumping engines manufactured by this one firm, which extends from the smallest practicable hot air pumping engine to the largest size steam pump

These works for several years past have been extensively engaged in the manufacture of pumping engines of every variety. They have given pumping engines for domestic use a vast amount of attention, and their exhibit attracts very much notice for this reason, as it contains several machines designed for that special purpose, and they all show the result of skill and thought combined with the knowledge of the varied requirements of the numerous conditions of water supply and the duties to be performed by domestic pumping engines. These pumping engines use atmospheric air for a motive power. The air is alternately compressed, heated (which expands it, thus furnishing the power), and cooled. The same air is used over and over continuously. There is no exhaust or noise of any kind, and there are no valves in these engines, except in the water pump.

Of these hot air pumping engines exhibited there are two varieties, styled respectively the *Ericsson* and the *Rider*. The *Ericsson* hot air pumping engines, which have been widely introduced within the last few years, are built, as are all the pumping engines manufactured by this firm, under a very rigid system of gauges, which makes the parts perfectly interchangeable, and they are made in such quantities that the cost of one of the smaller sizes comes within the reach lower end, where it is instantlations from thus furnishing the power. The hot air engines, is only single and of the fly wheel continues the ceives an additional impulse be above mentioned conditions, we revolution. The same air is used to cooled, compressed, heated, a gular order and without noise.

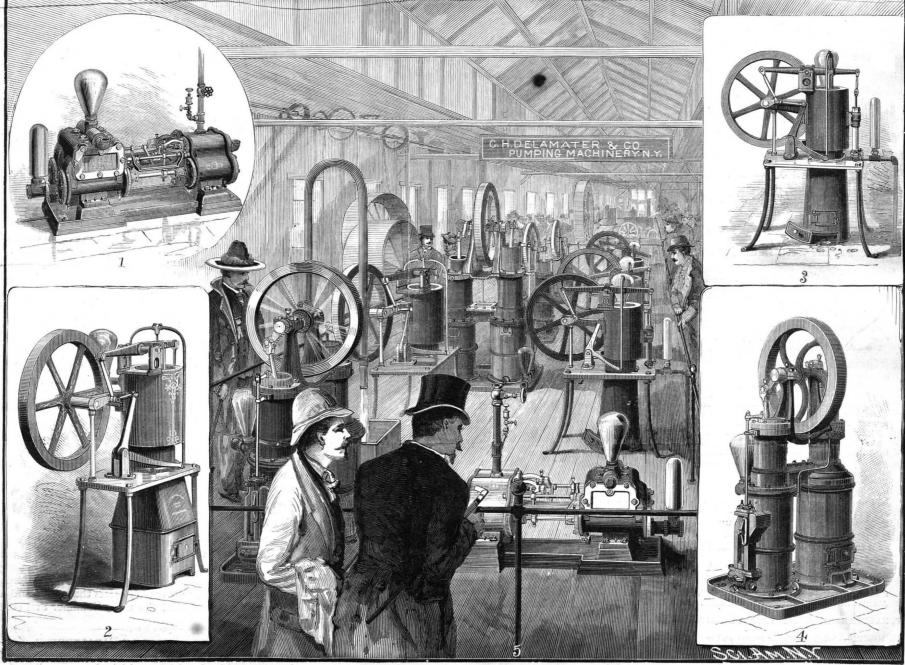
of even the smallest property owner. They are particularly adapted for use in private dwellings, and, as they can be operated by either a gas jet or a wood or coal fire, they are among the most complete and convenient, as well as the cheapest, arrangements for raising water.

The *Ericsson* hot air pumping engine is a single cylinder engine in which are two pistons, one called the "main" or air piston, which receives and transmits the power, and the other is called the "transfer" piston, the office of which is to transfer the air contained in the machine alternately, and at the proper time, from one end of the cylinder to the other.

The cylinder is provided at its upper end with a water jacket, through which all the water passes on its way from the well to the tank. This keeps the upper end of the cylinder cool, while the lower end is exposed to the fire and becomes as hot as is practicable to make it. By the peculiar arrangement of connections between the air and transfer pistons, the proper relative motions between these pistons are obtained. The operation is as follows: After the lower end of the cylinder has been sufficiently heated, which usually takes only a very few minutes, the engine must be started by hand, by giving it one or two revolutions. The air contained in the machine is first compressed in the cold part of the cylinder; it is then transferred to the lower end, where it is instantly heated and expanded, thus furnishing the power. This engine, like all other hot air engines, is only single acting. The momentum of the fly wheel continues the revolution until it receives an additional impulse by the repetition of the above mentioned conditions, which occur once in every revolution. The same air is used continuously, and is cooled, compressed, heated, and expanded in the re-

Figure 3 in the illustration shows one of these engines with a furnace adapted for burning coal, and Fig. 2 the same adapted for burning wood. Several of these engines are now at work in suburban residences, using wood for fuel, and the owners speak of them in the highest terms. As the furnace is small, the chips from the wood-pile can be used, and the fuel really costs nothing. For use in cities where a gas supply can be obtained, and the water has not sufficient force to flow to the tops of the houses, they are arranged with a gas furnace, as shown in Fig. 5. We are informed that this firm has sold in New York city alone several thousand of these engines, which are so simple and safe that their care is usually intrusted to the hands of the cook or the coachman. A great many suburban residences are unfortunately situated with respect to obtaining pure water, and the owners are obliged to resort to very deep wells, being often compelled to sink artesian wells to a depth of several hundred feet in order to obtain pure water for cooking and drinking purposes. One of these engines at the exposition is provided with a very neat and suitable device, by which the pump can be lowered down into the well a sufficient depth to reach the water, the engine standing on the surface, where it can be easily attended to.

Figure 4 is an illustration of the *Rider* Hot Air Pumping Engine. For the present these engines have only been adapted to using either coal or wood as a fuel. They are somewhat more expensive than the engines previously mentioned, and are intended to do more severe work. This style of engine is extensively used in the large flat houses in this city, and also in the numerous summer hotels at the watering places in all parts of the country, and great numbers of them have been exported to different foreign countries. They are (Continued on page 277.)



EXHIBITION OF PUMPING ENGINES BY C. H. DE LAMATER & CO. AT THE NEW ORLEANS EXPOSITION,

# Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

#### TERMS FOR THE SCIENTIFIC AMERICAN.

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies a same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

#### The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with Scientific American. Terms of subscription for Supplement \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.-The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

#### Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies, 50 cents. [37 Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

#### NEW YORK, SATURDAY, MAY 2, 1885.

#### Contents.

(Illustrated articles are marked with an asterisk.)

Air power, compressed	Hollow vs. solid shafting. 279 Inventions, agricultural. 281 Inventions, engineering. 261 Inventions, engineering. 261 Inventions, engineering. 261 Inventions, mechanical. 281 Inventions, miscellaneous. 275 Notes and queries. 276 Oler for crank pin*. 274 Oil stoves, distributor for. 276 Paper filter, toughened. 275 Planets for May, aspects of. 280 Planter, potato and tree*. 274 Pocket and cap, detachable*. 276 Potato and tree planter*. 274 Power hammer, Vulcan*. 275 Pump double geared*. 275 Pump double geared*. 275 Pump ing engines, exhibition of. 271 Rust event. 272 Shafting, hollow vs. solid. 279 Steamer, a great. 276 Telegraph, Phelps'. 275 Torpedofboats, new. 275 Torpedofboats, new. 277 Trade mark and label registration 272 Vulcan power hammer*. 273 Waterworks, Columbus. 263
Healing by faith	

#### TABLE OF CONTENTS OF

#### THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 487,

For the Week Ending May 2, 1885.

Price 10 cents. For sale by all newsdealers

PA	AGE
I. CHEMISTRY.—The Production of Ammonia from the Nitrogen of Minerals.—A paper read before the Society of Arts by Mr. Geo. Bellby, and discussion following the same.—3figures	7778
II. ENGINEERING AND MECHANICS.—Timber Dry Docks.—The advantages of timber over granite docks.—2 engravings	7768
Military Ballooning.  The Corvette Alexandrine of the German Navy.—With engraving.  Improved Anchor Gear.—4 figures.  Heating Buildings by Steam from a Central Source.—By J. H. BARTLET.—Apparatus required, street mains, expense, etc.—With map showing the heating system of New York, tables, and two fig-	7771 7771
Concrete as a Building Material.—By Thos. Potter.—A paper read before the Society of Architecture.	
III. ELECTRICITY, ETC.—The Thermomicrophone	
IV. ART AND ARCHÆOLOGY.—Sixteenth Century Helmets and Armor.—2 engravings.  Mexican Archæology.—The bronze age.—Specimens of pottery, statues, jade, etc.—Characteristics of their art.—In Central America.	
America	

VI. MISCELLANEOUS.-Winter Scenes on the Brocken.-6 engrav-

#### TRADE MARKS AND LABEL REGISTRATION.

In former issues of this paper we have discussed and criticised the action of the Commissioner of Patents, in refusing label registration to what he judged to be proper subjects for protection as trade marks. The case of the Willcox & Gibbs Sewing Machine Co. was practice of the Office should be based. This decision, together with another unreported case, in which a mandamus was granted, sufficed to change the practice in the days of Mr. Butterworth's predecessor, and we held that it should have been the rule for his action

The Commissioner named above held that the opposite interpretation of the statutes was the true one, and believed that the Patent Office authorities should act as judges of the character of the device submitted for registration. To sustain this position, the text of the statute was appealed to. The refusal to comply with the rulings laid down by the Supreme Court decisions in the Willcox & Gibbs and Schumacher & Ettinger cases was justified on the grounds that the case had not been fully presented by the former Commissioner, his counsel. This was equivalent to saying that the cases alluded to went by a sort of default. The fallacy of this suggestion of default is shown by the fullness of the opinion rendered in the one now reported, the Willcox & Gibbs Sewing Machine Co.'s application. It was unusually long, and showed how thoroughly the case had been studied by the judges of the court to whom application for the mandamus had been made the Supreme Court of the District of Columbia.

Thus matters stood during most of the incumbency of the last Commissioner. The views of the Supreme Court, so fully expressed in one case, and confirmed by their action in a second, were of no avail to determine the practice of the Office. This practice could not be justified by either of the cases alluded to.

The subjects of trade mark or label registration, as a rule, are not of the highest importance. They cannot, on the average, compare for interest or value to their movers with cases involving patented structures.

The Bell telephone patents and the barbed wire patents are held to be worth many millions of dollars. No label or trade mark can approximate to such a value. Yet labels and trade marks are of importance and interest enough to render the Commissioner's action in discriminating within the Office between them very annoying to such as believe his action unjustified by law. Considerable friction between applicants for registration of designating designs and the Patent Office has for some time past been in existence. Both counsel and the Commissioner of Patents have doubtless wished that the question were disposed of in one way or the

At last a case (Moodie vs. Butterworth) was brought to trial, in which a mandamus was applied for from the Supreme Court of the District of Columbia, and was refused by that tribunal. The decision was rendered but a short time before the change of Commissioners and to a certain extent stamped with the seal of court approval the existing practice of the Office. That this interpretation was put upon it by the Commissioner is evident from the way in which notice of it was published in the Gazette. A report of the decision was printed as a statement in the Official Gazette of January 6, 1885. The date of the decision was December 27, 1884. The necessity for thus printing it as a "statement" arose from the fact that the court delivered no written opinion in the matter, and full reports of its voice are not on record. A mandamus was refused. This is all that the "statement" could positively assert about the attitude of the court. Its definite conclusion or opinion is not given. The case seen in this light forms a very imperfect offset to the written opinion rendered in the former suit. The published statement of the decision could not go behind the record, and that was merely a mandamus refused in a particular case. The refusal justifying the Commissioner's action in this suit was cited in the Gazette in support of his views as to all cases. But the question, just as before, is open to discussion. We do not see how the arguments stated in the Willcox & Gibbs case can be thus i lightly disposed of.

Recognizing the fact that every decision in this vexed question was of importance, and regretting that no expression of the court's opinion was accessible, we have succeeded in obtaining the private expression of several of the District Supreme Court Judges' opinions in relation to trade marks and labels. This interesting record we lay before our readers in the present issue, commending it to their careful reading. It will be seen that it does not by any means make the Moodie case a conclusive one. In this suit a mandamus was refused. In other words, the Court adopted a negative action, owing to the trouble of satisfactorily interpreting the statute. The bench of judges acknowledge a difficulty trouble in disposing of.

Mr. Butterworth, after a full experience of the duties

something to secure a better expression of the trademarks and label registration statutes. Such action would be welcomed by all, and the ex-Commissioner's special experience, backed by his legal attainments, would do much toward securing a better state of things. Nothing is so productive of ill in the matter of enactthen cited by us as the great decision on which the ments as uncertainty. The uncertainty of the label and trade-mark statutes apparent on their faces has only been reaffirmed, and in no sense done away with. by the simple decision of the Supreme Court Judges in the Moodie case.

In a recent article on Patent Office examinations of novelty, an allusion was made by us to the departure from the spirit of the opinion in the Wilcox & Gibbs case, in the Patent Office practice in examining labels and trade marks. This has called forth a lengthy and very able communication from the Examiner of Trade Marks. In it the writer cites the Moodie case, and reaffirms the propriety of the Office practice. In considering our article as directed toward his division of the Office he is entirely in error. It is intended to apply, as indicated by its title, to the practice in the Department of Patents. We incidentally remarked that compliance with the views of the Supreme Court was not to be found in the practice followed in label and trade mark registration. His arguments in rebuttal of this statement are based largely on the Moodie case. This should be only regarded as an implied opinion in a single individual case. The communication alluded to will be found printed at length in the SCIENTIFIC AMERICAN SUPPLEMENT of this week, No. 487.

#### RUST CEMENT.

One of the most adhesive and durable of cements known to mechanics who essay to unite iron surfaces is the oxide of iron itself; with this a joint can be made so perfect and sound that the iron will break before the cement will part. In removing the cast iron pipe of a bilge pump from a ship that had made four Atlantic voyages, it was necessary to take the sections apart. The flanges had been pasted with a cement of cast iron drillings and filings, mixed with sulphur and sal ammoniac, moistened with water. Then the nuts-three in each flange-were set up on the bolts, and the union was completed. The four voyages—going and returning—occupied nearly a year. When the separation of the parts was attempted, even the cold chisel was unable to make a division between the solid castings and the intervening cements. The sulphur and ammoniacal salts are simply means to more rapidly oxidize the iron drillings and filings—the iron rust is really the cement. If time is allowed, ordinary water or salt water would act as a solvent.

All our iron ores are simply oxides, and when they are exposed to the atmosphere they show the ordinary color of iron oxide-red. This oxide gives the red color to the "brownstone" (red sandstone) so much affected for building purposes. These stones are only sand cohered in mass by iron rust. Their formation can be witnessed even now on some of the New England beaches. The narrow and slightly raised windrows of sand thrown up by some heavy storm or some very high tide, so that they are beyond the redestroying effects of common tides and ordinary winds, can be noticed slowly solidifying. Fragments may be gathered which are only sand slightly held by the oxide, but others may be found which are embryo stone—if such a term may be allowed-solid to the feeling, and capable of being thrown as missiles. Beyond these are the shingles of the beach and the cliffs that define the shores. In olden time this sand and this iron was mixed, subjected to pressure by outerlying layers, and at length became "solid rock," as we call it. And yet this quarried rock of sand cemented with iron is still somewhat soft, and for building purposes requires seasoning—the gradual reabsorption of the water given by the atmosphere; and this water is essentially salt, or it has the oxidizing effect of salt water, for its effect on iron is similar to that of salt water on iron under similar circumstances.

It is evident that any substance that induces rust in iron is not a safe one to use in connection with permanent structures of iron. Some years ago an instance of iron in connection with red sandstone—brownstone -was noticed, where wrought iron rods were secured into steps of brownstone. The stairway was removed, and the iron in the stone was disintegrated into mere threads. In this instance the holding of the iron balusters was sulphur. And sulphur is much worse than lead; it is impossible to secure iron in stone, or even in iron, by sulphur. Lead is perhaps as safe as any material that is not too expensive to use. In removing an iron fence, the embedment of the palings in lead, lining the holes in the stone, making a superficies of about fourteen inches, was readily overcome by lever action; while the cross section of the same paling through iron rails, iron on iron, the area being less than three and a half inches, necessitated the use of hammer and cold

To disguise the Taste of Paraldehyde.—Sutter (Arch. d. Pharm.) finds rum and tincture of lemon combined with paraldehyde make it pala-

#### VIEWS OF THE DISTRICT OF COLUMBIA JUDGES ON TRADE-MARK AND LABEL REGISTRATION.

The following has been furnished to us for publica tion by a prominent member of the Washington bar, who personally followed up the matter at our request

The question of the power of an applicant to the Commissioner of Patents, for the registration of a label, to determine for himself whether the design he presents shall be considered a label or a trade mark, and the further question as to whether the duty of registration involves the exercise of some judicial function or mere ly a purely ministerial action, has been decided by the Supreme Court of the District of Columbia in a more recent case than the Willcox & Gibbs sewing machine

The case referred to is that of the United States ex rel. Schumacher vs. Marble, which will be found in 3 Mackey 32 (not yet published.) The following is a copy of the decision of the Chief Justice, who delivered the opinion of the Court in the latter case, taken from the advanced sheets of said report:

"It is objected in behalf of the Commissioner of Pa tents that the act of Congress of June 18, 1874, providing for the registration of labels is unconstitutional, and therefore void.

A very elaborate, ingenuous, and perhaps, under appropriate circumstances, successful argument has been made to sustain this position.

But we think the point raised has no application to this case. We do not think it lies in the mouth of a government official to call in question the constitutionality of a law directing him to perform a purely ministerial duty.

If the question was raised between other parties, as, for instance, in a suit for infringement in the use of a label, and the constitutional rights of the parties were involved in it, that is to say, whether one man was prohibited from using it because another man had registered it as a label, the argument might be pertinent, but we do not think it is a question which can be

The next reason assigned by the Commissioner for his refusal to comply with the petitioner's demands is that the design offered for registration is a mere fanciful sketch, which, while it may be used as a trade mark, has none of those descriptive features about it characteristic of a label.

A label, it is contended, consists of a pictorial representation or a written description of the article to which it is affixed; and that a fancy picture, such as this, having no connection with its proposed use or application, cannot be registered as a label. This ques tion has been settled by this Court in the case of the Sewing Machine Company vs. Marble. We decided in that case that the duty of the Commissioner of Patents, on the application to him to register a label, is a purely ministerial one, as much so as the act of a recorder of deeds in placing upon public record a muniment of title. The statute has not defined what shall be considered a label, whether it shall be a picture or a writing; whether it shall be descriptive of the article to which it is affixed, or whether it may be a mere arbitrary design. If the applicant presents it as a label, and appeals to the Commissioner to give it the protection which the law provides for it as a label, the duty of the Commissioner is to register it, and in doing so he gives it only the protection which the statute provides.

It is not protected as a trade mark, nor as a copyright. The public at large may use and enjoy it, but qua label it is restricted to the use of the party who has registered it for that purpose and no other; with the character of the device the Commissioner is not at all concerned. His function is as purely ministerial as it is capable of being. The writ will issue.

In reference to the case of U.S. ex rel. Moodie vs. Butterworth, No. 25,748, at law, docket 30, in the same court, it appears from the record that a petition was filed by Moodie for a mandamus to the Commissioner of Patents to require him to register a label, registration having been refused by the Commissioner, after investigation, because the alleged label did not contain subject matter which could be registered under the a rule to show cause why a mandamus should not issue maintained at 90 pounds per square inch. Thence to stitute a submerged main for this double pipe. The of the respondent was filed.

record is concerned, appears to have been made by the

An interview with one of the counsel for the relator disclosed the fact that the court had made a decision, and had decided not to issue a mandamus. Counsel stated that Chief Justice Cartter, with Judges McArthur hydrants, and a hose with a snap coupling attached, and James, heard the case, and that Judge McArthur delivered the opinion of the court.

owing to the uncertainty of the statutes they would in equal to the occasion, for he connected the exhaust grounds. Eighteen steam boilers will be employed, the case before them discharge the rule. Chief Justice pipe of one engine in his exhibit to the boiler of an capable of evaporating 110,000 lb. of water per hour.

subject, and still entertained his former opinion. The Commissioner of Patents had the right to decide that a thing, described as a label or trade mark by an applicant, but really of an entirely foreign nature, as a bomb shell, torpedo, or a battering-ram, could not be registered, but that a man had a right to call a trademark a label if he felt so disposed, and the Commissioner of Patents, when requested, would be bound to register it, The Chief Justice further said that the court sometimes, in matters of writs of mandamus, exercised their case the court had taken that course, but that the court had not reversed its former rulings.

Judge McArthur, who delivered the opinion in the Moodie case, said that he had held in that case that the Commissioner of Patents had the right to inquire. upon an application being made to him for the registration of a label, into the character and design of the label, and that if the Commissioner found that the proposed label contained matter properly registrable as a trade mark, and that the proper fee had not been paid, he would have the discretion to refuse registration of the device offered.

Judge McArthur further said that the Chief Justice had had some difficulty in agreeing to the judgment discharging the rule, owing to a former decision made by him, but that the Chief Justice had finally concurred, although not on the same grounds, with the judgment of the court discharging the rule.

Judge James, who delivered the opinion in the Willcox & Gibbs sewing machine case, said that the whole question was in a cloudy and uncertain state, and that the statutes were not in a condition to admit of a lucid exposition of the law, and that additional legislation was needed on the subject. The Judge said that in the Willcox & Gibbs case he had held that the duties of the Librarian of Congress in the matter of registration of labels had been transferred to the Commissioner of Patents, and that his duties were simply those of the Librarian, but that he had recently changed his views somewhat, owing to the want of clearness in the statutes affecting the subject; and that he was now of the opinion that the Commissioner of Patents had more power than had been vested in the Librarian of Congress, but to what extent the power of the Commissioner of Patents went he was not prepared to sav. The judge further said that he did not agree with the views that Judge McArthur had announced in the Moodie case, but that owing to his own change of opinion somewhat, and in view of the difficulties surrounding the case, and also in view of the fact that it was in the discretion of the court whether such a writ as a mandamus should issue, he had concurred in the ledge sufficient to enable him to know where to go to judgment of the court discharging the rule to show find more if he wants it.

#### Compressed Air Power.

At Guinnesec Falls, Michigan, the water power is used to compress air, which is conducted through a 24inch pipe to the iron mines, a distance of three miles. where it is used for operating pumps, engines, and drills in place of steam. The head of water at the falls is 47 feet, and drives three turbine water wheels, each of which operates a pair of air compressors, and the whole plant has been in satisfactory operation for over a year. One of the earliest instances of the application of air on an extensive scale in the operation of drills was, says Engineering, in the excavation of the railway tunnel, 28,081 feet in length, which pierces Hoosac Mountain, situated in western Massachusetts, where a rapid river at the eastern terminus furnished the water power which was used to compress air which actuated the drills, while the exhaust served to ventilate the tunnel. Several years ago the manager of the cordage works at Plymouth, Massachusetts, introduced an air locomotive which took the place of some sixteen horses and an equal number of men employed in transporting material from one department of the establishment to

The risk of fire prevented the use of a steam locomotive in these ropewalks and mills. The air passes from | inch wrought iron pipes laid under the floor girders of statute as a label. This petition was filed on the 4th the reservoir, which takes the place of a boiler, through day of November, 1884. On the 10th day of November a reducing valve into a receiver, where the pressure is main again upon the city side. It is intended to sub was passed, and on the 8th day of December the answer the cylinders, where it is used like steam, except that distribution consists of 10, 8, 6, and 4 inch cast iron the refrigeration produced by the expansion of the air Here the record stops; and no decision, as far as the is so great that it is necessary to use very limpid oil for lubrication on such places. The compressed air is furnished from a receiver of boiler iron, which supplies a system of underground pipes, with hydrants at convenient places; and when the air supply at the locomotive is becoming low, it is stopped near one of these and the air supply replenished with little delay. At one of the fairs of the Charitable Mechanics' Associa-Counsel further stated that Judge McArthur took the tion in Boston, the management forbade any fires in whether it was a label, and that the other members of opportunities of showing the operation of their

Cartter said that he had no doubt about the law on the other of his engines, removed the safety valve, and connected the flywheel by belting to the shaft which was kept in motion by the main engine of the exhibition. This method of driving an engine furnished a supply of compressed air into the second boiler, whence it was used for motive purposes. Soon the manager learned that these portable engines were in operation, and assuming that the regulations concerning fire were necessarily violated, sent a worthy colored messenger to examine and report the facts to him. After looking these engines over very carefully, he reported discretion and refused the writ, and that in the Moodie that they were running the engines in question with the "northwest wind or something or other." A group of laborers were examining the engine, and one of them gave his opinion that "cold steam and no fire was the greatest invention yet."

#### · The Education of the Artisan.

Professor Huxley says: For myself, I look upon simple knowledge by itself as of far less importance to the artisan in his career in life than a number of other qualities. I do not say that knowledge is not an extremely good thing; but if a man is to make a good workman, or to do anything in practical life, you must give him an education that fits him for the conditions of life with which he has to deal, and you will not give him that education by filling his head with a number of intellectual abstractions, or even by giving him the largest acquaintance with scientific principles. And I think it is a profound mistake, considering the career to which the majority of artisans or persons in that class of life are necessarily bound, ever to take them out of the wholesome discipline of practical contact with the realities of life, for the mere sake of giving them a greater or less amount of knowledge. A man who is inclined to do so may always pick up knowledge, and he may do so at the same time that he is getting his education, in the highest sense of the word, out of his contact with the realities of his daily life; but if you make a bookworm of him, if you take him away from all that contact with reality and turn him back afterward into it, he has lost touch of life.

I speak with the greatest hesitation, because I have nothing to do with industrial pursuits; but I have had to do with mankind in many stations in life, and it seems to me that what is wanted in a foreman is a man of energy, punctuality, business habits, and power of dealing with men, all of which things are not to be got out of books or laboratory work. These qualifications are the most essential qualifications in a foreman, and what you want besides in such a man is not book learning, but an intelligence sufficiently trained to be able to deal with new conditions, and an amount of know-

#### Columbus, Ga., Waterworks.

At a recent meeting of the Engineers' Club of Philadelphia, the secretary presented, for Mr. Jacob H. Yocum, an illustrated description of the recently constructed waterworks at Columbus, Ga., which city has a population of 25,000. The Chattahoochee River was investigated as a source of supply, but on account of the expense of filtering after its frequent freshets, and of pumpage, it was abandoned, and a gravity system adopted. Among the adjacent hills was found a pure and soft water, delivered through the gravel beds, and a gathering ground of 12 square miles, which would yield, after allowing 50 per cent for absorption and evaporation, a daily supply of 15,000,000 gallons. The water is impounded in successive dams, respectively  $130\frac{1}{2}$  and  $115\frac{1}{2}$  feet above the center of the city. The upper dam is 266 feet long by 21 feet high; area, 20 acres; capacity, 100,000,000 gallons. The lower dam is 250 feet long by 21 feet high; capacity, 20,000,000 gal-The forest ground they occupy was carefully cleared, grubbed, and surface removed to the gravel and clay. The discharge of upper into lower dam is arranged with reference to aeration of the water.

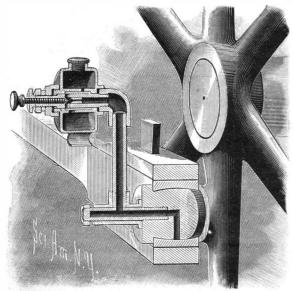
The water is conveyed to the city by 18,000 feet of 12 inch main, which divides at the river into two 9 a bridge 800 feet long. These pipes unite in a 12 inch pipes, fitted with the Cassin double fire-hydrant and the necessary valves. A 1 inch jet can be thrown 85 feet. At the opening test seven streams were thrown 75 feet simultaneously. The works provided abundance of pure, good water during a four months' drought, and have generally exceeded expectations. An additional 400,000,000 gallon reservoir is, however, contemplated to meet prospective requirements.

#### ---The Inventions Exhibition, London.

The forthcoming exhibition, which opens May 4, is ground that the device shown was not a label, and that the building; and as a consequence, the exhibitors of to be magnificently illuminated at night by means of the Commissioner of Patents had the right to determine portable engines considered that they were deprived electricity. Ten thousand lamps are to be employed. Of these,  $464\,\mathrm{are}$  arc lamps and  $5{,}530$  incandescent lamps of the court differed with this view, but said that class of engines. One exhibitor showed resources for the exhibition proper, the remainder for the

#### AUTOMATIC OILER FOR CRANK PINS.

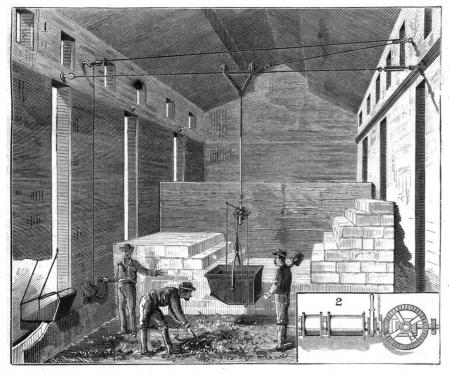
The crank pin is formed with an aperture upon the axial line extending inward from the face, and thence at a right angle to the outer bearing surface. Screwed into the aperture is a hollow plug, to which a tube is attached at a right angle. On the outer end of the tube is a quarter bend that carries the oil cup and its parts. The oil cup is of cylindrical form, and is pro-



HARTNETT'S AUTOMATIC OILER FOR CRANK PINS,

vided with a feeding cap at one side. At its center it is formed with a transverse tube forming a sleeve around a fixed tube screwed into the end of the quarter bend. The sleeve and tube are provided with apertures to allow the oil to pass through the tubes to the plug, so that a continuous passage is formed for the oil from the cup to the crank pin. The cup has an annular flange fitting over the quarter bend, and at its outer side is a similar flange that is threaded and receives a packing gland whereby the ends of the tube are made tight.

The outer end of the inner tube is screw-threaded and furnished with a set nut taking against the gland, so as to hold the cup up to place; and in the outer end of the tube is a screw plug that can be screwed in to more or less close the aperture, and thus regulate the escape of the oil. The tube holding the oil cup projects from the center line of the shaft, so that in the rotation of the crank pin the oil cup simply rotates with the shaft, while the plug in the crank pin, moving with the latter, a centrifugal movement of the oil is set up from the cup through the tubes to the crank pin, thereby keeping up a constant and uniform supply of oil that can be regulated according to the amount desired. In order to fill the cup while the engine is running, it is only necessary to take hold of it to prevent its rotation with the tube, when the cap can be removed. A loop | drum, when the bucket runs down the cable and dumps



CONGER'S HAND POWER APPARATUS FOR HOISTING AND CONVEYING BROKEN ICE, ETC.

on the under side of the cup is for convenience in taking hold of it to stop its rotation. In the space between tube and sleeve is a wire cloth, which, while allowing the oil to pass freely, prevents any sediment from finding its way to the bearing.

Additional particulars regarding this patent may be Lyons, Kansas.

#### HAND POWER APPARATUS FOR HOISTING AND CONVEY-ING BROKEN ICE, ETC.

The invention herewith illustrated shows an improved arrangement for hoisting and conveying purposes, which has been recently patented by Mr. Henry **B.** Conger, of Burlington, Vt. It is more especially designed for conveniently and rapidly removing valueless pieces or clippings of ice, as they accumulate in ice houses, to a point where they can be readily carried away, a work heretofore generally performed by hand barrows and dump sleds, slowly and expensively.

According to this invention, an inclined wire cable or rope is suspended from any point within a building to a point above or near the dumping spout on the other side, the cable supporting a traveling carriage, from which a bucket is so suspended that it can be easily raised or lowered and dumped automatically at the spout. The lower end of the cable is attached to a stationary hook over the dumping chute, but the other and higher end is connected to one extremity of a turn buckle, attached to an adjustable hook, whereby the cable is kept taut, and this hook is adapted to slide in a grooved bracket, extending longitudinally along the located, and then securely fixed at any desired point

end of which is a differential pulley supporting a bucket by means of a chain and bail, the latter so adjusted as to hold the bucket upright while it is being filled and moved, until the bucket is tilted and its contents dumped into the spout by its toe coming in contact with the nose of the spout, from the rapid movement of the carriage with its suspended bucket down the inclined cable. To haul the carriage up the cable, the hauling rope passes over the larger of the two drums shown in Fig. 2, the shaft carrying these drums being attached to the side of the building. The smaller drum carries a special cable for use in tilting the bucket when this apparatus is to be put to some different employment; the length of the dumping cable is then regulated according to where the load is to be deposited, and it can be so adjusted that the contents of the bucket may be distributed over a greater or less space as desired. The carriage with its bucket is drawn up the inclined plane by a crank on the gear wheel shown in Fig. 2, and is held while being filled by a friction brake on the larger drum, the bucket

pulley; the brake being loosened, the weight upon the hoisting rope rapidly reverses the movement of the the inner ends of the short rear cross bars are stand-

> be readily conceived, can be used in the building of railroads by extending the wire cable over tripods at each end and made fast to the ground, conveying the earth for cuts and filling of ravines, doing away with horses and carts; also for building trenches for sewers and water pipes, first by opening the trench and commencing laying of pipe, and then extending cable as before, taking out the earth and dumping back on pipe, thus handling the earth but in fact, in connection with is thus practically applicable up to 600 or 700 feet.

> itself. This apparatus, as will

#### Solidification of Nitrogen and of Carbon Monoxide.

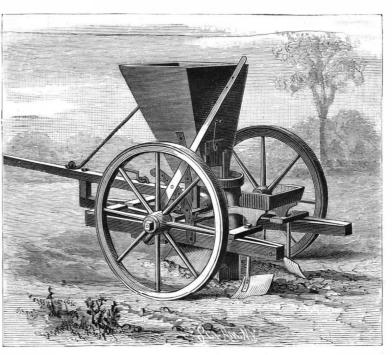
Nitrogen is solidified at a temperature of -214° and

under a pressure of 60 atmospheres, its critical point being —146° under the pressure of 35 atmospheres. By carrying the rarefaction to 4 mm. of mercury, the author has succeeded in obtaining a temperature of -225°. The solidification point of carbon monoxide is -207° with a pressure of 100 m. of mercury. Oxygen obtained from the inventor, Mr. John M. Hartnett, of stills remains liquid at a temperature considerably below —211°.—Olszewski.

#### COMBINED POTATO AND TREE PLANTER.

The engraving shows a planter designed to facilitate the planting of potatoes and small trees and to promote accuracy in such planting. The axle is bent at the inner side of each wheel so as to form a crank, the straight middle part of which rocks in bearings attached to the side bars of the frame of the machine. To the inner sides of the rear ends of the side bars are secured the ends of two bars whose forward ends are secured to each other in the central line of the machine. The forward parts of the side bars are connected with the inclined bars by short cross bars, and the rear parts are connected with the inclined bars by short bars whose inner ends project to serve as supports for the standards of the covering plows. The end of the tongue is secured to long cross bars attached to the side and inclined bars a little in the rear of the middle part of the axle.

The upper end of the plow standard passes through the forward long cross bar and tongue, so that it serves as a bolt for securing the latter in place. The forward edge of the standard is made sharp to act as a colter, and formed upon its lower end is a opposite side of a room or building. The invention plow. Suitably connected to the opposite sides of the covers special details whereby this hook may be easily rear part of the standard and to the frame are plates, the rear parts of which, by means of a right and left in the sliding bracket. Suspended from the carriage screw working in U-shaped keepers secured to the which travels on this cable is an iron rod, on the lower inner surfaces of the plates, may be moved further



HAMRE'S COMBINED POTATO AND TREE PLANTER.

being lowered and raised by means of a differential apart or nearer together, according as a wider or narrower channel may be required. Secured by nuts to ards; by adjusting the nuts the covering plows can be adjusted to work deeper or shallower in the ground. The covering plows are made in the form of mould boards arranged with forward ends inclined outward.

The seed hopper is made with inclined front and sides and vertical back, and the bottom is secured to the top of a pedestal, the lower end of which rests upon the forward cross bar and is recessed to receive the tongue. The hopper is so secured that it can be readily detached from the frame, together with its attachments. In the lower edge of the back of the hopper is the discharge opening, which is provided with a gate. Attached to the gate is a cord which may be wound around a pin to hold the gate at any height to regulate the discharge of seed. The bottom of the hopper extends rearward to form a feed platform, which is rounded and formed with a flange to prevent the potatoes from rolling off. In the outer part of the platform once: also for conveying from is an opening leading to a spout made of such a length one building to another, and, that its lower end enters the space between the rear upper parts of the plates. The dropper's seat can be nearly all kinds of excavation, easily removed when necessary. To one of the crank being especially advantageous | arms of the axle is rigidly attached the end of a lever. where it is desirable to lift by which the machine can be readily adjusted to open and remove earth to a dis- a channel of the required depth, and to raise the plows tance, it being claimed that it from the ground for convenience in turning round. The lever is locked in position by a pin passing through holes in the lever and in a curved catch bar. To the inner side of the outer part of the lever is secured a strap which engages with a headed pin on the side bar of the frame, to hold the lever in position when lowered to raise the plow from the ground. When the machine is to be used for planting trees, the hopper and its attachments and the seat are detached, and the young trees are placed upon the machine or in a box on the frame. As the machine is drawn forward an attendant places the seedlings singly and in the proper places in the furrow between the plates, and soil is thrown around them by the covering plows. This invention has been patented by Mr. E. J. Hamre, and particulars can be obtained from the Rev. J. G. Riheldaffer, D.D., Minnesota State Reform School, St. Paul, Minn.

#### Toughened Filter Paper.

At a recent meeting of the Chemical Society a paper was read on "Toughened Filter Paper" by E. E. H. Francis. Filter paper which has been immersed in nitric acid, rel. den. 1.42, and washed with water, is reliquids, and quite different from parchment paper made | a large wheel journaled in the upper ends of the frame with sulphuric acid. Such paper can be washed and rubbed without damage, like a piece of linen.

The paper contracts in size under the treatment, and the ash is diminished; it undergoes a slight decrease in weight, and contains no nitrogen.

Whereas a loop formed from a strip one inch wide of ordinary Swedish paper gave way when weighted with 3 to 5 ounces, a similar loop of toughened paper bore a weight of about 3 pounds. The toughened paper can be used with the vacuum pump in ordinary funnels without extra support, and fits sufficiently close to prevent undue access of air, which is not the case with parchment paper. An admirable way of preparing filters for the pump is to dip only the apex of the folded paper into nitric acid, and then wash with water; the weak part is thus effectually toughened.

#### THE "VULCAN" CUSHIONED POWER HAMMER.

The hammer herewith illustrated presents several important features to commend it as one of the most useful of American machine shop appliances. The improvements it embodies are such as will be at once recognized by a hand accustomed to the use of power hammers, or who has had experience in the stamping out of work with dies, a branch of machine construction which is every day finding new channels of development. Its special

adaptation for die work is a consequence of the slides, whereby it must necessarily descend each time in the same place, and deliver a true and square stroke. Perfect elasticity of stroke, with cushioning, are obtained by means of four rubber cushions, mounted above and below the fulcrum bearing of the helve, which is a solid steel forging, so that the latter is, in fact, mounted on elastic bearings. The effect of this arrangement is to almost double the stroke of the ram and produce a quick, sharp, and elastic blow. The ram, rebounding instantly, does not in the least chill the iron, as in the case of hammers resting on the work. The hammer, being constructed on the dead stroke principle, the helve is connected to the crank shaft by a connecting rod, the length of which may be adjusted by means of a right and left hand nut, so that the distance between the dies can be quickly increased or diminished, as desired. The force of the blow can be completely controlled by means pump. of the treadle. The machine is built entirely of iron

and the necessary brass work. This design makes it superior to any modification of the trip hammer, it being impossible, when the helve works on fixed pivots, to forge square when the work varies in size: but, as will be readily perceived, it is impossible to forge out of square with this hammer, no matter what may be the size or shape of the work, unless the dies are specially made. Expensive foundations are not needed, since the anvil is heavy enough to receive the force of the blow.

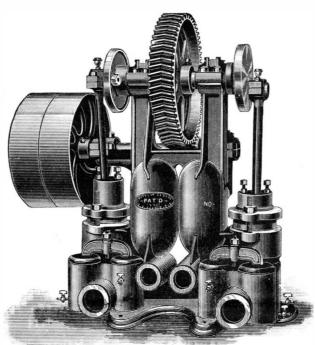
The perfect ease with which this hammer can be operated by the most ordinary workman, it simplicity of construction, and the rapidity with which a large class of work can be turned out with its help, are points which have been already well attested in a practical way in leading machine shops. It is adapted for all kinds of forging and die work, such as edge tools, agricultural implements, springs, machine forging, file makers, tool makers, etc. In the making of all these classes of goods, the exactness with which the hammer can be made to do its work, and the nicety with which its action can be controlled, are points which largely affect the amount of subsequent labor necessary in the finishing, as also the ultimate quality of the goods, and in these respects the hammer shown in the accompanying engraving has elements of superiority which practical men

will unhesitatingly concede. The manufacturers of shafts. The valve seats—both the valves and valve grain of gallium from 80 kilogrammes of zinc blende. The the Vulcan hammer are Messrs. W. P. Duncan & Co., of Bellefonte, Pa.

DR. EDWARD VANDERPOOL, of New York, recommends Fowler's solution of arsenic in neuralgia of the stomach, in six to ten drops three times per day. His experience with it appears to have been highly satisfactory in the cases reported.—Independent Practitioner.

#### DOUBLE PLUNGER GEARED PUMP.

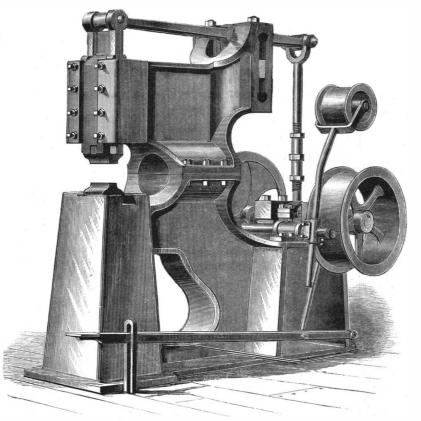
The accompanying engraving represents a well designed and durable pump for feeding boilers or tanks, and for use in tanneries, paper mills, breweries, etc. The pulley shaft is mounted horizontally about in the markably toughened, the product being pervious to center of the frame, and carries a pinion meshing with



DOUBLE PLUNGER GEARED PUMP.

fact that the ram moves in permanently fixed vertical standards. Owing to the form of teeth used, the action this city. The gentlemen in the car awaited the anof these wheels is exceedingly smooth and noiseless. and the wear upon the contact surfaces is reduced to a minimum. The strength of the pinion teeth is increased by side flanges. At each end of the main shaft is a disk crank, finished on edge and face, and provided with steel crank pins made large to decrease the wear. The connecting rods are united to the crank pins by a cap and box, so that all wear can be easily taken up when necessary, and are fitted with brass oil cups. The lower ends of these rods are connected to the center of the plunger by a new device, designed by the makers of this pump, by means of which wear can be taken up by simply screwing up set bolts on the upper end of the plunger. The suction and discharge pipes, which are tapped to standard pipe threads, are clearly shown in the cut. There are similar openings for discharge pipes on the opposite side of the

The air chambers are large, and are so disposed as to and steel, with the exception of the rubber cushions form part of the frame supporting the pulley and crank ment, but the message continued. The induction was



THE "VULCAN" CUSHIONED POWER HAMMER.

seats are made of bronze metal—are screwed into the valve chamber. The removing of one nut permits both the suction and discharge chambers to be examined. The bracket supporting the pulley shaft is so formed that it can be placed at either side of the frame, as may be found most convenient in setting up the pump.

Practically, the machine consists of two separate pumps, which may be operated together or singly, and | luster brighter than that of mercury, it may be found which may be used to pump different liquids at the of useful application by and by.

same time. Both shafts are of steel. All the journals have oil boxes with covers to keep out dust and grit from the oil holes. The body of the pump and valve chambers have drain cocks, so that the pump can be thoroughly drained in cold weather. The pump is compactly and strongly built, occupies but a small space considering its capacity, and all its wearing parts

are large and well proportioned, insuring easy running and durability. The journals are made large, and are filled with No. 1 Babbitt metal. Additional particulars can be obtained by addressing the manufacturers, the Stewart Heater Company, of 40 & 42 Clinton Street, Buffalo, N. Y.

#### The Phelps Induction Telegraph.

A most interesting, as well as wonderful, experiment in telegraphy was successfully tried recently by the B. & O. Telegraph Company officials. They succeeded in telegraphing on a railroad train while going at the rate of 40 miles an hour by the Phelps induction system. [This system was described in the Scientific American for Feb. 21 last.] The experiment was conducted by Mr. Phelps, the inventor, and under the direction of the B. &. O. officials. Messrs. Joseph G. Pangborn, the Assistant General Passenger Agent, and Mr. McLaren, the Manager of the New York city B. & O. telegraph offices, went on the car, and Mr. Weaver, the B. & O. electrician, remained at the receiving office in New York. The experiment was tried on the Harlem River branch of the New York and New Haven Railroad.

Soon after the train was started, and while going at the rate of 40 miles an hour, the operator in the car called New York. A direct wire had been furnished through to Baltimore and into President Garrett's private office in the Central Building in

swer with anxiety. Soon the instrument began ticking as loudly as if in a stationary office. New York had responded. The induction system worked. Major Pangborn then indited a telegram to President Garrett, saying that the Phelps induction system was a success. The telegram went direct to Mr. Garrett, and an answer was received by the experimenters on the car: "Your telegram has been delivered to President Garrett in his private office." Major Pangborn then wrote another: "President Garrett, I am telegraphing to you, on a train going 40 miles an hour, by the Phelps induction system. The wire in our car is 7½ in. from the wire laid on the ties of the track." While the operator was sending the dispatch, Major Pangborn noticed that the train had gone its 12 miles, and that it would soon pass over the wire in the wooden trench. He said nothing, but let the operator continue. The train left the box behind. As it passed over the end there was a fainter sound of the ticking of the instru-

> so strong that the current had gone to the wire on the telegraph pole 40 ft. from the track. It seemed marvelous to the experimenters. Sitting in a car with no wire nearer than 40 ft., and to send and receive messages! When the train returned the experiments were continued, and it was found that the inductor worked as well as on the other track. The message was sent over the wire in the wooden trench on the other track, 11 ft. away. Of course there was a difference in the sound from the one received and sent when the car was over the wire and when 11 ft. from it. On the return the telephone was connected with the induction system, and a message on a wire 60 ft. away was heard. The sender was in New York; and he was sending a message to his wife in New Rochelle: "I will not be home to-night. Business detains me in

> Mr. Phelps stated that a system of bells could be placed on the engines and worked by the induction system, so that trains could relegraph to each other, and a system arranged so that when trains were within 1,000 ft. of each other a bell would ring, announcing the number of the train ahead.—Baltimore American.

> Gallium.—Dr. L. Ehrlich, a German chemist, has succeeded in isolating the metal gallium by an industrial process. A preliminary experiment has yielded 0.6

method followed was a modification of that introduced by M. Lecoq de Boisbaudran, which by lixiviation of the zinc sulphate resulted in a small quantity of mud containing ferric oxide and gallium. The galliferous alkaline solution was then electrolyzed in a platinum capsule, and the metal deposited in fine needles. As the melting point of gallium is low, about 30.5° C., and its

#### Healing by Faith.\*

It is not our purpose to deny, or even question, the verity of cures "by faith." The "mind" so acts on the body, and the brain plays so important a part in the nervous system, by which the whole organism is energized and controlled both in regard to its functions and nutrition, that it is not only quite possible, but an absolute fact, that many maladies which are not so far advanced as to be dependent upon changes in structure, or "organic diseases," may be remedied by or through the agency of the mind. We will even go so far as to affirm that a very large proportion of the ailing might be, and probably would be, sound if only they were sufficiently strongly impressed to believe themselves to be so. This influence of the mind on the body has been the stronghold of quackery from the earliest times, and "faith" is as powerful an influence for good or evil now as it has ever been. Such "miracles" as the Salvationists are working with their presage among the emotional classes, whether illiterate or well informed, have uniformly signalized the commencement of a new era in religious enthusiasm. When the first enthusiasm subsides, "miracles cease" of physico-mental necessity. The large class of so-called hysterical, cataleptic, and even epileptic affections are distinctly amenable to this influence; so are those nervous disturbances and derangements which consist wholly or chiefly in disorderly activity, as distinguished from actual disease. The mimetic maladies, of which there are always a very large number of cases, are, of course, amenable to the curative influence of faith. Outside these classes, however, stand a multitude of badly managed or misunderstood cases which only need to be placed on a new footing-it matters little what-to get well. A wondrous crowd of ignorant prejudices still hovers over many districts as to the curability or hopelessness of special diseases which are better understood and more successfully treated—on common sense principles—in the centers of knowledge.

For example, we know of localities and affections which, being associated, produce the most dire delusions as to the length of time bones usually take to | HELLER'S COMBINED DETACHABLE POCKET AND CAP. unite in healthy subjects; and how coughs and other distressing maladies are, or are not, under the control of the will. In such combinations of facts and fiction, it is easy to get miracles out of such common matters as the union of the accurately applied ends of a fractured radius in three or four days! There is not a word to be said against "healing by faith." Every busy practitioner has cases under his observation that he would be heartily glad to find so powerfully affected that they could be cured even by this agency. All we are anxious to point out is that an intelligent lay press ought not to lend itself to the promulgation of nonsensical beliefs and impressions. Of course, it is true that many of the poor people who are reported to be "cured" are actually benefited, and by their faith. This is a fact, and there is no sort of reason why the benefits received should not be permanent. If the subjects of these cures are thankful to the Giver of all good, that is not a matter to make merry about. It is as it should be. We are glad of their gain, and pleased to find them moved to gratitude. Meanwhile, if these "cures" need be discussed, let the comments made be neither irreverent, offensive, nor puerile. The modus operandi of such recoveries is perfectly well understood, and there is nothing either specially noteworthy or wonderful about them.

#### New Torpedo Boats.

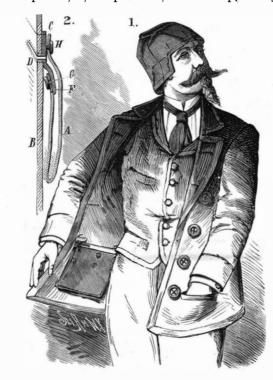
Yarrow & Co. are building for the Austrian Government a pair of large boats of what may be called the excessive speed class. The length is 135 feet and the beam 13 feet 9 inches. These boats are expected to run 24 knots within the hour when light, and 22 knots with gear on board ready for action. The engines are of the three-cylinder or triple-expansion type. The working pressure is to be 140 pounds, and the horse power is estimated at from 1,100 to 1,200 indicated. There will be but one boiler, of the usual torpedo boat type adopted by Messrs. Yarrow, and it will be a point of great interest to marine engineers, says Engineering. to see how far it is practicable to get so great a power from a single locomotive type boiler.

The dimensions of the first-class torpedo boats have been increasing of late, while the second-class, or original 60 foot boats, appear likely to become extinct, their place being taken by high speed pinnaces of somewhat larger type than those hitherto carried on war vessels. The improvements in machinery, and consequent increase in speed, enable these craft to be used for torpedo warfare, while they are to be at the same time available for ordinary ships' purposes. The first-class boats, of lengths from 100 feet to 110 feet, are undoubtedly fit to go through any reasonable weather, and such craft will always prove useful; still, by lengthening the boat from 130 to 140 feet, her powers would be greatly increased, while, generally speaking, no serious disabilities would be added. Of course, there is the question of cost, but the testimony of naval officers appears to be so completely in favor of the larger boat that the additional expense would no doubt be warranted.

#### \* From the (London) Lancet.

#### COMBINED DETACHABLE POCKET AND CAP.

An invention recently patented by Mr. Andrew Heller, of 2095 Madison Avenue, New York city, provides a pocket for coats which can be readily detached and shrubs, Mr. C. E. Parnell, of Queens, L. I., replies as used as a cap. To the inner surface of the coat is sewed follows: a piece of fabric, C, having a slot coinciding with the sewed to the coat at the edges of the slot, and the upper edge of the piece is sewed to the coat, the lower are sewed to the piece as shown in Fig. 2, and the sides of the pocket, A, are provided, at their upper edges,

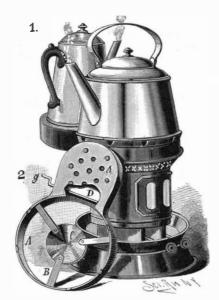


with holes to receive the buttons. Cords are passed through the upper corners of the pocket, for the purpose of drawing the sides together when the pocket is held on the coat, or for holding the cap on the head.

As will be readily perceived, the pocket can be easily detached and then worn as a cap, the long side covering the back of the head. It can be combined with any coat, and would prove very handy for travelers, soldiers, and others.

#### HEAT DISTRIBUTER FOR OIL STOVES.

The invention shown in the accompanying engraving, recently patented by Mr. Benjamin Hunt, of Neosho Falls, Kansas, is designed to distribute the heat and flame of gasoline or oil stoves so that the heat will be applied equally over the bottom of the cooking ves sel, thus avoiding danger of burning food from a concentration of heat at one spot. In the main part of the device are radial arms, B, whose inner ends support an inverted sheet metal cone, C. The extension is closed at the bottom by a plate, and at the top by a perforated plate formed with knobs upon its upper surface, for the purpose of slightly raising the vessel to permit the heat to pass out through the holes and come in contact with the bottom. The amount of heat ad-



HUNT'S HEAT DISTRIBUTOR FOR OIL STOVES.

mitted to the exterior can be regulated by a damper, D, pivoted in the entrance.

The device is placed upon the oil stove, so that the point of the cone will come in the center of the flame, and deflect and distribute the heat equally over the pottom of any cooking vessel which may be placed upon the upper edge of the main portion of the rim, feet broad, and 41 feet deep, the engines being of 12,500 A. The extension may be used when a slow heat is indicated horse power. The Etruria is soon to leave required. The utility, simplicity, and small cost of the Liverpool on her maiden transatlantic trip for New device will recommend it to those using oil stoves.

#### A Dozen Hardy Shrubs.

To an inquirer in the Rural New-Yorker for the names of a dozen of the best ornamental flowering

It is really a difficult affair to select a dozen only, for pocket slot. D. The edges of the slot in the piece are there are so many beautiful sorts, and all of them present so many claims to our notice, that it appears to be altogether unjust to neglect the many on account of a edge forming the tongue, F. The buttons, H and G, few. But as there are many who, like your correspondent, only desire, or have room for, a few, one cannot do less then make the attempt at a selection. First, I would choose Weigela nana variegata, one of the most beautiful shrubs in cultivation. It is of dwarf habit, with clearly defined variegated leaves of a bright golden yellow. The flowers, which are of a pale rose color, are produced in the greatest profusion early in June. Weigela rosea Desboisii is of erect, compact growth, and has deep rose-colored flowers in June. Spiræa Thunbergii is a beautiful low-growing shrub of rounded form, and has delicate green lanceolate foliage, and small white flowers, which are produced early in May in such profusion as almost to cover the entire plant. Spiræa Reevesiana is a very graceful, slightly drooping species, with white flowers; while S. callosa alba is a low-growing variety, producing its small, white flowers in large corymbs during June and July. Philadelphus coronarius is rather a long name for a very popular and well-known strong growing shrub that produces its large, pure white, sweet-scented flowers about the middle of June. Hydrangea paniculata grandiflora is so well known as to need no further description than to say that it is one of the best, if not the best, ornamental shrub we have in cultivation. Buist's Variegated Althæa is another choice variegated shrub, the leaves of which are beautifully marked with creamy white. It stands the sun well, is of free growth, and is attractive at all times. Then we must include the Golden Bell (Forsythia viridissima), which is well known as one of the earliest flowering shrubs, the bright yellow flowers appearing before the leaves. Deutzia crenata fl pl. alba produces its double white flowers in racemes four or five inches in length late in June, and is a shrub of vigorous growth; while D. gracilis is one of the most graceful of shrubs. It is of dwarf, compact habit, and the pure white flowers are most freely produced. The Persian Lilac (Syringa Persica) is a shrub of medium size, having small leaves and purple, fragrant flowers.

All of the above are perfectly hardy, and can be cultivated by any one, even by those who possess but little skill or experience, and, if properly cared for, they will prove very satisfactory. They are not rare or expensive, and nice specimens can be obtained at a very moderate price of any of our leading nurserymen.

### Ginseng.

A parliamentary paper contains the account of a journey made by the Consul-General of Great Britain in Corea. Some interesting information is given with regard to the production of the famous drug ginseng, so prized as a tonic by the Chinese. It is grown from a seed which is sown in March. The seedlings are planted out in beds raised a foot above the level of the surrounding soil, bordered with upright slates, and covered in from sun and rain by sheds of reeds, well closed in except toward the north side, where they are left to open. In the first or second year the ginseng plant is only two or three inches high, and has only two leaves. It is transplanted frequently during this period. In the fourth year the stem is about six inches high, with four horizontal leaves standing out from it at right angles, and in the fifth year a strong, healthy plant has reached maturity, though it is more usual not to take it up until it has reached the sixth season. Ordinary ginseng is prepared by simply drying the root in the sun or over a charcoal fire. To make red or clarified ginseng, the root is placed in wicker baskets, which are put in a large earthenware vessel with a closely fitting cover, and pierced at the bottom with holes. It is then placed over boiling water, and steamed for about four

Ginseng was for centuries regarded as a very elixir of life all over the East; and especially in China and Japan. Its properties were supposed to be miraculous, but they were generally supposed to be confined to the Corean ginseng But its enormous price put it out of the reach of the poorer classes. The wild ginseng of Corea has frequently fetched twenty times its weight in silver in China. The export from Corea is a strict monopoly, which affords a considerable revenue, and is said to be the king's personal perquisite. Death is the punishment for smuggling it out of the country. The total export is only about 27,000 pounds avoirdupois.

#### A Great Steamer.

The steamship Etruria, a sister ship to the Umbria, built by Messrs. John Elder & Co. for the Cunard Company, is now ready to leave the Clyde. Built of steel, her tonnage is 8,000 tons; she is 520 feet long, 571/4

#### EXHIBITION OF PUMPING ENGINES AT THE NEW ORLEANS EXPOSITION.

(Continued from first page).

also provided with deep well pumps for artesian and other deep wells, are noiseless, and may be run by unskilled labor.

These engines have two cylinders, one of which is kept cool by the water in a similar manner as the Ericsson, and the other is heated. The compressing is done in the cold cylinder, and the expanding in the hot cylinder. The air is alternately transferred from one cylinder to the other, and in its passage it passes through a regenerator, which is situated between the cylinders. This regenerator is for the purpose of saving as much as possible of the heat which remains in the air after it has done its work and is ready to be cooled and compressed. It is composed of a series of thin plates placed on edge and having thin spaces between them. Through these spaces the air flows. The heated air on its way to be cooled heats these plates to a high degree, and consequently parts with the greater part of the heat contained in it. These plates remain heated until the air, after having been cooled and compressed, returns through them, when the plates give up the heat contained in them to the air. This arrangement effects a very great saving in fuel. These engines, like the Ericsson above described, use the same air over and over. They, however, compress the air to a higher degree. The operation of obtaining the power is theoretically the same in both engines.

Accompanying these engines are several varieties of pumps, each adapted for a particular service, such as deep well pumping, forcing water to extreme heights, etc. The pump usually furnished is intended for what is called "surface pumping," and is secured to the cold side of the engine; it is double acting. The main portion consists of two parts of cast iron. The working barrel is a brass cylinder, and the piston is packed with two cup leathers made of sole leather pressed into shape. The four valves, two for suction and two for discharge, consist of cylindrical pieces of rubber, and, being free to roll with the action of the current of water, the wear is even throughout the entire length. The valve seats are milled smooth to fit the valves. The ports covered by the valves are not, as usual, a series of small openings, but consist of a single port without bridges or grating, thus preventing the inconvenience arising from the seats becoming clogged with grass, etc. The suction valves are situated at the bottom part of the pump, as near the base of the engine as possible. The discharge valves are placed in the upper portion. In designing this pump, great care was exercised in order to prevent the possibility of any "air trap." pump rod works through an ordinary stuffing box, which is packed in the usual manner, and provided with a neat cup to catch any leakage; tapped in the cup is a pipe for leading away the water which collects in it; this makes it easy to keep the engine and surroundings dry and clean.

In addition to the above mentioned hot air pumping engines, Messrs. C. H. De Lamater & Co. manufacture an extensive line of steam pumping machinery, both single and duplex. Figure 1 represents one of their duplex steam pumps, which has many novel points about it, and in which the workmanship and material appear to be of the highest standard. These duplex steam pumps are used for pumping water for hydraulic elevators in large office buildings and hotels, where it is imperative to prevent all noise, as the steady flow of water through the pipes is perfectly noiseless and without the slightest jar.

They also manufacture and have on exhibition a very handsome single steam pump, which for smooth working and general design and appearance is quite attractive. These pumps have been made on an extensive scale, and some very large ones have been built. The new steel cruisers recently built by the U.S. Government are fitted with these pumps.

The De Lamater Iron Works have been long and well known throughout the United States, and are at present one of the largest establishments of their kind. The pumping engine department is only one of many in impetus to American productions, and will be equivatheir business, and they make a specialty of surface lent to additional tightening of the screw of intercondensers for all purposes, an machinery of all kinds. The "De Lamater" propeller wheel is well known to all steamboat men throughout the country. The works are situated at the foot of West 13th Street, and their general offices are at 16 Cortlandt Street, New York. They also have a branch house at 40 Dearborn Street, Chicago.

It has been asserted that the quality of tea may be approximately estimated by the weight of ash which it yields, the value of tea being inversely proportional to the ash. M. Nikatinski has lately, says the Grocer, made a series of experiments with the view of testing the truth of this assertion, and finds that the ash is a very fair index of the quality of the tea. Thus a good Shanghai tea gave 5·16 per cent ash, a cheap green brick tea 6.87, and two Orenburg teas, which are known to be adulterated with rose leaves, and of which the price was 115s. and 48s. per cwt., yielded respectively 7.87 and 10.42 per cent of ash.

#### Velocity of Projectiles.

The manner of ascertaining the velocity of a projectile was lately described and illustrated at the meeting of the New York Electrical Society by Henry A. Sinclair, electrician at the United States Ordnance Proving Ground at Sandy Hook. One of the Boulenge chronographs used at the proving ground was set up in the lecture room, and Mr. Sinclair demonstrated its quickness and accuracy in determining the velocity of a pistol ball. The instrument was described as being very simple and very easy to work. It consists of an upright brass tube, supporting two electro-magnets, one above the other. When a test is being made, an electric wire connects one of the magnets with the point of firing, and another electric wire connects the other magnet with the target or objective point of the projectile. A long rod is suspended from the first magnet, and a short rod hangs from the second one.

The projectile in leaving the gun cuts the first wire, and the broken circuit releases the long rod, which drops downward. When the projectile strikes the objective point, the second wire is broken and the short rod falls, striking a spring which causes a knife blade to mark the descending long rod. The space from the base of the long rod to the indentation is then measured, and by the fixed law of falling bodies the time taken by the projectile in going from the gun to the target is ascertained, and from that the velocity is figured. Mr. Sinclair took a good sized revolver, loaded it with 3½ grains of powder and a bullet weighing 133 grains, and fastened one end of the wire attached to the first electro-magnet across the muzzle. He then fired at a wired target in a tubular shooting gallery about 4 feet long. The time of the transit of the bullet was determined from the mark on the long rod, and it was speedily announced that the velocity of the bullet was 156 feet per second. A second trial with the same in strument showed a velocity of 207 feet per second.

"Why is it desirable to ascertain the velocity of a projectile?" asked a member of the society.

"Because," replied Mr. Sinclair, "it is a means of comparing the power of a gun, of comparing different kinds of powders and projectiles, of determining their energy, and approximately their range and penetration into iron plates. Had the officer in command of the Monitor at the time of her memorable encounter with the Merrimac known what his guns would stand, he could have sent projectiles clear through the iron-covered sides of the ram. He used only six or seven pounds of powder in a charge when his guns would have stood charges of fourteen or fifteen pounds. Few persons realize how much energy a large projectile possesses. A 12 inch shot weighing about 700 pounds, and traveling with a velocity of 1,500 feet a second, would strike as hard a blow as a railroad train consisting of locomotive and five or six cars (weighing about 100 tons) moving at the rate of 57 miles an hour.

Attempts were made to ascertain the velocity of projectiles as early as 1740, and in 1840 electricity was first used for that purpose. By the Schultz chronoscope, which Mr. Sinclair said was the most accurate instrument of its kind, intervals of time can be measured from thirty seconds to one five-thousandth part of a second. Mr. Sinclair exhibited specimens of the fuses used to fire large guns, and also showed several varieties of powder. Some of the grains were as large as a hen's egg. The method by which the pressure exerted by an exploded charge on the inside of the gun was measured was explained. The lecturer said that guns had been tested at Sandy Hook up to a pressure of 107,000 pounds per square inch, but that was extraordi-The average pressure on a gun was about 40,000 pounds to the square inch. The velocity of projectiles from large guns ranged from 600 to 2,400 feet per second.—New York Times.

#### American Competition.

The London Globe says:

"A reduced American tariff means closer competition against this country in the neutral markets of the cultivated in Belgium, Holland, France, and Germany. world. Every diminution of that tariff will give new national competition. Unfortunately for this country there are other elements in the industrial condition of largely drunk as an independent beverage. For home the States which will act to our detriment. One of consumption it is put up in small round and square these is the silver question, the other is the superior packets of various weights, with highly colored and mechanical equipment of American industry and the attractive looking labels attached, and so dispensed to more satisfactory relations prevalent between capital and labor in that country.

country, in its inevitable rivalry with the United States, lies in the more perfect organization of our competitor. The American is par excellence a mechanical inventor. His natural ingenuity, fighting against the artificial enhancement of prices resulting from the prevalent fiscal system, has driven him to seek relief in mechanical assistance. He had compensated for dearness of material in cheapness of production. Every workman in every manufacturing center is stimulated to study injury from atmospheric changes. The London Grocer and master the machine under his charge, with a view to improving it. Mechanical development is part of annually shipped from Belgium to all parts of the the character of the nation. We may be sure that the world.

country which produced the grain elevator, the oil pipe pumps, machine-made watches, the high speed printing machines, the ring frame, and other inventions without end, will develop still greater creative powers under the stimulus of a growing export trade. Where shall we be then? The relations also between the capitalist and labor classes in the States are more of a nature to encourage production and to develop the capacities of rising generations. Greater attention is given to the physical and moral well-being of the American artisan than is considered to come within the sphere of duty of the British or European manufacturer. A certain spirit of emulation pervades the laboring classes on the other side of the Atlantic, in the place of the leveling down to a general average which prevails in this country. The American artisan works for himself, knowing that his success will be recognized and encouraged. He seeks to rise, and his industry progresses with him. Are we doing all we should and all we might do on this side to keep pace with this progressive movement? We fear not, and yet such social advance leaves an indelible mark on its generation, and expresses itself industrially in good merchandise and low prices."

#### Zinc in Drinking Water.

A paper on the above subject is given in the Journal of the American Chemical Society, by Dr. F. P. Venable. It has long been known that zinc dissolves in water, and that soft water, such as rain water, dissolves it more easily than hard water. Water containing carbonic acid is specially able to dissolve it. The use of galvanized iron for pipes and tanks being so much on the increase, the subject becomes more and more important, and it is desirable to ascertain, as far as possible, to what extent solution of the zinc coating takes place, and how far water contaminated by zinc is injurious to health. The author quotes several investigators as to the latter point, the evidence being to some extent conflicting, but giving a very decided balance on the side of the view that such water is considerably injurious. Investigations made on behalf of the French Government resulted in the prohibition by the Ministry of Marine of the use of galvanized iron tanks on board men-of-war. Professor Heaton has given an analysis of a spring water, with a further analysis of the same water after it had traveled through half a mile of galvanized iron pipe. It had taken up 6.41 grains of zinc carbonate per gallon. Dr. Venable gives the results of an observation of his own, where spring water passed through 200 yards of galvanized iron pipes to a house, and took up 4.29 grains of zinc carbonate per gallon. It seems pretty clear that drinking water should not be allowed to come in contact with zinc.

#### Chiccory with Coffee.

The chiccory root, which was used more with coffee when the latter brought a higher price than it does now, but which is still greatly used on the Continent, somewhat resembles a parsnip. The stem rises to a height of two to three feet, the leaves round the base being toothed, not unlike those of the dandelionindeed, it is closely allied to that plant. The preparation of chiccory, as carried out in Belgium, is very simple. The older white roots are selected, cleaned, sliced, and kiln-dried, and are then ready for the manufacturer. It is roasted in an iron cylinder, called a drum, which revolves over a coke furnace. When taken out it is of a dark brown color, and while hot it is soft and pliable, but after being raked out and subjected to a draught of cold air, it becomes hard and crisp, and is then ready for the mill. From the mill the powder is passed through a cylinder sieve, from which it emerges as fine as the finest flour; and the partially ground pieces, or foreign matters that may have found their way into the chiccory, drop into a separate bin. The shades of color vary occasionally to suit the taste of the purchaser. The chiccory root is In Belgium, where it is also used as a vegetable, it is very extensively grown, its culture and its manufacture (both of which are unrestricted) forming two of the reatest industries of that country; and its the public, who can also purchase it in a loose state. To preserve it in good condition, chiccory should be "But our great fear as to the industrial future of this kept in a tightly closed tin box and in a dry place; otherwise, it will become lumpy and rank, and unfit for use. Instead of being ground down to a fine powder, chiccory is sometimes granulated—that is to say, ground into grains or small lumps. This is often done when it is intended for export, as in this state it can be packed loosely in barrels, and is less likely to deteriorate. When exported in powder it is packed in tin cases, which are hermetically soldered down to prevent says that large quantities prepared in both ways are

#### THE GREAT DRILLING MACHINES OF THE FORTH BRIDGE.

In the SCIENTIFIC AMERICAN of April 4, we gave a description of the main piers of this great bridge, with the construction and method of erection, and also

they are removed, and allowed to cool slowly. When cold, they are again placed in the press and straightened finally. The edg es and ends are then planed, and each plate is weighed, marked, and laid aside, ready described and illustrated the caissons used in building to be placed on the tube when required. The longi-

them while hot in a large hydraulic press, from which intended to deal. The tubes are built round about a mandrel, being supported therefrom by temporary connections, and drilled through the various parts, while in the exact form they are intended to be when finally erected.

The mandrel, plate edge planer, hydraulic press, and

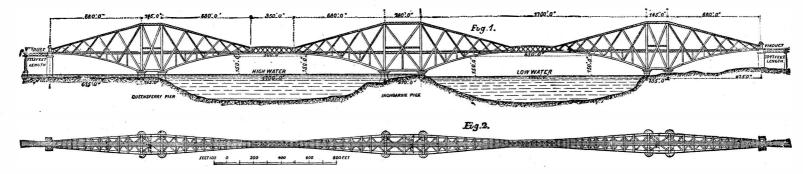


Fig. 1.—THE FORTH BRIDGE.—ELEVATION AND PLAN.

of the mammoth tubes, and Figs. 2, 3, and 4 show the machines for drilling these tubes.

length and capabilities for resisting thrust be employed. The form which best fulfills these conditions is the tubular. As well nigh six miles of tubes are required in the completed bridge, it at once becomes evident that the construction of them could only be effected within a reasonable time by the adoption of special plant. Owing also to their novelty of form and great size, no machinery was in existence capable of dealing with such work. On account of this, and for various other reasons, it was determined to design special plant for the whole work.

The struts required are of various dimensions, ranging from that of the largest, 12 feet in diameter, to that of the smallest, which is only 3 feet. Fig. 5 is a cross section of one of the 12 foot horizontal tubes between the piers. It consists of ten plates and ten longitudinal H beams, stiffened at intervals of 8 feet by means of the circular girders shown in elevation. The girders, again, are made up of diaphragm plates, connected to inner and outer angles, the former being riveted to the H beams, while the latter are similarly fixed to the tube plates.

One of the most difficult operations was the curving of the heavy plates, which are 16 feet by 4 feet 4 inches by 11/8 inch and 11/4 inch thick, and weigh from 28 to 32 hundredweight each. The method now adopted is to bend

the piers. From the accompanying elevation and plan tudinal H beams are made up of a deep webbed tee hydraulic crane are very fully described and illustraviews of the bridge, the general dimensions and form and two angles, being partly drilled through these be- ted in the Scientific American Supplement, No. can be ascertained; Fig. 5 shows a cross section of one fore erection. The circular girders are also partly 478. drilled before being placed on the mandrel. These different parts form the main tube proper, leaving out out in the open (Fig. 4), on what is called the drill One of the well known features in the design of this the connections to skewbacks, the girder fixtures, tees, roads. These are laid down to suit the drilling ma-

The work of building and drilling the tubes is done undertaking demands that struts of hitherto unequaled and other minor details, with which it is not at present chines, and at such a distance and with such a length

as to allow the bracing girders and connections thereto to be placed in position, as the work stands on the ground, prior to the final erection. The roads are so arranged as to be all equally suitable of access for the steam traveling cranes used in carrying the material to position and in building the tubes. This is accomplished by means of traversers, of which there are three, one in the center and one at each end of the drill roads, those at the ends running on rails at right angles and close to the main roads, but fully 12 inches lower, while the center one is run on cross rails, on the same level as the main roads. If it is necessary to change the position of a crane, it is run on to the traverser, and on it carried to the desired point, and there run off. In this way the whole of the ground is commanded by the cranes.

The mandrel, M (Fig. 5), is 45 feet long by 5 feet in diameter, raised on iron trestles, T, to a height, at the center, of 10 feet from the ground. This corresponds with the center of the outer rings of the drilling machines. The great length of mandrel is required to allow of its being carried up at the ends, where the H beams and plates are built in position. On this mandrel there are now secured, but in halves, temporary iron rings, R, at the horizontal distance from each

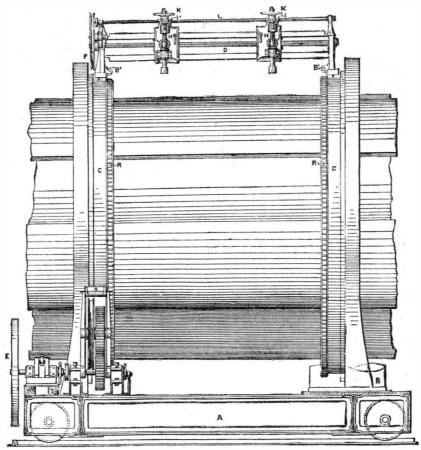


Fig. 3.-SIDE ELEVATION OF TUBE DRILLING MACHINE.

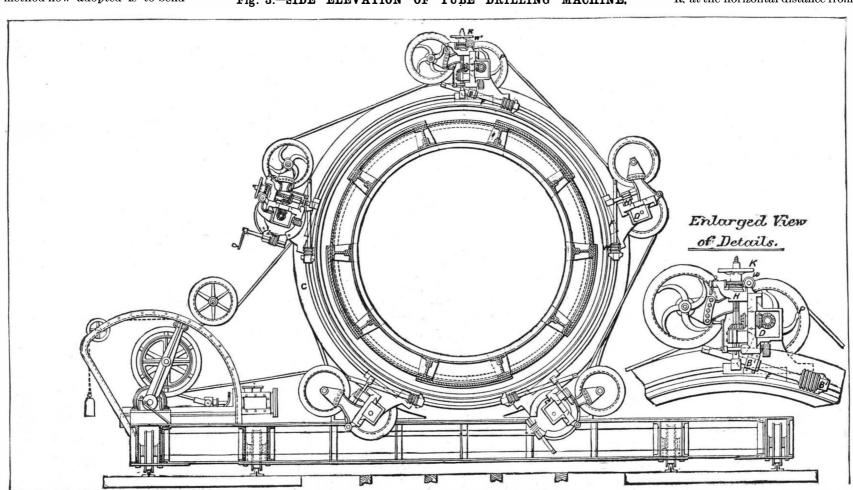


Fig. 2.—SECTION OF TUBE DRILLING MACHINE,

other of 8 feet. To these are fixed the radiating plates, P, having holes punched in the outer end for bolting on the first part of the permanent work, viz., the inner angle, A, of the circular stiffening girders. The same bolts are also made to carry the web plates, W, of these girders, on the outer edge of which are fixed the angle irons, I, for making the final connection

H, are now placed in position, being securely bolted through the inner angle of the circular girders. On these beams are now placed the shell or tube plates, the ends forming buft joints, while longitudinally they lap one another, this taking place over the solid flange of the H beams. The end joint of the one plate breaks opposite the center, or solid part, of those on either side. The first plates to place in position are the inner, or those lying close against the flange of the beams, beginning generally at the bottom and coming up on each side. Owing to the passing of the one plate beyond the other, one-half of each remains free to put grabs and drawwashers on, without interfering with the placing of the outer ones in position. So soon as the outer ones have been put on and fixed in a similar manner, there are passed round

all a couple of angle iron rings, for binding and drawing them up to their proper position. The tightening them up is done by means of iron wedges between the plates and the rings. After the bottom plates have been fixed in position, the tube is borne up by wooden blocks, built between it and the cradle underneath. The true position of the tubes, both as re gards horizontal distance apart and height, is found by means of a theodolite, placed at one end of the roads, on a fixed platform, in a position such that when it is in line with a stationary point at the other end it always fixes the centers 120 feet apart throughout, and horizontally in the same plane. If the center of the mandrel is not in this line, then it is made so by being raised, lowered, or shifted sideways to suit. When the mandrel is right, the tube must of necessity be so also, seeing the centers coincide.

When the building of one ring of plates has been completed, the drilling machine is moved forward, the blocks in front being taken out of the way and rebuilt behind as it is traveled along. To enable the drilling to go on continuously, the building of the tube in front is being proceeded with while the machine is still at work on the portion immediately behind. These tube drilling machines—of which there four—are shown in Figs. 2, 3, and 4. Each is self-contained, and on being run along the rails, carries all with it. The principal parts are the wrought iron underframe or carriage, A, on the one side of which is fixed the engine. E. and boiler, B, and two large cast iron rings, C, firmly bolted to the main cross girders. These rings have an internal diameter of 13 feet, sufficient to enable them to pass freely round the tube when the machine is being moved along. Five cast iron slides, D, are fixed thereon, and held in position by means of small slipper blocks, F, fitting into a recess in each of the rings, C. On each of the slides are the two heads, HH. Each head is provided with a single drill, and is capable of being rapidly run from one point of the slide to another by rack and pinion gearing. The slides are kept in position, and also turned round the rings, C, in either direction, by means of two worms, W, carried in brackets, F, one gearing in each ring in the circular racks. R. These racks being bolted to the rings serve also as guides for steadying the whole upper portion of the machine. All the drills point to the center of the tube, and having, as shown, both a circular and longitudinal motion, can with ease be made to reach every hole in any part of the structure; some of which are through a depth of as much as 4 inches of solid metal.

It might be here mentioned that some of the slides were specially designed to overcome the difficulty of drilling, say, a flat part in any of the tubes. The difficulty lies in the fact that the drills on any of the fixed heads always point to the center of the tube, whereas in the case just mentioned the holes require to be drilled at right angles to the special or flat part. The mode adopted to overcome this was to make both ends of each slide circled, fitting them into separate heads, which in turn were bolted to the slipper blocks, F, as in the others. On the head at one end is placed a worm,

the slide can be made to place and keep the drill pointing in any required direction.

The whole of the drills are fed into their work by an automatic arrangement, the motion being imparted to the longitudinal shaft, L, by a band driven off the main driving pulley. On this shaft slides, and by it also are to the shell of the tube. The horizontal H beams, driven, the worms, W, necessary for turning the worm

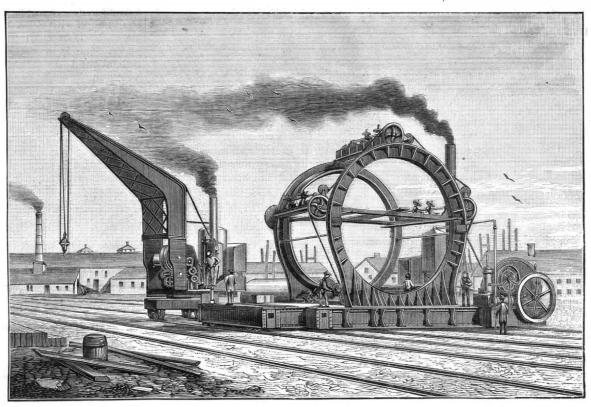


Fig. 4.-THE GREAT DRILLING MACHINES OF THE FORTH BRIDGE.

wheel, I, which at will can be made to drive the hand the building without being given time to close the fire wheel, K, thereby feeding the drill into its work. At one end of each of the main slides is overhung the driving pulley, P, the power being transmitted from the engine to the whole of these by means of a cotton rope, guided where necessary by supplementary pulleys. The slack is taken up by a shifting quadrant, moving about the engine shaftas a center, assisted by auxiliary pulleys on a wrought iron frame close by the en-

When starting work on any tube, a drilling machine is moved forward to the point at which operations are to begin. Each of the five slides is now moved around the rings until all the points of the drills face truly any series of holes in the longitudinal beams. The holes in this line, or series, are all drilled, two drills being at work on each line, then the slides are again placed so as to suit a new set, and so on until the whole of the

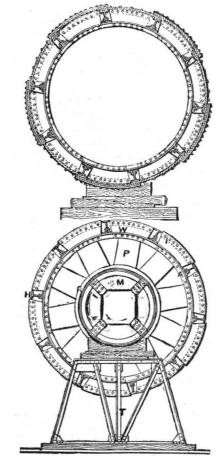


Fig. 5.-SECTION OF TUBE AND MANDREL.

tube commanded by the machine in its present position is finished. This is equal in length to 8 feet, and includes the full circumference of the tube. The number of holes in such is about 800, and the time required to drill all, when working continuously, is from twentywhile on the same end of the slide there is keyed a four to twenty-eight hours, varying thus much princi-strain.—The Garden.

wheel into which the worm is geared, by turning which pally on account of the difference in thickness of the various parts of the tubes. For Figs. 1 and 4 we are indebted to La Nature; for Figs. 2, 3, and 5 to Engineer.

#### Spontaneous Combustion.

The Boston Manufacturers' Mutual Fire Insurance Co. in a recent circular says:

A very considerable loss has lately been incurred by

one of our members in a building used for dyeing and drying, which was not suitable to be insured by us, and on which we had refused to issue policies. This fire has been made the subject of close investigation, and is very suggestive.

The building consisted of two sections, divided by a brick party wall, in which there were wide doorways fitted with suitable fire doors. On one side the risk was considered bad, and this part had been fully protected with Grinnell automatic sprinklers. On the other side the risk was considered fair, and automatic sprinklers had not been placed therein, but were about to be.

In this "fair" section the fire occurred, and the section, with its contents, was wholly destroyed. The "bad" section was wholly saved by the automatic sprinklers, the workmen having been driven from

doors, so that the fire might have passed except for the sprinklers.

The circumstances were as follows: Stock known as camel's hair, dved with chromate of iron, was in process of drying, under the action of a 56 inch fan operating at nine hundred revolutions per minute.

The fire is attributed to the spontaneous combustion caused by the rapid oxidation of the chromate of iron. In a still air it might have smouldered, but, under the influence of the fan, it burst into flame with the semblance of an explosion; the men were instantly driven from their places, and the section was totally destroyed, while the other division was saved as already stated.

The point of interest therefore is, how to stop a fan automatically, the instant a fire occurs, by the action of the heat; and this problem may be considered not only in connection with drying machinery, but in connection with all fans, and, perhaps, with some or all

This can be accomplished by automatically throwing off the belt, and it is probable that a different device may be required for each kind of fan; but in every device a fusible link can be made use of, soldered with the same solder which is used in automatic sprinklers, or with solder melting at a high degree, if exposed to more than ordinary heat.

The constant recurrence of fires caused by friction and spontaneous combustion in the processes of drying fabrics, as well as fibers, keeps us in the constant expectation of loss in the processes of drying, and we therefore again revert to the subject.

#### Hollow versus Solid Shafting.

A shaft made in the shape of a tube is stronger than it would be if made of a solid bar of the same dimensions. From this, however, it does not follow that a solid shaft is increased in strength or better prepared to stand a sudden twist if a portion of the material is bored out along its central line. Frequently workmen entertain the idea that the core of an axle or the bearing of a shaft is a hinderance in the way of strength, and is one of the reasons for making them hollow; this not so, as it is merely the arrangement of the material that improves its strength. Boring out a solid shaft lessens both its weight and its strength, but the material is removed from the portion where the least resistance is offered; therefore the loss of weight is greater than the loss of strength. The particles on the outer surface are tested to their utmost when those in the center barely receive any action at all, and from this line to the circumference they are gradually being brought into use until those on the outside are ready to break apart when the limit of strength is reached. In tests that have been made, results have shown that the weight may be reduced sixteen per cent by boring, while the strength would not be lessened by more than one and a half or two per cent. The success of many designs lies in so arranging the material that where any fracture is likely to occur, as much metal may be used as is likely to be wanted to stand the increased

#### ASPECTS OF THE PLANETS FOR MAY.

is morning star until the 4th, and then commences her brilliant career as evening star. On the 4th, exactly at midday, an event occurs in her history that gives her prominence on the annals of the month. She is in superior conjunction with the sun, passing beyond the sun, making her advent on his eastern side, clinging closely to him for a time, and hiding herself in his brilliant rays. As the weeks roll on she will emerge from her seclusion, shine with fitf glow, almost in the full blaze of the twilight, and before the summer wanes will be the loveliest object in the western evening sky, while winter will commence in earnest before she reaches her point of greatest distance from the sun. No true lover of the stars can gaze unmoved upon this fascinating planet, as, like a golden bead strung on an invisible wire, she oscillates eastward from the sun until her eastern elongation is reached on the 8th of De cember. Even more interesting is her return to the great orb, to whom she is linked by chains lighter than gossamer, and indestructible as the material universe itself.

Observers who watch closely the movements of this radiant star will readily perceive the oscillation eastward and westward from the sun, for such is the appearance she presents to spectators on the earth.

In reality, Venus and the earth are both revolving in elliptical orbits around the sun, as would be plain if observers could take the great luminary for a standpoint. Venus, being nearer the sun than the earth, moves faster and in a smaller orbit. She travels 21 miles in a second, and it takes her 225 days to complete a revolution. The earth moves slower, and makes a larger circuit. She travels 18 miles in a second, and completes a revolution in 365 days.

Thus our nearest planetary neighbor and her twin sister, the earth, move on in their shining paths, the former gaining upon the latter all the while. A time must come when the two planets and the sun will be in line, as is the case with all the planets in the system, and on the 4th Venus and the earth will reach that

Mathematicians give the exact figures. When Venus has made two entire revolutions and six-tenths of a third one, and the earth has made one revolution and six-tenths of a second one, a superior conjunction of Venus will take place, following, of course, a preceding epoch of the same kind. Venus requires 584 days to accomplish this feat. It is therefore called her synodic revolution, and represents the time that elapses between two consecutive returns to superior conjunction. The same law holds in regard to inferior conjunctions.

Venus, then, on the 4th, is in superior conjunction with the sun, rising and setting with the sun. She is in line with the sun and the earth, the sun being in the middle, is at her greatest distance from the earth, invisible as she passes beyond the sun, and invisible for some weeks to come, being eclipsed by his all-powerful

Although at present we may not behold the fairest of the stars with the physical eye, it is none the less sure that the light of her countenance is turned earthward, and that before long she will be visible in the west as evening star, and will throw a spell over the summer nights with her soft, dreamy beauty. She is lovely as in the morning sky she heralds the sun's approach in the glowing east, and even dares to shine in his majestic presence. She is more lovely, in our view, as, in the evening sky, she hangs in the star depths like a golden lamp suspended on invisible chains, sinks slowly in the west, increasing in brilliancy as the shadows deepen, outshining the myriad twinkling hosts that surround her path, and reigning the acknowledged queen of the star-spangled firmament.

But we anticipate the coming glory of our sisterplanet. For, during the month, she can only be seen by the eye of fancy as she makes her way toward us amid the blaze of sunlight that encircles her.

Venus, on the 11th, moving eastward from the sun, pays her respects to Neptune, moving westward toward the sun. The planets are in conjunction, Venus being 1° 15′ north.

The right: her declination is 14° 38′ north; her diameter is 10.2″; and she is in the constellation Aries.

Venus rises on the 1st 8 minutes before 5 o'clock in the morning; on the 31st she sets 20 minutes before 8 o'clock in the evening.

is evening star throughout the month. His course is is evening star. He is now conspicuous in the western marked by an interesting event. On the 17th, at 10 o'clock in the morning, he is in quadrature with the sun on the eastern side. Jupiter in quadrature is almost as impressive as Jupiter in opposition. For as the sun sinks below the western horizon, the princely and he is in the constellation Taurus. planet comes into view, looking down with friendly eyes from the zenith. It is a fitting place for the most distinguished member of the sun's family, who though 8 o'clock. three months have passed since opposition, retains the golden luster, the large proportions, and the beaming is evening star. The month closes with Neptune, aspect that marked his presence on his nearest approach to the earth.

Jupiter and Regulus continue to be near neighbors during the month, as they have been for the last six months. On the 30th, at 7 o'clock in the morning, they and he is in the constellation Virgo. are in conjunction for the third time, Jupiter being 41' north. A better opportunity seldom occurs for studying the difference in apparent movement between a planet and a fixed star. The star seems to be unchangeable in its position, being carried westward by the earth's motion eastward in her orbit. The planet is rightly named a wanderer, for he seems to move now forward, now backward, and is now stationary. Thus on the 7th of October of last year, Jupiter and Regulus were in conjunction, the planet after that time being east of the star. On the 14th of March, they were in conjunction again, changing places, the planet being west of the star. On the 30th they will be in conjunction for the third time; the planet again being east of the star, to whose vicinity he will no more return until he has completed a revolution round the sun, taking in the whole circle of the zodiac. Regulus is very near the sun's path, being only half a degree from the ecliptic, so that sun, moon, and planets are often passing near it. Mars was in conjunction with the star in May, and Venus in October of last year.

The right ascension of Jupiter on the 1st is 9 h. 54 m.: his declination is 13° 58′ north; his diameter is 37.2″ and he is in the constellation Virgo.

Jupiter sets on the 1st about a quarter before 1 o'clock in the morning; on the 31st he sets a few minutes before midnight.

is evening star until the 13th, and then becomes morning star. On the 13th at noonday, he is in conjunction with the sun, passing to the sun's western side, and commencing his course as morning star. He is the first of the giant planets to reach the goal, though the other members of the fraternity will follow his example in due time.

It is well to note the difference between the conjunction of an outer planet and the superior conjunction of an inner planet, as illustrations of both occur during the month. In the former case, that of Neptune, he passes from the sun's eastern side to his western. In the latter case, that of Venus, she passes from the sun's western side to his eastern, apparently reversing the process. Venus, being the first to arrive at conjunction, must meet Neptune hastening to the same goal, and, as already referred to, the planets are in conjunction on the 11th.

The right ascension of Neptune on the 1st is 3 h. 22 m.; his declination is 16° 47′ north; his diameter is 2.5′; and he may be found in the constellation Taurus.

Neptune sets on the 1st at half past 7 o'clock in the evening; on the 31st he rises about half past 3 o'clock in the morning.

#### MERCURY

is morning star. On the 25th he reaches his greatest western elongation, being 24° 59' west of the sun. Although he is nearly as far as possible from the sun, he is 9° south of him and not as favorably situated for observation as he was at eastern elongation in April, when he was 19° 26′ from the sun. He will, however, be visible to form the cargo of the canoes. It is astonishing how the naked eye, under the best conditions of wind and weather, for it is the first of the three times in the year when there is a possibility of picking him up as morning star. On the 25th he rises about an hour before the sun, and is in the constellation Aries, but there are no bright stars in the vicinity to point him out. The observer who succeeds in finding him is blessed with keen visual power.

in conjunction with Mars, being 2° 27' south. On the hang a kettle on three sticks. In Canada you make a 30th, at 4 o'clock in the afternoon, he is again in conjunction with Mars, being 2° 56′ south.

The right ascension of Mercury on the 1st is 2 h. 12 m.; his declination is 12° 49' north; his diameter is 12"; and greater than that of burning it as it is, and its cost is he is in the constellation Aries.

Mercury rises on the 1st about half past 4 o'clock in the morning; on the 31st he rises at a quarter after 3

#### MARS

is morning star. He is twice in conjunction with Mercury, and very near him during the whole month.

The right ascension of Mars on the 1st is 1 h. 32 m.; his declination is 8° 54' north; his diameter is 4'4"; and he is in the constellation Pisces.

Mars rises on the 1st soon after 4 o'clock in the morning; on the 31st he rises about 3 o'clock.

#### SATURN

sky, but at the close of the month will be too near the sun to be of much account.

The right ascension of Saturn on the 1st is 5 h. 24 m.; his declination is 22° 10' north; his diameter is 16":

Saturn sets on the 1st a few minutes before 10 o'clock in the evening; on the 31st he sets about a quarter after

#### URANUS

Mercury, and Mars as morning stars, and with Venus, Saturn, Jupiter, and Uranus as evening stars.

The right ascension of Uranus on the 1st is 11 h. 58 m.; his declination is 0° 58′ north; his diameter is 3.6″;

Uranus sets on the 1st soon after 3 o'clock in the morning; on the 31st he sets soon after 1 o'clock.

#### THE MOON.

The May moons fulls on the 28th at 31 minutes after 3 o'clock in the evening. The moon does not encounter a single planet in her path until the 12th, when she is in conjunction with Mars, being 2° 3′ south; four minutes later she is in conjunction with Mercury, being 22' north. She is in conjunction with Neptune on the 14th, about three hours before new moon, and with Venus on the same day about three hours after new moon. On the 16th, she pays her respects to Saturn. on the 20th to Jupiter, and on the 23d she makes a close conjunction with Uranus, being 1° 11' south. The close conjunction with Mercury on the 12th is an occultation for observers more favorably situated, and so is the conjunction of Uranus on the 23d, an occultation to observers in some parts of the far south.

The celestial kaleidoscope reveals a brilliant picture for the month of May. Venus is in superior conjunction, Neptune is in conjunction, and Jupiter in quadrature with the sun. Mercury reaches his greatest western elongation. Venus is in conjunction with Neptune. Mercury is twice in conjunction with Mars. The moon, besides swinging her ponderous sphere near the whole family of planets, occults Mercury and Uranus, for the telescopic delight of those observers who chance to be on that portion of the earth's surface where the exhibition is visible.

#### A Bark Canoe.

The camping out season is approaching, and an accessory to a life in the woods is the canoe. A writer in Macmillan's Magazine gives the following timely information for tourists: A bark canoe is only one man's load; he turns it upside down, and walks with it on his head. A man toiling across a portage in this attitude is a somewhat grotesque sight, suggesting a monstrous new kind of snail. Then the canoe will go over shallows where anything else would stick, and as for handiness, an expert canoeman will almost turn it around with one twist of the paddle. Repairs are frequent but simple, consisting mainly in the free application to damaged places of a resinous gum kept in store for that purpose. Speed is a secondary consideration; you cannot go fast paddling up, and you cannot help going fast coming down. We came down a reach in half an hour that we had taken half a day to work up. Often towing and poling have to be resorted to to make way against a heavy current. Paddling, though a more wasteful application of muscular work than rowing, is less fatiguing when the pace is not forced, and after a little practice becomes a very delectable exercise. The traveler embarked on a canoe voyage has to carry most things with him. Along the river there are only scattered farm houses, and the only certain and comfortable way of securing shelter for the night is to camp out. The tents and other necessaries much stuff can be stowed away in a canoe that looks quite small-another merit of the savage birch bark we choose our camping ground, pitch our tents, and make our camp fire; this last is of great importance, not only for warmth and brightness, but for driving away insects, the only drawback in a life otherwise perfect. When people play at camping out in England, On the 13th, at 3 o'clock in the morning, Mercury is they make a fire a foot or two across, over which they fire of logs five or six feet long, or may be whole roots of pine or cedar, which will burn all night. trouble of chopping the wood up small would be nothing. In many places, indeed, the best fuel is drift wood, which could in no way be made otherwise useful. Even in summer nights the fire is a welcome companion, and after a day's work at paddling, hot tea is the best of drinks whatever the temperature may be not that other drink would be easy to get if one wanted it, but no such want is felt.

#### Diphtheria in the Chief Cities.

Deaths from diphtheria per 100,000 inhabitants in 
 Warsaw
 167
 Stuttgart
 61

 Philadelphia
 163
 Rome
 56

 Chicago
 146
 Edinburgh
 50
 Malines...... 36 

The Siglo Medico, from which this extract is taken, considers Brussels a highly favored city. It is certainly so in regard to exemption from diphtheria.

#### ENGINEERING INVENTIONS.

A car coupling has been patented by Mr. Jefferson Fuller, of Huntington, W. Va. This invention covers a special construction and combination of parts of a device intended to couple cars automatically, having for its object to arrange the link pin to fall in place at the right time without the use of springs, and to manage the pin from either side or from the top of the car.

A car coupling has been patented by Mr. Isaac Linthicum, of Liberty, Neb. The drawhead has a funnel-shaped mouth, behind the bottom of which a recess or cavity is formed in the upper surface of the bottom, the front side of the cavity being beveled, and at the bottom of the cavity is a magnetic plate, to assist in keeping the outer end of the link raised, with other novel features.

A steam boiler has been patented by Mr. Thomas Kays, of Newton, N. J. This invention covers an improvement on the Lawson patented boiler of 1880, and provides for an additional partition or diaphragm dividing the steam space of the boiler arranged above or beyond the partition which divides the main steam space from the water space, such additional partition having openings in it for the passage of steam of somewhat greater aggregate area than the openings in the first partition, but still less aggregate area than the opening through which the steam passes to the cylinder of the engine.

#### MECHANICAL INVENTIONS.

A shuttle box motion for looms has been patented by Mr. Louis C. Werner, of Broad Brook, Conn. This invention covers a special construction and combination of parts to provide an improved mechanism for automatically operating shuttle boxes, made in such a manner as to adapt it to be applied to old looms, and one which is simple in construction and reliable in operation.

# AGRICULTURAL INVENTIONS.

A sulky plow has been patented by Mr. James E. Mohney, of Eight Mile, Mo. This invention includes a novel system of connections from the front furrow wheel of the plow to the rear furrow wheel, so the furrow wheels will be moved toward and from each other by a swinging of one wheel, also special connections of the wheels to the tongue, and other novel features.

A check row attachment for corn planters has been patented by Mr. John K. Voorhees, of Pella, Iowa. This invention relates to certain improvements in a former patented invention of the same inventor, and is intended to facilitate the hills being always dropped to form rows both ways of the field, and so no difficulty will be experienced in effecting the proper adjustment of the parts.

#### MISCELLANEOUS INVENTIONS.

A screw cutting die has been patented by Mr. Philip H. Class, of Greenfield, Mass. By this invention screw cutting dies are set eccentrically in the stock or holder in a manner to allow of their opening and closing, so that screws of different depths or sizes may be cut, and the adjustment being given a wide range.

A calculator has been patented by Mr. John L. Richardson, of Tuscola, Mich. This invention covers a little machine with marked and figured disks, pointer operated by a ratchet wheel with one hundred cogs, and other novel features, making a simple device for adding numbers, one which gives reliable results and can be easily operated.

A rotary force pump has been patented by Mr. John Serdinko, of New Braunfels, Texas. It is made with a tubular standard having one or more flexible tubes with interior half tubes and an interior cylinder mounted upon a crank shaft and having adjustable bars carrying rollers, whereby a liquid can be raised by the successive action of the rollers upon the flexible tubes.

A machine for punching lock plates has been patented by Messrs. Thomas Donahue and William W. Cone, of Terryville, Conn. Combined with a punch and with a die having an L-shaped slot is a sliding carriage with a tongue having an L-shaped cross-section, a hopper being located between the sliding carriage and the die, the plate going into the die forcing out the stamped plate.

An adjustable folding table and ironing board support has been patented by Mr. Henry P. Schenk, of Jeffersonville, Ind., deceased (Sophia R. Schenck, adminstratrix). It is formed with two legs, to each of which an L-shaped top plate section is hinged, so that these top plate sections can be swung upward and united to form together a square or rectangular top plate, with other novel features.

A washing machine has been patented by Mr. Henry D. King, of Nevada, Mo. Hollow projecting beating studs are attached in the form of inverted cups to the lower side of the dasher, for beating the clothes more effectually than solid studs forcing the clothes in and out of the hollow spaces of the studs, with other novel features and special combinations, to make an improved washing machine.

A clothes line fastener has been patented by Mr. Thomas McCoy, of Lawrence, Kansas. It is formed of a pivoted lever with a fork at its upper and a crosspiece at its lower end, combined with another pivoted lever having a cross piece at its upper end, the rope being clamped between the cross pieces after it has been passed over the fork on the upper end of the lever.

A syringe has been patented by Mr. Henry M. Howell, of New York city. It is designed more especially for use with plastic substances, as ointments, salves, etc., and consists of a shell to be filled with the plastic substance, and inserted into the syringe tube, the plunger of the syringe to be forced into the shell for expelling the substance, thus avoiding the inconvenience of filling the syringe tube.

A safety attachment for elevator cars has been patented by Mr. Philip Cohn, of Nuevo Laredo, Mexico. Latches are pivoted to the standards, with means for throwing them outward, the latches being locked in place so as not to catch on racks in the shaft, but so that when the hoisting cable breaks, the latches are thrown outward and catch on the racks, thus locking the car in place.

A machine for embossing and ornamenting boot or shoe soles has been patented by Mr. William D. Hall, of Beloit, Wis. Combined with a shaft carrying a toothed die or wheel is a vertically movable shaft adapted to turn on its longitudinal axis, a horn held adjustably on the shaft, and a check screw for limiting the upward movement of the shaft, for ornamenting the soles and producing an imitation stitch.

A collar button has been patented by Mr. George Krementz, of Newark, N. J. This invention relates to improvements on a collar button formerly patented by the same inventor; it has a hollow stem formed on a base, and the edges of the head are bent and curved down so as to form a rounded head, and to prevent the edges of the head from cutting into the skin in case the button is tilted and laid over against the flesh.

A mechanism for converting motion has been patented by Messrs. Daniel D., George L., and Charles W. Wiley, of Lanark, Ill. This invention covers a special mechanism in tended for use with wind-mills to convert the reciprocating motion of the pump rod into rotary motion for operating churns, grind-stones, etc., insuring a noiseless movement and intended to equalize the irregular speed and power of the windmill rod.

Improved bolt work for safes forms the subject of a patent issued to Mr. Thomas M. Brintnall, of Maryville, Mo. The invention consists in a lever so connected with the bolts and so intercepted by latches that it will first extend the bolts and afterward retract them, while impelled continually in one direction by a spring or its equivalent, with various other novel features. The same inventor has also obtained a further patent having for its object to extend the bolts of a safe door by the act of closing the door, to lock the same, and to unlock the door by time mechanism, so the door may be both locked and unlocked without any means of communication with its lock after the door is closed.

#### Special.

#### VIEWS OF THE HON. WM. PENN NIXON.

Mr. Nixon is widely known as the editor of the Chicago Inter-Ocean, one of the most outspoken and spirited dailies of the present age. Like many other busy editors, Mr. Nixon overworked himself, and about six years ago found that his health was gradually running down. His business associates and his family felt that he was in a perilous condition, and urged him to take rest—giving up for a while all editorial labor. His natural ambition and his long habits of diligent work were against this. Declining the suggestion of a vacation, he kept at his desk. At last, after fighting for some months with the condition of his system, which was gradually undermining his vitality, Mr. Nixon concluded to take a few weeks of rest. Of that rest and of what followed it we will let him tell, in his own words, as communicated to one of our correspondents, who recently visited him at his editorial

ooms in Chicago. Mr. Nixon, who now appears in the prime of life, and in the full vigor of bodily and mental vitality, said, sub-stantially: "It was in February, 1878, that I took a severe cold. My system had become much worked down, and driven with constant editorial duty, I had neglected it. After long consideration I concluded to take needed rest. I went to Florida and Cuba for a few weeks. On the way I had several hemorrhages from the lungs. I was quite sick, and returned in no better condition than . My wife was much alarmed about me. physician who attended me on my return gave me inhalations, tonics, alteratives, and pills; after taking which, for about two weeks, I was weaker. I kept at my work, which was exacting. By September my state had become critical. I lost flesh, and suffered from a severe soreness in the upper part of my right lung. My wife's sister, who was in Boston, wrote about a treatment which was novel to me—Compound Oxygen. A relative of hers who had been in such poor health that he had been compelled to spend several winters in Florida had been restored by this Compound Oxygen to such an extent that he was able to endure the climate of Boston in winter. The little book issued by Starkey & Palen on Compound Oxygen was sent me, and after reading it I concluded that even if their method of treating my ailments could do me no good, there was reason to suppose that it would

do me no harm. "I procured a 'Home Treatment' from the office of Messrs. Starkey & Palen, in Philadelphia, determining to give it a fair trial, and abide the result. For four or five months I took the inhalations at regular intervals, twice a day; continuing my work steadily. At first no marked effect was observed; in fact, not until three or four weeks. Then I began to feel that it was doing me good. I found that when I was exposed to the cold, and to chilling draughts, my power of resistance was far greater than it had been. There was no exhilaration, but there was a constant increase of strength. I still coughed considerably, and, in fact, did so for some months. The sore spot on my right lung gave me much annoyance. I rubbed my chest with various liniments, and I wore a chest protector. But gradually the soreness went away, as the lung gained strength. And the cough, which had so long clung to me, at last went off in an unexpected manner. One of the last coughing spells I had was almost as severe and extended as any ever experienced. It seemed to be the going out of the cough habit. There was probably some extraneous mat ter in the way, and this severe spell of coughing got rid

"I gained flesh very slowly, but gradually came back to my original weight, and now weigh more than before my illness. I am more able to resist cold, and, though I now take cold occasionally, I am far less subject to it than I was of old. My digestion, which was, of course, disordered, is now all that I can desire, and I am able to do my customary work without inconvenience or serious fatigue. I have never given a testimonial to any patent medicine, and I would not; but I do not consider Starkey & Palen's Compound Oxygen a patent medicine. It is a vitalizer and a restorer, and to it I owe my life."
"Mr. Nixon, did you ever take any other 'Oxygen

"Mr. Nixon, did you ever take any other 'Oxygen Treatment' than that of Messrs. Starkey & Palen?"

"No; I had no use for any other. This served the Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 254. just beginningthe science of chemistry.

purpose perfectly, and did even more than I could have expected of it."

"Do you ever have occasion to return to the use of the Compound Oxygen Treatment sinceyour restoration to health?"

"Only occasionally; for instance, if I have been exposed, and have taken cold. But I keep a 'Home Treatment' in my family, for we set a high value on its efficiency in cases of need, and several of my friends have found the advantage of it. You may put me on record as being a hearty and thorough believer in it."

Mr. Nixon's case is not a peculiar one. Thousands have been benefited by the use of Compound Oxygen. Among those who have experienced its wonderful curative properties are Judge Flanders, of New York; Edward L. Wilson, the popular lecturer and photographer; T. S. Arthur, the well known author, and Judge Kelley, of Philadelphia; Mrs. Mary A. Livermore, the eminent lecturer; and many others equally prominent.

If you are interested to know what it has done for others, and what it can do for you, send to Drs. Starkey & Palen, 1109 Girard Street, Philadelphia, who will send you free a treatise on this remarkable vitalizer—its discovery, nature, action, and cures.

#### 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 Thursday morning to appear in next issue.

Wanted.—Patented articles or hardware specialties to manufacture on contract or to manufacture and place on the market. First-class facilities. Correspondence solicited. Address Hull Vapor Stove Co., Cleveland, Ohio.

Grindstone Truing Device.—Price, \$16, with 7-inch roll; \$20, with 12-inch roll. Brown & Sharpe Mfg. Co., Box 469, Providence, R. I.

Reliable Dividers for machinists and draughtsmen. Catalogue free. J. Stevens & Co., Box 28, Chicopee Falls Mass

Special tools and machines of every description.

Interchangeable Tool Co., 313 North 2d St., Brooklyn.

Skating Caps,—Our machine makes the best. Lamb Knitting Machine Co., Chicopee Falls, Mass.

Miners supplied with pumps for every service by

Valley Machine Works, Easthampton, Mass.
Rolling Lever, Hand Punches, and Shears. Pon

Machine Tool Co., Worcester, Mass.

Billings' Patent Adjustable Tap and Reamer Wrench-

es. Billings & Spencer Co., Hartford, Conn.
Stephens' Patent Bench Vises are the best. See adv.,

p. 268.

Wanted.—Situation by a mechanical draughtsman experienced in designing general machinery. Specialty

perienced in designing general machinery. Specialty, steam and gas engines. Address A., Room 232, "Stewart Building," N. Y.

Detachable Pocket and Cap Patent for sale, or on royalty to clothiers and rubber clothiers. See illus., p. 276. Address A. Heller, 2005 Madison Ave., New York.

Telephones and Magneto Bells, \$10. W. E. Lewis, corry, Pa.

Cash Box, with "Champion" Keyless Locks. Secure

as a safe. Miller Lock Works, Philadelphia, Pa.

The most complete catalogue of Scientific and Mechanical Books ever published will be sent free on ap-

plication to Munn & Co., 361 Broadway, N. Y.

Oars to face your course with speed and ease. At
Alex. Beckers. Hoboken. N. J.

Shafting, Couplings, Hangers, Pulleys. Edison Shafting Mfg. Co.,86 Goerck St., N.Y. Send for catalogue and prices.

AirCompressors, Rock Drills. Jas. Clayton, B'klyn, N.Y. The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Penna.

Iron Planer, Lathe, Drill, and other machine tools of nodern design. New Haven Mfg. Co., New Haven, Conn.

The leading Non-conducting Covering for Boilers, Pipes, etc., is Wm. Berkefeld's Fossil Meal Composition: % inch thickness radiates less heat than any other covering does with two inches. Sold in dry state by the pound. Fossil Meal Co., 48 Cedar St., N. Y.

Try our Corundum and Emery Wheels for rapid cutting. Vitrified Wheel Co., 38 Elm St., Westfield, Mass.

The Providence Steam Engine Co. of Providence R.

The Providence Steam Engine Co., of Providence, R. I., are the sole builders of "The Improved Greene Engine."

Every variety of Rubber Belting, Hose, Packing, Gaskets, Springs, Tubing, Rubber Covered Rollers, Deckle Straps, Printers' Blankets, manufactured by Boston Belting Co., 226 Devonshire St., Boston, and 70 Reade St., New York.

Brush Electric Arc Lights and Storage Batteries. Twenty thousand Arc Lights already sold. Our largest machine gives 65 Arc Lights with 45 horse power. Our Storage Battery is the only practical one in the market. Brush Electric Co., Cleveland, O.

Write to Munn & Co., 361 Broadway, N. Y., for catalogue of Scientific Books for sale by them.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky. "How to Keep Boilers Clean." Book sent free by James F. Hotchkiss. 86 John St., New York.

Mills, Engines, and Boilers for all purposes and of every description. Send for circulars. Newell Universal Mill Co. 10 Barclay Street. N. V.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. For Power & Economy, Alcott's Turbine, Mt. Holly, N.J.

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York.

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, 361 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N.Y. Steam Pumping Machinery of every description. Send for catalogue.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.
All Scientific Books and App. cheap. School Electricaty N. Y.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 254. Nickel Piating.—Sole manufacturers cast nickel an odes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty, St., New York.

Catalogue of Books, 128 pages, for Engineers and Electricians, sent free. E. & F. N. Spon, 35 Murray Street, N. Y.

For Steam and Power Pumping Machinery of Single and Duplex Pattern, embracing boiler feed, fire and low pressure pumps, independent condensing outfits, vacuum, hydraulic, artesian, and deep well pumps, air compressers, address Geo. F. Blake Mfg. Co., 44 Washington, St., Boston; 37 Liberty St., N. Y. Send for catalogue.

A lot of the Chucks of all sizes, slightly damaged, at half price. A. F. Cushman, Hartford, Ct.

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Emerson's Process Book of Saws free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 270. For Sale.—Complete set of Scientific American

from 1845 to 1885. Noye Manufacturing Co., Buffalo, N. Y.
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. For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, send for catalogue to Rowley & Hermance, Williamsport, Pa.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 270.

Young Men! Read This!

The Voltaic Belt Co., of Marshall, Mich., offer to send their celebrated Electro-Voltaic Belt and other Electric Appliances on trial for thirty days, to men (young or old) afflicted with nervous debility, loss of vitality and manhood, and all kindred troubles. Also for rheumatism, neuralgia, paralysis, and many other diseases. Complete restoration to health, vigor, and manhood guaranteed. No risk is incurred, as thirty days' trial is allowed. Write them at once for illustrated pamphlet free.

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 of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

#### NEW BOOKS AND PUBLICATIONS.

THE RESCUE OF GREELY. By Commander W. S. Schley, U. S. N., and Professor J. R. Soley, U. S. N. New York: Charles Scribner's Sons, 1885.

In this very clear and straightforward account of the rescue, the authors have produced a book which will prove attractive even to those who have not hitherto been interested in the progress of Arctic discovery. While it has been the chief purpose of Commander Schley and his associate to relate the circumstances attending the Relief Expedition of 1884, they have added much to the interest of their book by an admirable introduction. One-third of its contents has wisely been devoted to the recital of those events which originally placed Greely at Lady Franklin Bay, and made the final expedition imperative. The reader is familiarized with the ground by a brief sketch of the geography of Baffin's Bay and of the ice barriers which impede its navigation. An account of the general plan of the circumpolar stations as proposed by Weyprecht explains the mission of Greely and his party at so desolate a post as Fort Conger. Then follows that dreary chapter of accidents which made the expeditions of the Neptune and the Proteus so utterly ineffectual, the station at Littleton Island no more than a promise, and the word of a great government an unredeemed pledge. Prepared by this introduction, the reader is placed in a position to follow intelligently the subsequent movements of the Thetis and Bear in effecting the final rescue. From the first he is made to feel that his sympathies are engaged in a successful enterprise, and to share in a measure the enthusiasm of the rescuers. An occasional explanation places some censured action in a truer and more favorable light, but as a rule the promised freedom from comment is favorably observed. The book is illustrated by fourteen engraving and three very serviceable maps.

AN INTRODUCTION TO PRACTICAL CHEMISTRY, INCLUDING ANALYSIS. By John E. Bowman, F.C.S. Edited by Charles L. Bloxam, Philadelphia: P. Blakiston, Son & Co., 1885.

In this eighth edition of an already well known book, several valuable additions have been made. The gravimetric methods of analysis have been considerably extended, and a new chapter on volumetric analysis added. The chemical nomenclature has also been modernized. The book is divided into five parts, which have for their purpose respectively: General Chemical Experimenta tion; the Qualitative Analysis of Inorganic Salts and of the more common Organic Acids and Alkaloids; Examples in Qualitative Analysis; Quantitative Analysis; and the Use and Preparation of Reagents. In the appendix, several useful tables have been included. The text is clear, and the eye is materially assisted by a judicious variation in the type. Wood cuts are sparingly used to illustrate the different processes, and are generally satisfactory. The arrangement and style are excellent. Much valuable information has been con densed into convenient space, which will commend the book to the amateur analyst, as well as to the student

# Scientific American.



#### HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little earch, and, though we endeavor to reply to all, enter by letten or in this department, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred

Scientific American Supplements referred to may be had at the office. Price 10 cents each. to may be nad at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

- (1) B. W. B.—Persimmon bark is an astringent, and is said to have been used advantageously in intermittents, and in the form of a gargle in ulcerated
- (2) G. M. W.—You can become an expert runner by practice only. It is possible that you are not adapted by nature to running.
- (3) D. R. R. asks: How many pounds pressure does it require to force water up a half inch pipe, grade 30 feet, distance 300 feet? A. 15 or more pounds, according to velocity.
- (4) J. M. H.—While book knowledge is very valuable to mechanical engineering, shop practice is more important. Both are desirable and necessary There is no end of books which you might read.
- (5) C. H. K.—Two and a quarter times as much water will pass though a three-eighth inch hole as through a one-quarter inch hole under the same
- (6) W. F. C. asks if there is any kind of solder that can be used with a soldering iron that will take a plate of nickel and be the same color as the rest of the work. We use high brass and low brass and copper. A. Use pure tin.
- (7) A. & C. H. write: We have a horizontal boiler, and the flues leak around the ends, caused by being heated when there was no water in the boiler. How shall we remedy this? A. Get the nearest boiler maker to expand the tubes. Anything that you can put into the boiler to stop the leaks will only be a temporary makeshift, and may give you more trouble in the end.
- (8) O. F. asks: 1. What is best for me to use for dissolving the Russian isinglass (that which is used for clarifying purposes)? Alcohol does not seem to answer. A. Try acetic acid. 2. What can I mix with paint in order to produce a lasting and glossy appearance when it becomes dry? A. Use boiled linseed
- (9) E. S. writes: In chemistry is there any such thing as atomic weight? And if so, please give the definition. A. Atomic weight is used to designate the weight of any of the elementary substances in comparison with the weight of hydrogen. Thus we accept 1 as the atomic weight of hydrogen, and therefore, finding oxygen sixteen times as heavy, we give to this latter substance the atomic weight of 16.
- (10) J. H. J. writes: In your issue of the 14th instant, you give a receipt for making liquid ghte, in which you say, "100 parts best Russian glue." Where can Russian glue be obtained? And why Russian? Will not the best American or French answer as well? A. Russian glue is prepared from the intestines of fish, and is considered more tenacious than the ordinary varieties of glue. It can readily be substituted by the commercial article known as "fish glue," which can be procured from any wholesale paint house.
- (11) J. B., of the United States Army, asks a recipe for making a brilliant black gloss or polish applicable to black leather belts and boxes, so that they will look well at parades and inspections. Also how the brilliant gloss on patent leather is obtained? A. Boiled linseed oil and lampblack, with a drier, form the base of different compounds for leather dressings, but you had better buy one of the many preparations for your purpose. The patent leather gloss is obtained by baking japan on the leather in an oven, and is a very difficult process.
- (12) F. L. asks how to imitate walnut graining. A. Try the following: The wood, previously thoroughly dried and warmed, is coated once or twice with a stain composed of 1 ounce extract of walnut peel dissolved in 6 ounces of soft water by heating it to boiling, and stirring. The wood, thus treated, dry is brushed with a solution of 1 potassium bichromate in 5 ounces boiling water, and is then allowed to dry thoroughly, and is to be rubbed and polished as usual.
- (13) S. A.—The white Castile soap is probably the best soap known. It consists of soda and pure olive oil. The olive oil is sometimes substituted in part as follows: Olive oil 40 parts, ground suet and tallow 30 parts each. Caustic potash is used instead of soda, but it is more expensive, and the soap is a softer article. See the articles on "Soap and its Manufacture" in Scientific American Supplement, Nos. 308, 325, 330, and 360.
- (14) D. H. B.—The pressure of wind at 20 miles per hour is 2 pounds per square foot. As there are some conflicting elements in the computation for your special form of windmill, to determine its power we can only recommend you to make a practical trial, which is far more reliable, and takes in the elements of friction, variable angle of sails, and back action behind the hood, caused by the angular position of the windward arm.
- (15) L. M. B.—For the volume of spherical domes-Rule: To 3 times the square of the radius

add the square of the height of dome; multiply this sum by the height of dome, and multiply this product by 0.5236, or  $3r^2+h^2h\times 0.5236$ . For volume of a cone: Multiply area of base by the height, and take one-third the product.

- (16) J. P. S. asks: Would a cornet player be able to use his instrument successfully after having his upper teeth extracted and a false set put in And are there good players so situated? A. A player having false teeth can use his instrument, but cannot play so well; we doubt if there are any very good players with false teeth.
- (17) J. P. L.—To find how much tin ressels will hold, use the following rules: For the contents of cylinders: Square the diameter, and multiply the product by 0.7854. Again, multiply by the height (all in inches). Divide the product by 231 for gallons. For the frustum of a cone: Add together the squares of the diameters of large and small ends; to this add the product of the diameter of the two ends. Multiply this sum by 0.7854. Multiply this product by the height (all in inches). Then divide by 231 for the num-
- (18) P. McF.—The right ascension of a planet is its distance from the vernal equinox or the point in the heavens at which the plane of the ecliptic crosses the plane of the equator measured upon the plane of the equator-the distance being measured in hours, minutes, and seconds, 24 hours representing the whole circle, or 360°. The declination north or south is the distance of a planet from the plane of the equator north or south in degrees, minutes, and seconds, reckoning from 0° at the equator to 90° at the pole. The diameter is its apparent size as seen from the earth in parts of a circle of 360°.
- (19) S. L. S.—In regard to throwing two banks across a lake in which other owners might be interested, you should first ascertain what riparian rights you might infringe. The building of a safe dam on soft bottom is a very precarious undertaking; the silt being very mobile will not only move out from under the filling, but will also give no anchorage against the pressure. With a moderate depth of 4 or 5 feet of silt, a row of piles close together across the lake would be necessary to insure a footing. Then fill in with as coarse material as possible, making a hard rammed partition of clay or cement and sand on the pressure side of the pipes. Carry the partition as low as possible or below low water. Sheet piling with two rows of horizontal planking spiked and filled in on each side even with top, with broken stone, makes a cheaper spill than surface planking upon sills as sketched by you. Further, we do not understand from your letter whether it is a natural lake, the widening of a river, or a cut out from some river, all of which should be considered in any plan interfering with water flow. We do not consider that the current or depth that you speak of now interferes with the quality of the ice. You speak of white streaks and clearice. Our best ice in this market is much marked in this way. These streaks are caused by the condition of the weather in the freezing season, alternate snow and rain, with wind, being particularly detrimental to a clear ice crop.
- (20) R. S.—One of the very best scouring pastes consists of:

	Oxalic acid	11	oart.
1	Iron peroxide	-	
	Powdered rotten stone	20	"
ì	Palm oil	0	44
	Petrolatum.	1	"

Pulverize the oxalic acid and add rouge and rotten stone, mixing thoroughly, and sift to remove all grit; then add gradually the palm oil and petrolatum, incorporating thoroughly. Add oil of myrbane or oil of lavender to suit. By substituting your red ashes from stove coal, an inferior representative of the foregoing paste will be produced.

- (21) G. W. W.—Dynamite or giant powder consists of about 75 per cent nitroglycerine and 25 per cent of some absorbent, generally infusorial earth. Its manufacture is attended by many difficulties as well as being exceedingly dangerous, and unless you have had considerable experience in chemical manipulation, you will be unable to prepare it.
- (22) S. J. writes: I set out 50 young apple trees last fall on some sandy soil. Should it be dry next summer, would it be well to lay last fall's apple pomace around them, and how thick would be safe? A Yes; 4 to 6 in. deep.
- (23) W. D. G., Jr., asks: How large a main pipe will be required to supply 6 hydrants and 50 dwelling houses, the water to be brought 1 mile with a 70' head; the hydrants to be used with a 1" nozzle, and there being no probability of more than two being required at a time? A. About a 6" pipe; a smaller one would not give the desired pressure for hydrant
- (24) E. F. P. asks for a substance for polishing brass trinkets in a tumbler. A. Use leather scraps or skivings and tripoli, with rotten stone or pulverized pumice stone for first polishing; finish for a shine with rouge and skivings in another tumbler.
- (25) T. F. W.—If you require power, it pays to use the exhaust of any engine for heating purposes. Independent of the want of power, and for a small place, a hot air furnace is the cheapest. For large buildings a low pressure steam apparatus has many advantages. Better advise with parties in the steam heating business.
- (26) E. P. O. writes: Suppose a cannon is placed on a railroad car so as to shoot perpendicularly. into the air, with force enough behind the bullet to carry it a mile high at the rate of a mile a minute, the railroad car also moving at the rate of a mile a minute when the cannon is discharged; how far will the cannon and ball be apart when the ball strikes the earth? A. The question supposes an impossibility; one cannot shoot a bullet to go a mile high at the rate of only a mile a minute; if started at that rate, it would drop to the ground as quickly as a marble snapped\_from the

- (27) W. D. C.—We do not see how any hemicals can be put on the undressed side of leather to render it capable of being smoothed with emery cloth. The fibrous character of the leather is of such nature that the smoothing is done with a very little grease and elling, hammering, or slicking.
- (28) E. S. T. asks for a good receipt for good office mucilage? Take 2 parts of gum dextrine and add 1 part acetic acid with 5 parts of water. Dis solve over a water bath and add 1 part alcohol.
- (29) C. E. O. asks what "Sozodont" is omposed of? A. Take of:

Potassium carbonate	é	ounce
Honey4		44
Alcohol2		"
Water10	,	44
Oil of wintergreen and oil of rose, to		
flavor sufficient		

- (30) B. A. H. asks how to make a polishing paste for blackening and polishing stoves? A. Try the following: black lead pulverized, 1 lb.; turpentine, 1 gill; water, 1 gill; and sugar, 1 oz.
- (31) G. G. writes: Some months ago I was shot in the face: it is all healed, but left quite a scar, and in order to hide it, want to raise a beard. I have a growth of hair, but not sufficiently strong, there fore ask you the question if there is a remedy that would force hair to grow, and what it is. A. Where the hair glands have been destroyed, it will, of course, be impossible to produce a growth of hair. The use of borax in the water employed for washing, together with stimulating lotions containing small amounts of tincture of cantharides, is frequently of service. Such a lotion may consist of 1/2 oz. tincture of cantharides, 2 oz. eau de Cologne, 1/2 drm. oil of nutmeg, and 10 drops oil of lavender.
- (32) G. B. writes: I want to run a short telegraph line (100 yards) between two offices. Please give diagram and principal connections for single line? A. For a telegraph line of the length stated, you may place your battery, sounders, and keys all in one circuit; your ground connections at the ends may consist of wires attached to gas or water pipes, or you may connect your ground wires with metallic plates having about 20 sq. ft. area, and buried in earth that is constantly moist.
- (33) F. B. B.—It is not an easy matter to repair a mirror, but if it is silvered with mercury amalgam, you may be able to repair it by cleaning a space on the back of the mirror large enough to remove the scratch, then moistening the amalgam on the back of a piece of mirror with a little mercury, and cutting out a patch from the amalgam so moistened which will fit the cleaned place on the back of your mirror; then carefully slip the patch from the piece of mirror and place it in position on the injured mirror, then place on the back of it a piece of cloth and then a weight. Allow it to remain several days in this condition. If the work has been carefully done, the patch will not be noticed.
- (34) F. A. K. asks if the electric current produced by small jets of steam is of any value? A. The electric current produced in the manner described is of no practical value.
- (35) W. J. M. writes: 1. I am making some magneto call bells, which do not work satisfactorily on account of the revolving armature, which is of cast iron, becoming charged; how will I treat them so as to prevent this? I have tried many receipts to soften cast iron, but failed. I hope you will send me a receipt that will save me further trouble. A. Heat your cast iron very hot, and bury it in powdered slaked lime to cool. 2. What is the best kind of steel to make the permanent magnets of, such as used in all the telephone call bells? I am using cast steel hardened in salt and water. Is there a better way for doing the same? A. Chrome steel is said to be best for this purpose. Only the ends of the magnets need to be hardened. 3. Is Alvar steel any good for magnets, if so, where can I procure it? A. We do not know of any steel by that name. 4. Have you got a Supplement giving full instructions how to construct an electric bath? A. If you mean an electroplating bath, see Supplement 310. 5. What is the electromotive force of a single Leclanche cell in volts? A. About 1.48 volts. 6. Would you consider it an improvement on the Grove battery by using a solution of wash ing soda instead of sulphuric acid? A. It depends upon the results secured.
- springs, we suggest the use of a muffle or small chamber made of fire clay in the shape of a half cylinder with one end closed; or iron will answer the purpose, but will soon burn out. Build the muffle in a small brick furnace, so that the fire may be in contact with top and bottom. The springs can be passed into the muffler with a small tongs, and taken out as fast as heated. In this way a dozen or more may be heating at once. Harden in water or oil in the usual way. For drawing the temper, we think there is nothing better than a pot of boiling oil (linseed), in which dip the springs a few seconds until they are of the same temperature as the oil, then quench in hot water, which will leave enough heat in the springs to dry them. For this operation a flat-bottom basket made of wire makes a very convenient way of handling 3 or 4 dozen at once. red hot lead in a crucible for heating articles for hardening. We do not think it best where large numbers are to be handled, as the springs would have to be held under the lead, which might be troublesome.
- (37) E. O.—Emery wheels are in common use for grinding tools. A little care only is required to keep the tools from heating, and thereby destroying the
- (38) J. H. S.—We know of no remedy for your wet wall but furring off and newly lathing and plastering in the regular way. It is the cold wall that condenses the moisture of the rooms. The kitchen is the principal source of excessive moisture.
- (39) W. F. K.-To run your copper into ingots, treat it in the crucible with borax and soda as a flux. Heat the moulds so as to make them perfectly dry before pouring the metal.

- (40) C. C. asks: Which would be the best test for water works—to have three streams on one main near each other, or three streams on different mains scattered over the town? The mains, 8 in., 6 in., and 4 in., works half a mile from town. A. If you are testing in the interest of contractors, place the trial streams as near the source of supply as possible, and also near the 8 inch main. A fair test will be to locate the streams widely apart on one distributing branch.
- (41) G. C.—Coke is supposed to be free from sulphur or other deleterious gases. We have little experience here with coke fired boilers, but learn that in England coke has a high reputation as a steam fuel.
- (42) A. B.—Galvanized iron is generally used in damp places. Copper and brass are the only substitutes, both of which are more expensive, their values depending upon the conditions of their use.
- (43) W. C. H.—Knife sharpeners and class cutters are made of fine steel only, and given an extra hard temper. Hard bronze, 75 parts copper to 25 parts of tin, makes a very hard alloy, and can be meltd in a brass furnace and cast. It is not as hard as the hardest steel, but will make very good cutting instruments. Can be cast in iron moulds. Iron may be readily brazed in a forge, or if small, with a blow pipe.
- (44) J. M. C. asks: Will it destroy the power of a balance wheel by running a belt from it to a shaft? A. It will not. 2. We use a 6 horse power engine set on a cast frame; the fly wheel is 26 inches in diameter, 11/4 inch rim, 5 inch face, weighs about 150 pounds; will it be safe to put on about a 450 or 500 pound fly, or about what size and weight would do? A. If the engine now runs steady or evenly, more fly wheel will not be beneficial. If there is much shafting with pulleys and a belt on the present fly wheel, you will gain nothing by adding another and heavier fly
- (45) A. F. McE. writes: We carry 60 pounds steam on a boiler used to run an Armington & Sims 35 horse power engine for incandescent lighting. The exhaust from this engine is connected into the 8 inch main steam pipe of low pressure heating apparatus, on which we carry a pressure of 7 pounds. Will you please tell me, through the columns of your paper, what is the thermal value of the exhaust of this engine in terms of the total heat of the steam in the boiler, or what part of the energy of this boiler is used in running the engine and what part is available for heating purposes? Temperature of feed water is 60° Fah. A. Your statement does not enable us to give you a clear Carrying 60 pounds pressure in the boiler answer. does not indicate the amount of steam used in the engine. This can only be done by indicator cards, which show the mean engine pressure, together with the speed record. On the other hand, you may be said to be using for heating purposes all of the thermal power generated and passed through the engine, with the only exceptions of the amount of radiation and leakage and the heat value that escapes to the atmosphere after heating the building. If you use all the exhaust for heating purposes without wasting, or, in other words, condense all the exhaust in the heating coils, you may safely conclude that you are running your engine free of cost while so utilizing the exhaust. The only apparent error in your system appears in the large amount of back pressure on the engine. The best examples of exhaust service in this vicinity exhibit a back pressure of 0 to 1/2 pound, with the entire absorption of the thermal value of the exhaust in heating buildings

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated.

J. T. H.—The earth appears to be a light yellow ocher, too light in color and not possessing sufficient body to be valuable as a paint. For local wants, it could be used as a polishing powder and perhaps for inferior qualities of pottery. Nothing very definite can be said concerning it unless it were first analyzed.

#### INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

April 14, 1885,

### (36) M. & A.—In hardening such small AND EACH BEARING THAT DATE.

[ [	See note at end of list about copies of these patents.]
A	larm. See Burglar alarm. Railway train alarm.
Aı	malgam strainer, J. Kirby 315,637
A	malgamating pan and settler apparatus for
ĺ	treating ores, M. P. Boss
Aı	nimal shears, G. H. Coates
A	uger anchor, ground, Boehmke & Bohlken 315,593
A:	xle box, A. Fontayne 315,927
A	xle box, car, W. E. Wilcox
В	g holder and lifter, J. A. Hamsch 315,778
	ig rack, R. E. Williams 315,688
Ва	king powder, A. Peters315,830, 315,832
Ва	king powder, phosphate, A. Peters 315,831
В	le tie, wire, G. Nicholson
	ling press, J. R. & W. D. Slauson 315,850
	ling press, W. D. Slauson315,965, 315,966
	lling press, upright beater, J. J. Piatt 315,960
	rbers' chairs, head rest for, T. W. Patterson 315,540
	ttery. See Electric battery. Galvanic battery.
	ed spring, L. M. Prowse
Ве	ehive, J. G. Hubbs 315,505
Ве	er cooling and preserving apparatus, F.
	Beisinger
Ве	er, manufacture of, J. Von Rose 315,980
	lt fastener, L. W. Herrick 315,781
	lt replacer, J. J. Harnsberger 315,615
ве	nzaldehyde, production of chlorinated deriva-
	tives of, R. Gnehm 315,932
	rth, sleeping car, G. Leve 315,517
	liard cue chalk, substitute for, A. Peple 315,828
	nd slat fastener, window, J. M. Van Dyke 315,861
Ble	ouse and pantaloon overalls, combined, S.
	Jacobs
Bo	ard. See Drawing board. Multiple switch

board. Wagon scoop board.

# Scientific American.

Boat, J. Forbes, Jr	215 758	Electric switch signals, circuit for, A. W. Hall 315,498	Lathe tool rest, O. C. White	Rope buckle, V. P. Travers
Boiler. See Steam boiler.	310,100	Electric wires, aerial conduit for, D. B. Macquar-	Lever power, C. Salisbury	Rope coupling, hemp and wire, A. Engelmann 315,490
Bolt. See Shutter bolt. Bolt, J. J. Devine	315,748	rie	Life-preserver, C. Leduc         315,950           Lifting jack, Giffard & Roberts         315,611	Safe lock mechanism, H. Gross
Boot and shoe heels, machine for pricking, T. P. King	315,636	Elliptic springs, bar or plate for, H. B. Dye 315,920	Lifting jack, T. Maxon       315,807         Lifting jack, W. C. Willmore       315,871	
Boot or shoe, S. A. West	315,869	End gate for dumping wagons, T. S. Stewart 315,969 Engine. See Gas engine. Steam engine.	Light. See Drop light. Lightning conductor, F. R. Upton	Sand and water feed mechanism, D. Shortsleeve 315,848 Sash balance, T. Morton
ornamenting, W. D. Hall Boots, etc., composition of material for damp-	315,775	Envelope, sample, A. Ackerman 315,692 Evaporator, J. W. Babbit 315,696	Limb, artificial, W. Lockwood	Sash holder, F. H. Bultmann       315,474         Saw, C. Richardson       315,663
proof socks or soles for, R. J. Baggaley Bottle stopper, A. F. Kent.		Explosives, aerial drop for, M. L. S. Buckner 315,712 Fan holder, B. Brower	Lock plates, machine for punching, Donahue & Cone	Saw, buck, S. Walter
Bottle stopper fastener, W. Painter	315,655	Fare receiver, register, and alarm, W. A. Con-	Locomotive brake, G. S. Strong	Emerson
Bottle stopper fastener, J. T. Walker Bow and arrow, cross, J. Almond		nelly	Bonzano	Saw swage, Newnham 315,820
Box. See Traveling box. Bracelet, chain, W. I. Macomber	315,525	Farm gate, J. H. Laney	Loom reed, E. Adamson	Saw swage, A. S. Parke
Bracket seat, O. E. Briggs Brake. See Car brake. Locomotive brake.		Fence, D. B. Peck       315,827         Fence, flood, S. Ingels       315,991	Lubricator. See Car journal lubricator. Shaft lubricator.	Sawing machine, circular, L. Houston
Brewing purposes, preparing and purifying wort	015 050	Fence, iron, G. W. McCann	Lubricator, Jacobsen & Jensen       315,627         Lubricator, F. J. Renchard       315,550, 315,551	Scaffold iron, A. H. Campbell 315,720
for, C. Zimmer	315,822	Fence wire winding device, W. Logan 315,803	Measuring apparatus, grain, O. P. & O. E. Wagner 315,682	Screw cutting die, P. H. Class 315,728
Brick machine, P. L. Simpson  Brick machine, A. D. Thomas		Fences, device for forming openings in wire, W. M. Clow	Measuring utensil, multiple, P. C. Goodwin	Seal lock, J. F. Inghram 315,945
Brick pressing machine, S. P. Crafts		Fiber rubbing machine, A. Scott         315,666           Fifth wheel, F. L. Ezell         315,926	Mechanical movement, O. Arnold	Seat. See Bracket seat. Seeder, A. Gilmore
Buckle, C. T. De Forest	,	Filter, D. Biggs. 315,463 Filtering material, revivifying, J. W. J. Reford. 315,837	Metallic wheel, J. W. Marshall 315,805 Metallurgic gas furnace, J. S. Seibert 315,846	
Burglar alarm, J. H. Luebsen	315,641	Firearm magazine, J. M. Marlin	Meter. See Grain meter.  Milk can, C. S. Raymond 315,835	Settee, folding seat, H. J. Harwood 315,618
Burner. See Hydrocarbon burner.		Fire engines, apparatus for lighting the fires of	Mill. See Ore grinding mill. Windmill.	sedimentary matter of, B. Corscaden
Button, A. R. Boynton		steam, L. Campbell	Motor. See Spring motor.	Sewing machine, Cram & Covell315,915, 315,942
Button hook and coat hanger, combined, G. Heiles	315,500	Fish hook, combination, C. L. Spencer	Muffler and safety valve, J. M. Coale	
Calculator, J. L. Richardson		Folding chair, G. E. Vandenburgh	Musical instruments, mechanical, G. B. Hakins 315,774 Musical instruments, mouth-piece for brass, C.	Sewing machine thread controlling device, E.  Murphy
Can. See Milk can. Oil can. Sheet metal can. Can filling machine, J. G. Hoskins	•	Folding table and ironing board support, adjust- able, H. P. Schneck	Meister         315,810           Musical reed, M. Gally         315,49a	
Candlestick, H. Anlauf	315,695	Forceps for applying rubber dam clamps, Brewer	Net, fly, Studley & Dosch	Sewing to fasten the ends of sewed seams, E. S.
Car brake, J. J. Henry. Car brake, H. Walter.	315,982	& How	Nut lock, P. T. Brady	Shaft coupling, C. R. James
Car brake and starter, B. F. Bergh	315,620	furnace. Furnace, J. F. Coignet	H. P. Phipps       315,542         Odometer for vehicles, C. F. Church       315,727	Shaft tip, carriage, A. L. Howard 315,787
Car coupling, J. R. Avery		Furnace, R. M. Wier	Oil can and lamp filler, M. C. Richards	
Car coupling, C. A. Chamberlain	315,908	gauge.  Galvanic battery, A. Haid	Ore, etc., apparatus for grinding, Burr & Fuller 315.716 Ore concentrators, C. W. Patten 315.824	Shafts, supporter pad for propeller and other, V.
Car coupling, J. A. Craig	315,602	Garment fastening, J. C. Hyde 315,944	Ore crushing machine, W. E. Wild	Shears. See Animal shears.
Car coupling, Goettel & Howe	315,514	Garment, ventilated, C. I. E. Mastin	Paint composition, roof, D. Brobst	Shingle and siding gauge, W. H. H. Campbell 315,722
Car coupling, I. Linthicum	315,804	Gas conductor, J. Hunter         315,788           Gas engine, T. McDonough         315,808	Painted articles, apparatus for drying, G. & C. J.  Deckman	
Car coupling, O. D. D. Martin		Gas, furnace for manufacturing illuminating, F. Egner315,751	Pan. See Amalgamating pan. Paper box machine, B. E. Becker	Shoe stretcher, W. Jones
Car, freight, I. H. Congdon	315,600	Gas generator, A. Detwiler	Paper wreath, C. Kaufmann	
Car, sleeping, J. H. Sleicher	315,851	Gas pressure regulator, S. Cabot, Jr 315,717	Pavements, construction of, S. W. Cragg	Snutter fastener, J. Von Hollen 315,979
Car, street, G. M. Brill	315,898	Gas, purifying water, O. Lugo	Pendulum, compensating, A. Maille 315,527	Signal transmitters, automatic call for latent, F.
Cars on curves, mechanism for moving street, N. A. Fisher	315,491	Gear, reversing, C. M. Giddings	Piano, dummy, J. Casey         315,724           Pianoforte, L. Caldera         315,905	Signal transmitters, bell for latent, F. B. Herzog 315,941
Cars, safety attachment for elevator, P. Cohn Carpet lining, Howes & Jack		Generator. See Gas generator. Glass furnace, J. Anderson	Piano music rack, Scanlan & Dinsmore	Skate clamp, J. C. Howe       315,623         Skate roller, E. W. Otis       315,823
Carpet lining, W. E. Turner		Glass ornamenting, E. L. Brown	Pin. See Flask pin. Pipe coupling, W. W. Speer	Skylight, Overman & O'Connor       315,958         Sled, wheel, N. Harper       315,616
Carrier. See Egg carrier. Straw carrier. Cartridge belt, W. P. Beach	•	Glove or shoe fastening, E. W. A. Meyer. 315,811 Governor, J. Judson. 315,632	Pipes, filling attachment for the hubs of, C. Cop- man	Small-arm, breech-loading, H. Tolley.         315,858           Snap hook, J. B. Keefe.         315,796
Case. See Watch case. Caster, J. W. See.		Grain binder, C. Colahan       .315,479 to 315,781         Grain binder, Fecher & Olin       .315,479 to 315,781	Planers, pressure and feed mechanism for wood, J. Kane	Soldering machine, can, G. Ackermann 315,877
Casting car wheels, W. Wilmington. Casting steel, mould for, J. Henderson.	315,872	Grain binding machine, S. L. McColloch 315,528	Planter, J. H. & J. A. Kimbro	
Cement, manufacture of hydraulic, R. Bryce		Grain cleaner, F. M. Lynett.       315.523         Grain drier, E. W. Johnson       315,508	Voorhees	Spike machine, J. H. Alker
Chair. See Folding chair. Invalid chair. Check row wire, reel for, James & Carder		Grain meter, E. N. Williamson	Planter, corn, Thurstin & Jacoby	
Check rower, J. G. Gibson		row	Planter, seed, R. L. Herrick.       315,782         Plaster, J. A. Abbott.       315,691	Spring. See Bed spring. Car spring. Vehicle
W. Brenton	315,684	Halter clamp, rope, T. Hall.       315,614         Hame, G. H. Bartlett.       315,891	Plaster compound, G. L. Gregory	Spring hanger, Mack & Hanson
Chuck, lathe, J. H. Westcott		Hame fastener, M. T. Burke	H. Brown	Morris & Frech
Cider and wine press, Higinson & De Baun Clamp. See Halter clamp. Skate clamp.	315,784	Harness pads, die for pressing, C. H. Freeman 315,607 Harrow, J. R. Whittemore 315,579	Plow gauge, J. B. Law         315,799           Plow, sulky, J. E. Mohney         315,813	Spring motor, Jiencke & McKee
Clasp for wearing apparel, A. Winterburn	315,873	Harrow, sulky, French & Parvin	Plow, sulky, J. & E. E. Sickler 315,569 Powder keg discharge tube, A. H. Witman 315,874	
D. C. Pattyson		Harvester frame adjusting mechanism, G. G. Hunt	Power. See Horse power. Lever power. Power, device for transmitting, A. L. Colburn 315,735	Steam boiler flue cleaner, W. H. Cooper
Cleaner. See Grain cleaner. Peanut cleaner. Steam boiler flue cleaner.	,	Harvester pitman coupling, H. L. Heaton	Precious metals, apparatus for reducing the ores of, J. A. Bailey	A. W. Pratt
Clock, alarm, W. D. Davies	315,603	Harvesting machine, R. Brown 315,901	Press. See Baling press. Cider and wine press.	Waterman       315,864         Steam engine, W. J. Lane       315,516
Cock for house service and street washer connections, J. Moss		Heat and fuel economizing apparatus, oxhydro- carbon, J. T. Dysart	Oil press. Pump, J. D. Davies	Steam engine, Lynn & Wheeler 315,643
Coke oven, E. J. Bowen	315,559	Heeling machine, H. D. Stone	Pump, rotary force, J. Serdinko	Steam trap, J. R. Barry
Connecting rod, D. A. Woodbury		Hemp, etc., machine for spreading, J. Good 315,765 Hemp, etc., machinery for spreading and drawing,	rack. Radiator and heater, steam, T. M. Morton 315,818	Steamer, food, L. S. Bunker
Cooking utensils, device for joints in, T. F. Dean. Cores, apparatus for making dry sand, J. H. Bless-		J. Good	Radiators, automatic air valve for steam, P.  Gormly	Johnson
ing		Hitching device for vehicles, G. Morse	Railway, cable, W. M. Levering 315,800 Railway, cable, H. Root 315,992	Stock rack, J. O. Taft
Corn cutting machine, green, Woods & Lindsay Corset and garment supporter, combined, A. L.		Holder. See Bag holder. Dental file holder.	Railway, cable, E. Samuel	Stone, artificial flag, Sampson & Peck 315,557
Zorkowski	315,999	Fan holder. Ice holder. Sash holder. Sponge or mop holder.	Railway, cable, Wharton, Jr., & Samuel315,984, 315,985	Stone sawing machine, J. H. Frenier
Coupling. See Car coupling. Electric coupling. Harvester pitman coupling. Pipe coupling.		Hook. See Button hook. Fish hook. Snap	Railway crossing and target, J. W. Kughler	Jenkins
Rope coupling. Shaftcoupling. Thill coupling. Cradle, infant's, Jackson & Hannahs		Horse power for hay carriers, J. S. Grabill 315,934   Horseshoe, R. Condon	Railway fish plates, safety bar for, T. O'Donnell, Jr	
Creamer, centrifugal, Jacobsen & Jensen Crusher. See Clay crusher. Stone and ore	-	Horseshoe machine, Z. V. Purdy	Railway frogs, filling for, G. C. Lucas	
crusher. Culinary vessel, G. H. Ziph	315.989	Andersen	Railway rail connection, H. D. Winton 315,586 Railway signal, H. Johnson 315,792	
Cultivator, S. F. Weaver	315,866	Hydrocarbon burner, J. Reilly 315,549	Railway signal, electric, Hinds & Stimpson	Stoves, etc., portable elevated platform for, M.
Curtain fixture, J. A. Iliingworth	315,789	Ice holder for butter dishes, etc., F. H. Hawkins 315,619 Ice machine, W. H. Haney	Railway tie, L. Haas 315,777	Straw carrier for stacking machines, A. B. & M.
Cut-off valve gear, C. H. Roberts  Damper regulator, automatic, J. Burge	315,904	Injector, W. Johnston	Railway train alarm, S. C. Pullman	Supporter for wearing apparel, D. Greenhoot 315,497
Dead until their burial, safety apparatus for the preservation of the, R. Strauss		Insulator for telegraph wires, supporting, H. Prenzel	Samuel	
Dental file holder or carrier, H. E. Wales  Dentifrice, J. E. Edmundson		Invalid chair, L. W. Serrell	Razor blade guard, A. V. Brokhalme	Syringe nozzle, R. Van Buskirk
Denture, artificial, P. A. Palmer Die. See Screw cutting die. Tile machine die.		J. P. Witherow. 315,587  Irrigation, system of, G. W. Jessup. 315,629	Refrigerator car, C. F. Pierce	
Door check, J. W. Callaway		Jack. See Lifting jack.  Jar. See Drill far.	Regulator. See Damper regulator. Gas pressure regulator. Steam draught and pressure regu-	Tag cutting and punching machine, C. Colahan 315,482 Tedder, J. H. Thomas
Door lock, sliding, W. Gerwien	315,761	Joint. See Hinge joint.	lator. Riveting machine, T. Morton	Telegraphic relay, Stitzel & Weinedel 315,568
Drawing board and T-square, C. H. Prescott		Kiln. See Brick burning kiln.  Laboratory for dentists and jewelers, portable, N.	Road machine, S. Pennock	Telephone, W. L. Voelker
	315,547	W. Caughy	Rock breaker and pulverizer, W. S. Sharpneck 315,670 Rock breaker, submarine, T. F. Lonney 315,520	Thill coupling, H. K. Forbis
Drills, manufacture of, S. Moore		Ladder, railway step, T. A. Harvey       315,939         Lamp burner, D. L. Durand       315,919	Rock drill column support, H. C. Sergeant 315,668 Rock drills, core breaker and lifter for annular,	Thill coupling, W. Fuhrman
Drop presses, machinery for feeding, E. L. Howe, 315,942,		Lamp collar, A. L. Dawson	A. Ball	
Dyeing hanks of wool, apparatus for, T. G. Charlesworth	•	Dawson	S. Willershausen	
Egg carrier, J. Burns	315,476	Lamp, electric, M. N. Lynn       315,524         Lamp, electric arc, W. F. Buckley       315,473         Lamp, electric arc, W. F. Buckley       315,473	Roofing composition of tar, cement, etc, K. Wild-	tachment for clover, H. Campbell 315,906
Elastic fabric, machine for crimping and preparing, G. Schilling	315,842	Lamp, electric arc, F. M. Sparrow	Roofing for buildings and other structures, S. G.	Judd
Electric battery, A. Haid  Electric coupling, T. T. Smith	315,673	Lamp, street, E. Norton	Tufts	Thrashing machine feeder, D. H. Good
Electric light apparatus, T. T. Smith Electric machines, armature for dynamo, W. F.		Lantern, F. Wlach       315,875         Latch, J. R. Scott       315,845	H. W. Gates	
Buckley		Latch, J. M. Turner	for covering, A. Derrom	

204
Tile machine die, Chandler & Dodds
Timepiece, striking mechanism, C. Scholle 315,843
Tire for wheels, rubber, A. H. Overman 315,537 Trap. See Steam trap.
Traveling box for dogs, L. E. Evans
Trench building machine, W. S. Morton 315,534
Trestle, extension, H. H. Childers
Truck and bag holder, combined, C. W. Camp 315,719
Truck, hook and ladder, D. T. Young 315,690
Tube skelp, machine for bending, J. R. Jackson 315,626
Type writing machine, E. S. Belden315,700 to 315,702
Underground conduit, A. E. Lytle
Valve, engine, G. Schuhmann
Valve gear, G. S. Strong
Valve gear, steam engine, J. Nenert
Valve, safety, T. Burke
Valve stems, revoluble joint for screw, J. H.
Blessing
Varnish from sludge tar, manufacture of, R. M.
Breinig
Vault cover, J. Raynald
Vehicle spring, H. B. Dye
Vehicle spring, two-wheeled, F. Forder
Vehicle step, W. B. Philbert
Ventilating mines, apparatus for, M. L. D.
Weston
Ventilator, C. B. Loveless
Wagon, draught, G. S. & W. B. Morgan
Wagon, dumping, T. S. Stewart
Wagon scoop board, A. J. Sweeney 315,676
Wardrobe, G. A. Garrison
Washing machine, J. E. Mitchell
Watch case, E. C. Fitch
Watch movement box, E. C. Fitch
Watch, stem winding and setting, D. H. Church (r) 10,580 Watch, stop, P. V. Perret
Water closet, L. & J. Brandt
Water meter registering device, F. W. Hood 315,786
Watering trough for animals, A. E. Barber 315,697
Weighing and package tilling machine, automatic,
C. C. Clawson
Well boring apparatus, G. Pech
Well boring machine, W. C. Wells 315,868
Well point, drive, M. H. Morris 315,815
Well reamer, W. D. Braden
Wheel. See Fifth wheel. Metallic wheel.
Whip core, Mullen & Noble, Jr
Goodspeed
Windmill, R. M. Cosby
Wire feeding machine, O. Arnold
Wire uncoiling machine, O. P. Briggs 315,707
Wooden vessels, machine for cutting, W. D. John-
son
Yoke, neck, A. D. Shepard
<u> </u>
DESIGNS.
DESIGNS.
Bellgong, C. A. Bailey

• • • • • • • • • • • • • • • • • • •	
Bellgong, C. A. Bailey	16,044
Buckle frame, L. C. Voorhees	16,046
Carpet, J. B. Campbell	16,047
Carpet, A. L. Halliday	16,038
Carpet, N. Komori	16,041
Carpet, M. R. Loudon	16,049
Carpet, F. E. Smith	16,050
Dish handle, C. E. Haviland	16,048
Dishes, decorative pattern for, C. A. May	16,042
Dishes, decorative pattern for, W. Wood	16,043
Sewing machine case, N. A. Hull16,039,	16,040
Shade roller bracket, S. Hartshorn	16,037
Watch and clock dial, O. Kling	16,045
Window shade pull, J. G. Brothwell16,035,	16,036
	-

TRADE MARKS.		
Baking powder, W. P. Clotworthy		
Blanc mange powder, A. F. Bird	12,115	
Blood purifying compounds, Mexican Medicine		
Company		
Cheese, W. P. Harvey & Co	12,123	
Susini	19 138	
Cigars, cigarettes, and manufactured tobacco, G.	12,150	
Fuchs	12.141	
Cod liver oil, compound preparation of, S. J.	, -	
Bendiner		
Coffee, essence of, P. C. Tomson	12,145	
Corsets and other similar articles, Warner Broth-		
ers Cotton fabrics, black, Hyde & Burton		
Deodorizers and disinfectants, Koch Microcide	12,124	ĺ
Company	12 126	
Drugs and chemicals for dyeing, certain named,	12,120	
Stamford Manufacturing Company	12,143	
Egg powder, A. F. Bird	12,117	
Egg preserve and egg albumen, white and yellow		
of, S. B. Nachfolger	12,142	
Fabrics for ladies' and children's dresses, G. Bos-	10 104	ı
sange		
Fish, boneless cod, Caswell, Livermore & Co		
Jewelry, articles of, E. Naegele		
Knives, Eagle Pencil Company		
Liniment, family, G. L. Vrooman	12,131	
Lye, P. C. Tomson	12,146	
Medicinal composition, certain named, C. Ring-	40.400	
bauer		
Milk, cream, butter, and cheese, Pikesville Dairy	12,116	
Company	12,144	
Purgative compounds, liquid, California Fig Sirup	,	
Company	12,118	
Oars, sweeps, and sculls, New York Boat Oar Com-	i	
pany	12,129	
Paints and paint compounds for protective and	ļ	
preservative purposes, Paraffine Paint Company	19 190	
Pork, cured, G. Fowler		
Razors, C. Klauberg & Bros.		
Velvet, silk, A. Wimpfheimer & Bro		
Watch keys, J. S. Birch & Co		
Whisky, malt, Duffy Malt Whisky Company	12,121	

A printed copy of the specification and drawing of any patent in the foregoing list, also of any patent issued since 1863, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 361 Broadway, New York. We also furnish copies of patents prior to 1866; but at increased cost, specifications, not being printed, must be copied by

Wine, orange, Florida Wine Company...... 12,149

Canadian Patents may now be obtained by the inventors for any of the inventions named in the foregoing list, at a cost of \$40 each. For full instruction address Munn & Co., 361 Broadway, New York, Other foreign patents may also be obtained.

#### Sodvertisements.

Inside Page, each insertion - - - 75 cents a line. Back Page, each insertion - - - \$1.00 a line. (About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Adver-tisements must be received at publication office as early as Thursday morning to appear in next issue.



#### Standard Thermometers



Accurate, Legible. Sizes of Dials, 5 and 8 inches.

For sale by THE TRADE Manufactured and Warrant ed by the Standard Thermometer Co.,

Peabody, Mass.
General Agents,
FAIRBANKS SCALE HOUSES



# គឺ New Catalogue of Valuable Papers

contained in Scientific American Supplement, sent free of charge to any address.

MUNN & CO., 361 Broadway, N. Y.



STEAM ENGINE.—THE CADET ENgineer; or Steam for the Student. By JOHN H. LONG, Chief Engineer, U. S. Navy, and R. H. BUEL, Assistant Engineer, U. S. Navy; cuts. etc. 8vo, eloth, \$2.25. Address MUNN & Co., 36l Broadway, N. Y. City. Send for our special book catalogue, to be had on ap-

# LAST CHANCE

To obtain Government Lands free—that are suitable for general farming and stock raising purposes—before change of laws as per bills now pending in Congress.

320 IN THE DEVIL'S LAKE,
TURTLE MOUNTAIN,
NORTH ACRES
DAKOTA ACRES of P. P. Lorde in Mines

Over 2 000 000 Acres of P. P. Lorde in Mines

Over 2,000,000 Acres of R. R. Lands in Minnesota at the low price of \$3.00 per acre and upwards. Sectional Map and full particulars mailed free to any address by C. H. WARREN, Gen'l Pass. Agent, St. Paul, Minn. and Manitoba R. R., St. Paul, Minn.

#### The Cheapest and Best Lubricator.



The feed is very plain and postive. It has less parts than any oiler yet produced. We avoid glass tubes, and guarantee the most reliable feed. The new glass is almost everlasting. A child can replace the new shape glass. A specialty is our Small Engine and Pump Lubricator.

Holland & Thompson, 217 River Street, Troy, N. Y



BOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS—For grinding Popular D. TRIC MILLS—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay, Guanos, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Snuff, Sugar, Salts. Roots, Spices, Coffee, Cocoanut, Flaxseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers' Inks, Paste, Blacking, etc. J. S. & G. F. SIMPSON, successors to John W. Thomson, 26 to 36 Rodney Street, Brooklyn, E. D., N. Y.

# PATIDNI

The fact that this shafting has 75 per cent. greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical We are also the sole manufacturers of the CELEBRATED COLLINS' PAT.COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price list mailed on application to JONES & LAUGHLINS, Limited, Try Street, 2d and 3d Avenues, Pittsburg, Pa. Corner Lake and Canal Sts., Chicago, Ill.

FF Stocks of this shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass.

Geo, Place Machinery Agency, 121 Chambers St., N. Y.



Woodworking Machinery.

For Planing Mills, Furniture and Chair Factories. Car and Agricultural Works, Carriage and Buggy Shops, and General Wood Workers, Manufact'd by The Egan Company, Cincinnation, I.S., A.
Full assortment of Forin Saw Blades.

COMBINING WEIGHTS, VOLUMES, and Specific Gravities of Elements and Compounds. Abstract of a paper by William Farmer. Contained in SCIENTIFIC AMERICAN SUPPLEMENT NO. 455. Price 10 cents. To be had at this office and from all newsdealers.



RAILWAY AND STEAM FITTERS' SUPPLIES Rue's Little Giant Injector.

SCREW JACKS, STURTEVANT BLOWERS, &c.

JOHN S. URQUHART, 46 Cortlandt St., N. Y. BICHROMATE OF POTASH PILES.-

Description of a new arrangement of Grenet's bichromate of potash pile, making it an apparatus of great constancy and convenience. Illustrated with three figures. Contained in Scientific American Supplement, No. 455. Price 10 cents. To be had at this office and from all newsdealers.



THE BEST STEAM PUMP. THE BEST STEAM PUMP.

Van Duzen's Patent Steam Pump.

Incomparable in cheapness and efficiency. Needs no care or skill; cannot receive the first out of order; has no moving parts.

A Superior Fire Pump.

Instananous and powerful, ever ready. Available, wherever steam pressure can be had, for pumping any kind of liquid (hot, cold, sandy, impure, etc.). We make the sizes, prices from \$7 to \$75. Capacties from 100 to 20,000 gallons per hour of "Pumps."

State for what purpose wanted and send for Catalogue of "Pumps."



PHONOGRAPHY, or Phonetic Short Hand. Catalogue of works by Benn Pitman and Jerome B. Howard with alphabet and illustration for beginners, sent on application. Address: PHONOGRAPHIC INSTITUTE, Cincinnati, Ohio

### ROLLSTONE VARIETY LATHE.



TIGHT&SLACK BARREL MACHINERY JOHN GREENWOOD &CO.

AERIAL NAVIGATION. — DESCRIP and an account of the recent trial trips made therewith. With four illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 457. Price 10 cents. To be had at this office and from all newsdealers.



We build to order anything in the boat line. THOS. KANE & CO., (BOX F.) CHICAGO.

Leffel Water Wheels, 🖁 With Important Improvements. 11,000 IN SUCCESSFUL OPERATION FINE NEW PAMPHLET FOR 1883 Sent free to those interested. JAMES LEFFEL & CO., Springfield, Ohio.

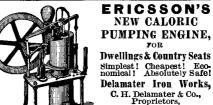
110 Liberty St., N. Y. City.

Beautiful & Lasting for ORNAMENTING WINDOWS, DOORS, TRANSOMS, &c.



W. C. YOUNG SOLE AGENT, 731 ARCHST. AGENTS WANTED EVERYWHERE.

A. W. STEVENS & SON. AUBURN, N. Y. Manufacturers of French Buhr Stone Corn and Feed Mills, Power Corn Shellers, Grain Threshers and Separators, Plain and Traction Engines. Send for circulars.



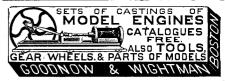
16 Cortlandt Street, New York, U. S. A., And 40 Dearborn St., Chicago, Ill.



Catalógue FREE. (Magic Lanterns Wanted.) 🗢 HARBACH ORGAN CO., Philadelphia, Pa. 🕉 Telegraph and Electrical

Medical Batteries, Inventors' Models, Experimental Work, and fine brass castings. Send for catalogue C. E. JONES & BRO. Cincinnati, G. Itis important to us that you mention this paper.

THE COPYING PAD.—HOW TO MAKE and how to use; with an engraving. Practical directions how to prepare the gelatine pad, and also the aniline ink by which the copies are made; how to apply the written letter to the pad; how to take off copies of the letter. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 438. Price il cents. For sale at this office and by all newsdealers in all parts of the country.



#### FRICTION CLUTCH Pulleys and Cut-off Couplings.

PETROLEUM AS FUEL IN LOCOMOtive Engines. A paper by Thomas Urquhart.—Howlocomotives are arranged for burning petroleum. The spray injector. Storage of petroleum. Experimental engines and tenders. Results of comparative trials. Contained in SCIENTIFIC AMERICAN SUPPLEMEET NO. 455. Price 10 cents. To be had at this office and all newsdealers.



BIBB'S
Celebrated Original
BALTIMORE
FIRE-PLACE HEATERS,
To warm upper and lower rooms.
The handsomest, most economical
Cool (Store Inthe World) The handsomest, most economic Coal Stoves in the World.

B. C. BIBB & SON,
Foundry, Office and Salescom.
39 AND 41 LIGHT STREET,
Baltimore, Md.
WARDLEIZED SLATE MANTELS,
67 Send for Circulars.

EMERALD GREEN.—A PAPER BY R. Galloway, M.R.I.A., describing the method of manufacture of this pigment, and discussing its poisonous and other properties. Contained in SCIENTIFIC AMERICAN SUPPLEMENT NO. 455. Price 10 cents. To be had at this office and from all newsdealers.



Mortgage Sale of Shipyard Machinery and Fixtures.

The entire equipment of the well known shipyard, lately of Ward, Stanton & Co., in the City of Newburgh, will be sold at Public Auction in said shipyard, on May 20th, 1885, at 11 A.M.

The property comprises a large amount of valuable machinery in good order. For circulars and particulars apply to Mr. James Beggs, No. 9 Dey Street, N. Y., or to the mortgagee, the National Bank of Newburgh, N. Y. Dated April 25, 1885.

PERFECT

### **NEWSPAPER FILE**

The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN AND SCIENTIFIC AMERICAN SUPPLEMENT can be supplied for the low price of \$1.50 by mail, or \$1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in gilt. Necessary for every one who wishes to preserve the paper.

Address

MINNY 2. CO.

MUNN & CO.. Publishers SCIENTIFIC AMERICAN

#### Rose's Mechanical Drawing Self-Taught. RECENTLY PUBLISHED.

Mechanical Drawing Self-Taught: Comprising instructions in the selection and preparation of Drawing Instruments, Elementary Instruction in Practical Mechanical Drawing, together with examples in Simple Geometry and Elementary Mechanism, including Screw Threads, Gear Wheels, Mechanical Motions, Engines and Boilers. By Joshua Rose, M.E. Illustrated by 330 engravings. Second Edition. 8vo. 313 nages.

#### BY THE SAME AUTHOR.

BY THE SAME AUTHOR.

The Complete Practical Machinist: Embracing Lathe Work, Vise Work, Drills and Drilling, Taps and Dies, Hardening and Tempering, the Making and Use of Tools, Tool Grinding, Marking out Work, etc. By JOSHUA ROSE. Illustrated by 356 engravings. Thirteenth edition, thoroughly revised and in great part rewritten (1885). 12mo.

The Sil de-Valve Practically Explained: Embracing Simple and Complete Practical Demonstrations of the Operation of each Element in a Slide-Valve Movement, and illustrating the effects of Variations in their proportions by examples carefully selected from the most recent and successful practice. By JOSHUA ROSE, M.E. Illustrated by 35 engravings.

The Pattern Maker's Assistant: Embracing Lathe Work, Bran's Work, Core Work, Sweep Work, and Practical Gelf. Construction; the Preparation and Use of Tools, together with a large collection of Useful and Valuable Tables. By JOSHUA ROSE. 250 engravings.

12mo, \$2.50 The above or any of our Books sent by mail, free of ostage, at the publication prices, to any address in the orld.

HENRY CAREY BAIRD & CO., INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS 810 Walnut Street, Philadelphia, Pa.

#### \$1 ON TRIAL TILL JANUARY, 1886. \$1. Industrial America.

A POPULAR Record of PROGRESS in the Arts and Sciences.

A POPULAR Record of PROGRESS in the Arts and Sciences.

Among the 498 separate articles (illustrated by 183 different engrayings) published during the first four months of the year, may be mentioned:

By Joshua Rose, M.E.—High Speed Engines. Illustrated. Lead in Steam Engines, 6 cuts; Port Openings, 7 cuts; How to determine position of Eccentrics, 4 cuts.

Thomas Whiteside Rae, C.E.—New Croton Aqueduct. Four Articles, 27 cuts.

W. E. Partridge.—Photography in the Manufacturing Establishment. Four Articles, 12 cuts.

N. O. Exposition, 63 articles, 49 cuts, covering the subject exhaustively, and including Steam Power, Water Supply, Electric Lighting, leading features and Exhibits.

Departments.—"I. A." Ill. Record of Patents. (1 page each issue; during the four months 229 important patents were described, accompanied by 44 diagrams); Dept. of Inquiries. 41; Western Industrial Notes; Engineering Progress; Scientific Notes.

Very creditable.—Age of Stell. Handsomely printed, freely illustrated—Springfied Republican. A most useful and attractive publication.—N.Y. Tribune. Handsomely printed, profusely illustrated.—Philadelphia Mercury. Clean, crisp, and intelligent, beautifully printed from bold type while its illustrations are nowhere surpassed.—Shamokin Tanes.

"Industrial America" is one of the most readable papers among the nearly 300 that come to us.

Engrytick Bross, Richmond, Ind.

Send \$1 and try the paper until January, 1886, or oreder it of your newsdealer at an expense of 10 cents every other week. Office, 9 Murray St., N. Y.

### THE HARDEN STAR HAND GRENADE



FIRE EXTINGUISHER Puts Out Fire Instantly. See editorial notice in SCIENTIFIC AMERI-OAN of November 22d, 1884. Send for circulars. Address

Harden Hand Grenade Fire Extinguisher Co.

205 Wabash Ave., Chicago. 10 Oliver St., Boston, or 84 West Broadway, New York.

PRINTAL DESIGNATION RES.



A.A.GRIFFING IRON CO STEAM HEATING APPARALUS SOLE MANUFACTURERS BUNDY STEAM RADIATOR 750 COMMUNIPAW AVE. JERSEY CITY, N.J.



With this WONDERFUL
Art Appliance beginners soon rival artists using old methods. Command better prices and ready sales.
Thousands having taste in art, if developed by use of the AIR BRUSH, can secure pleasant and profitable employment. Send for

ble employment. Send for particulars. Free. AIR BRUSH MFG. CO., Address No. 67 Nassau St. Rockford, Ill.

### PHOTOGRAPHIC OUTFITS



MICROSCOPES, TELESCOPES, FIELD-GLASSES, MAGIC LANTERNS, BAROMETERS,

THERMOMETERS. Drawing Instruments, Philosophical and Chemi-cal Apparatus.

List and Descriptions of our Ten Catalogues sent FREE on application.

# **OUEEN & CO.**

Philadelphia 4 6 1

**HOW TO** Quick at Figures. 32 pp.circular for stamp. The Woodbury Co., Boston, Mass



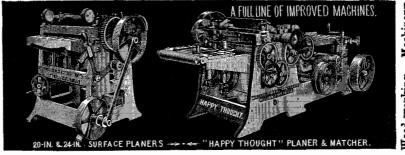
# THE DINGEE & CONARD CO'S BEAUTIFUL EVER-BLOOMING

# OSES

immediate bloom, safely by mail at all Post Offices 5 Splendid Varieties, your choice, all labeled, for \$1; 12 for \$2; 35 for \$5; 100 for \$12. Also

OTHER VARIETIES 2, 3, & 10 For \$1

according tovalue. Send for our New Guide, %pp
elegantly illus, and choose from over 500 finests sorts
Address, THE DINGEE & CONARD CO.,
Rose Growers, West Grove, Chester Co., Pa.



Wood-Working Machinery, Williamsport Machine Co. (Ltd.), 110 West 3d St., Williamsport, Pa., U. S. A.

lWachinery; also, Stationary Engines, Boilers, and Ventilating Fans. Estimates made and contracts taken for constructing all kinds of Mining Machinery. I. A. FINCH & CO., SCRANTON, PA. Prof. Chas. F. Chandler, Ph.D.,

OF THE SCHOOL OF MINES, Columbia College, I Has assumed the Editorship of NEW YORK

# Anthony's Semi-Monthly Photographic

BULLETIN,

Which is admitted to be the best Photographic Helper that is published.

Amateurs or Professionals Who need any advice can obtain it through its Correspondence Column. It will pay you to SUBSCRIBE for it.

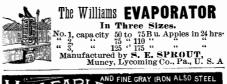
Sample Copies Free. Subscription, \$2.00 per Annum
E. & H. T. ANTHONY & CO., PUBLISHERS,

591 Broadway, New York. PHOTOGRAPHIC OUTFITS AND SUPPLIES.



DOUBLE BOATS.-TWENTY-ONE IL lustrations of patented double boats, the general construction and plan of which are so clearly shown as to need no detailed description. Name of patentee and date of patent accompanying each diagram. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 232. Price 10 cents. To be had at this office and from all newsdealers.

TRICKS Magical Apparatus, Scientific Novelties, etc. Fully illustrated. Book catalogue, 10 cts. MARTINKA & CO., 155 Wooster Street, N. Y.



MINING AND HOISTING

MALLEABLE CASTINGS FROM SPECIAL THOMAS DEVILW & CO. FINE TINNING JAPAN NING AND THOMAS DEVILW & CO. FINE TINNING JAPAN NING AND THOMAS DEVILW & AMERICAN ST. PHILA

IMPORTANT PATENT FOR SALE.—THE Magic Trace or Tugholder: traces shifted instantly without trouble: will certainly revolutionize the harness trade: rights for county. State or the United States for sale. For illustrated circulars and particulars, address M. W. REDDING, Patentee, 731 Broadway, New York.



Curtis Pressure Regulator,
FOR STEAM AND WATER,
Is made entirely of Metal. Occupies the
samespace as a Globe Valve. It has no
glands or packing, and is a lock-up valve.

**CURTIS STEAM TRAP** 

Has main valve outside and air valve inside.
CURTIS REGULATOR CO.,
54 Beverly St., Boston, Mass.

BOUND VOLUMES OF THE OFFICIAL, GA-ZETTE of the U. S. Patent Office complete for sale. Periectly fresh, morocco binding, 1872 to 1884 inclusive, 28 vols. at \$3.25 (Pat. Office price, \$4; also the annual bound indexes, 13 vols. at \$1.50 (Pat. Office price, \$2). HENRY W. WILLIAMS, 28 Washington St., Boston.

### THE CAMERON STEAM PUMP. STANDARD OF EXCELLENCE. 30,000 IN USE.

MANUFACTURED SOLELY BY The A. S. CAMERON STEAM PUMP WORKS, Foot East 23d St., New York.



TITO GAS ENGINE OVER 10.000 IN USE

WORKS WITHOUT ENCINEER OR BOILER, STEAM COALOR ASH. STARTS AT ONCE AND IS FREE OF DANCER FIRE OR EXPLOSION. 1 to 25 HORSE POWER SCHLEICHER SCHUMM & CO., 47 DEY ST. NEW YORK. 214 RANDOLPH & CHICAGO 334 & WALNUT STS. PHILADELPHIA



ROCK BREAKERS AND ORE CRUSHERS.

We manufacture and supply at short notice and lowest rates, Stone and Ore Crushers containing the invention described in Letters Patent. issued to Eli W. Blake, June 13th. 1858, together with New And VALUABLE IMPROVEMENTS, for which Letters Patent were granted May 11th and July 20th, 1880. to Mr. S. L. Marsden All Crushers supplied by us are constructed under the superintendence of Mr. Marsden, who, for the past fifteen years, has been connected with the manufacture of Blake Crushers in this country and England.

FARREL FOUNDRY AND MACHINE CO., Manufrs., Ansonia, Conn. COPELAND & BACON. Agents. New York.



DRAWING INSTRUMENTS.

Illustrated catalogue sent on application to WM. T. COMSTOCK, 6 Astor Place, New York.



TAKE NOTICE.

The "Sight Feed" is owned exclusively by this Company. See Judge Lowell's decision in the United States Circuit Court, District of Massachustts, Feb. 23, 82. All parties, except those duly licensed by us, are hereby notified to desist the use, manufacture, or sale of infringing Cups, as we shall vigorously pursue all infringers.

**BOILER & MACHINERY FOR SALE** 

The Seibert Cylinder Oil Cap Co. 35 Oliver Street, Beston, Mass.

horse Locomotive Boiler. 8 Hydraulic Presses. 4 ulic Pumps. 15 Lever Lard Presses. 1 Rock or Trusher. All in very good condition. WAHL BROS., 288 Randolph St., Chicago, Ill.



made, and 50 per cent more power than rated at. All engines warranted. All sizes and styles, 2 to 250 horse power. Send for prices and catalogue A 4.

B. W. PAYNE & SONS.

P. O. Box 1207.

Or our General Sales Office, 83 Liberty St. & 149 B'way, N.Y.

**Pubber Stainps.** Best made. Immense catalogue to agents. The G. A. HARPER Mfg. Co., Cleveland, O.

#### CUTLER'S POCKET INHALER



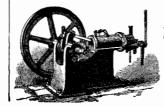
ANDCarbolate of Iodine INHALANT.

A curefor Catarrh, Bronchitis, Asthma, and all diseases of the Throat and Lungs-even Consumption. It will break up a Cold at consumption of the Court Madighus A fow

once. It is the King of Cough Medicines. A few inhalations will correct the most Offensive Breath. It may be carried as handily as a penknife, and is guar-

It may be carried as handily as a penknife, and is guaranteed to accomplish all that is claimed for it.

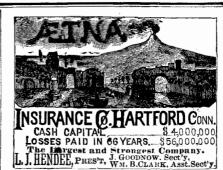
As a prepentive it is in truth the "magical Amulet" with which one may bid defiance to Cholera, Yellow Fever, and all Masmatic and Infectious diseases. It has been horoughly tested in various hospitals and localities infected with Malaria, Small Pea, Diphtheria, etc., and of the great number of persons, including Physicians and Nurses, who used the INHALER as a preventive, not one is known to have been attacked with any of the diseases to which they were exposed of the SCIENTIFIC AMERICAN through the agency of the SCIENTIFIC AMERICAN through the agency of the SCIENTIFIC AMERICAN through the size than any Medical Instrument ever intented. It is the only Inhaler approved by physicians of every school, and indorsed by the standard model of gournals of the world. All others in the market are either worthless substitutes or fraudulent imitations.



### **ECONOMIC MOTOR CO.'S** ENGINES.

An unequaled small Motor adapted to all uses. Simple, Safe, Economical, Durable. Four Sizes: IH, P., ½ H. P., 1 man power, and a Sewing Machine Motor. Send for Circulars.

ECONOMIC MOTOR CO., 12 CORTLANDT STREET NEW YORK.

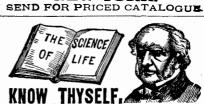


roots New Iron Blowen

POSITIVE BLAST IRON REVOLVERS, PERFECTLY BALANCED,

Has Fewer Parts than any other Blower. P. H. & F. M. ROOTS, Manufacturers, CONNERSVILLE, IND.

S. S. TOWNSEND, Gen. Agt., 22 Cortland St., 9 Dey St., COOKE & CO., Selling Agts., 22 Cortland Street, JAS. BEGGS & CO., Selling Agts. 9 Dey Street, NEW YORK.



A GREAT MEDICAL WORK ON MANHOOD. Exhausted Vitality, Nervous and Physical Debliity, Premature Decline in Man, and the untold miseries fiesh is heir to. A book for every man, young, middle-aged, and old. It contains 125 prescriptions for all acute and chronic diseases, each one of which is invaluable—so found by the author, whose experience for 23 years is such as probably never before fell to the lot of any physician. Three hundred pages, bound in beautiful French muslin, embossed covers, full gilt, guaranteed to be a finer work in every sense—mechanical, literary, and professiona—than any other work sold in this country for \$2.50, or the money will be refunded in every instance. Price only \$1.00 by mail, postphid. Illustrative sample, 6 cents. Send now. Gold medal awarded the author by the National Medical Association, to the officers of which he refers.

Address the Peabody Medical Institute, or Dr. W. H. Parker, No. 4 Bulfinch Street, Boston, Mass., who may be consulted on all diseases requiring skill and experience. A GREAT MEDICAL WORK ON MANHOOD.

Address DR. H. TRESKOW, 46 W. 14th St., New York.

To weak men, suffering from nervous debility, weak-ness of body and mind, loss of memory, mental and physical exhaustion, I will send you a valuable treatise upon the above diseases, also directions for home cure free of charge. Address of FOWLER Modern PROF. F. C. FOWLER, Moodus, Conn.



### FOREIGN PATENTS. Their Cost Reduced.

The expenses attending the procuring of patents in most foreign countries having been considerably reduced the obstacle of cost is no longer in the way of a large proportion of our inventors patenting their inven-

CANADA.—The cost of a patent in Canada is even less than the cost of a United States patent, and the former includes the Provinces of Ontario, Quebec, New Brunswick, Nova Scotia, British Columbia, and Mani-

The number of our patentees who avail themselves of the cheap and easy method now offered for obtaining patents in Canada is very large, and is steadily increas-

ENGLAND.—The new English law, which went into force on Jan. 1st, enables parties to secure patents in fereat Britain on very moderate terms. A British pa-tent includes England, Scotland, Wales, Ireland and the tent includes England, Scotland, Wales, Ireland and the Channel Islands. Great Britain is the acknowledged financial and commercial center of the world, and her goods are sent to every quarter of the globe. A good invention's likely to realize as much for the patentee in England as his United States patent produces for him at hone, and the small cost now renders it possible for almost every patentee in this country to secure a patent in Great Britain, where his rights are as well protected as in the United States.

O'THER COUNTRIES.—Patents are also obtained on very reasonable terms in France, Belgium, Germany, Austria, Russia, Italy, Spain (the latter includes Cuba and all the other Spanish Colonies), Brazil, British India. Anstralia, and the other British Colonies.

An experience of FORTY years has enabled the

publishers of THE SCIENTIFIC AMERICAN to establish competent and trustworthy agencies in all the principal foreign countries, and it has always been their aim to have the business of their clients promptly and properly done and their interests faithfully guarded.

A pamphlet containing a synopsis of the patent laws of all countries, including the cost for each, and other information useful to persons contemplating the procuring of patents abroad, may be had on application to

MUN'N & CO., Editors and Proprietors of THE SCI-ENTIFIC AMERICAN, cordially invite all persons desiring any information relative to patents, or the registry of trade-marks, in this country or abroad, to call at their offices, 361 Broadway. Examination of inventions, consultation, and advice free. Inquiries by mail promptly

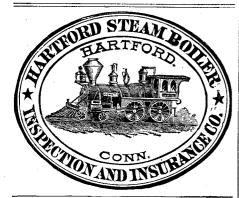
MUNN & CO.,

Address, MUNN & CO.,
Publishers and Patent Solicitors,
831 Broadway, New York.
Branch Office. cor. F and 7th Streets, opposite Patent
Office Washington D.C.

#### Advertisements.

Inside Page, each insertion - - - 75 cours a line Back Page, each insertion - - - \$1.00 a line. (About eight words to a line.)

engravings may head advertisements at the same rate per line, by measurement, as the letter press. Adver-tisements must be received at publication office as early as Thursday morning to uppear in next issue.



Free to Manufacturers and Inventors;
PLAIN WORDS ABOUT PATENTS.
E. B. Stocking, Washington, D. C.

#### KORTING UNIVERSAL DOUBLE TUBE. **INJECTOR**



FOR BOILER FEEDING.

Operated by one handle.

WILL LIFT HOT WATER.

POSITIVE ACTION GUARANTEED UNDER

ALL COMPITIONS.

WILL LIFT WATER 25 FEET. SEND FOR DESCRIPTIVE CO.
OFFICES AND WAREROOMS:

Philada, 12th & Thompson Sts.
Boston, 6i Oliver St.
Augusta, Ga., 1026 Fenwick St.
San Francisco, Cal., 2 California Street.
Chicago, Ill., 204 Lake St.

For Factories, Foundries, Warehouses, Raiload Buildings, Bridges, Car Roofs, Steamboat Decks, &c., consists of strong canvas, combined with an Asbestos coated felt, and a Manila lining, water-proofed and compressed into a compact, flexible sheet resembling leather. It is supplied ready for use in rolls containing 200 square feet, packed in cases suitable for shipment to all parts of the world. It is adapted for steep and flat roofs in all climates, costs only about half as much as tin, and can be readily applied by any one.

Asbestos Roof Coating and Cement for Preserving and Repairing Roofs.

Asbestos Bullding Felt.

This Felt is composed entirely of Asbestos, and is

This Felt is composed entirely of Asbestos, and is strictly fire-proof. For use under floors, shingles, weather-boards, &c.

Asbestos Boiler Coverings.

Asbestos Locomotive Lagging.

Asbestos and Hair Woven Felt.

Asbestos Lining Felt.

ASBESTOS PISTON-ROD PACKING.

ASBESTOS WICK PACKING.

Asbestos Mill-Board and Sheathing.
Asbestos Mill-Board and Sheathing.
Asbestos Gaskets, Rings and Washers, Asbestos and Rubber Tape and Cloth, Asbestos Cloths, Cord, Twine, Yarn, Asbestos Plastic Stove-Lining, Concrete Coating, Gasket and Retort Cements, Fire-proof Paints, &c.
DESCRIPTIVE PRICE LISTS AND SAMPLES SENT FREE.

#### H.W. JOHNS M'F'C CO. Manufacturers, 87 Maiden Lane, New York.

175 Randolph St., Chicago. 170 N. 4th St., Philadelphia. Billiter House, London.

BRIGHT, CLEAR

guaranteed in all cases, at low cost, and in quantities from 5 gals. to 5,000 gals. per minute. Adapted to Private Houses, Hotels, Asylums, Hospitals, Factories, Mills, Boilers, Steam Boats, Water Works in Towns, and Cities.

Our Filters are simple in construction and operation, will stand any pressure, the filtering material is imperishable, and can be cleaned in from five to twenty minutes, effectually removing all impurities from the Filter bed, Plans and specifications ready for a 15,000,000 gallon plant. Send for Circular, stating paper you saw advertisement in, to



# PATENTS.

lication of the Scientific American, continue to ex amine Improvements, and to act as Solicitors of Patents

In this line of business they have had forty years experience, and now have unequaled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about l'atents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals. Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Pa-

tents, etc.
We also send *free of charge*, a Synopsis of Foreign
Patent Laws, showing the cost and method of securing
patents in all the principal countries of the world.

MUNN & CO., Solicitors of Patents,
361 Broadway, New York.
BRANCH OFFICE.—Corner of F and 7th Streets,

#### THE BRIDGEPORT WOOD FINISHING CO

G. M. BREINIG. AGENT, PRINCIPAL OFFICE AT MANUFACTORY NEW MILFORD, CONN. e NEW YORK BUSINESS OFFICE, 96-98 MAIDEN LANE. MANUFACTURERS OF Wheelers Patent Wood Filler. BREINIGS LITHOGEN SILIGATE PAINT LITHOGEN PRIMER, WOOD STAINS SILEX FLINTAND FELDSPAR.

PAMPHLET GIVING DIRECTIONS FOR FINISHING HARD WOOD FREE TO ANY ADDRESS

# RUBBER BELTING, PACKING, HOSE,

RUBBER GOODS,

MECHANICAL AND MANUFACTURING PURPOSES. The Largest and Most Extensive Manufacturers in America.

THE GUTTA PERCHA AND RUBBER MFG. CO., New York, Chicago, San Francisco, Toronto.



# TRACTION ENGINE.

The only steam service suitable for rapid and economical transportation; always ready and reliable.

F. & M. DEPT.,

HARRISBURG CAR MFG. CO. Harrisburg, Pa., U.S. A.



#### GRATEFUL-COMFORTING.

BREAKFAST.

"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well selected Cocca, Mr. Epps has provided our breakfast tables with a delicately-flavored beverage which may save us many heavy doctors' bills. It is by the judicions use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us, ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—Civil Service Gazette.

Made simply with boiling water or milk. Sold only in half-pound tins by Grocers, labeled thus:

JAMES EPPS & CO., Homoeopathic Chemists, London, England.

IT PAYS to sell our Rubber Stamps. Free catalogue to Agents. FOLJAMBE & CO., Cleveland, O.



#### SHIPMAN STEAM ENGINE. A BOAT AND STATIONARY ENGINE.

No skilled attendant required! Safe from fire and explosion! No expense when engine stops!

—Steam in FIVE minutes.-Runs ten hours on less than 3 Gallons of Kerosene. illustrated article in this paper, September 13.

I SHIPMAN ENGINE CO. 55 Franklin St., Boston

### PRICES Including crating, and free delivery on cars or to express company's office from any one of our agencies or factories.

Engine No. 1, ½ to ½ H.P... \$100
"No. 2, full 1 tt.P... 125
"No. 3, full 2 H.P... 175

Illustrated Catalogues or receipt of stamp.

Wilmington, Delaware.

NOISELESS ROTARY FANS.

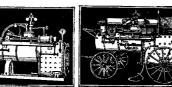
These fans can be fastened to ceiling or side wall, and driven by a round belt direct from a Backus Water Motor, Steam Engline, or other words with paper musling of the side ROTARY FANS THE BACKUS

SUPPLIES FROM
HYDRANT PRESSURE
the cheapest power known.
Annexed cut shows it in
use for running Ice Cream
Freezers. Invaluable for
running Printing Presses,
furning Lathes, Scroll
Saws, Grindstones, Coffee
Mills, Sausage Machines,
Feed Cutters, Electric
Lights, Elevators, etc. It
needs little room, no firing
up, fuel, ashes, repairs, engineer, explosion, or delay,
no extra insurance, no coal
bills. Is noiseless, neat,
compact, steady; will work no extra insurance, no cc bills. Is noiseless, ne compact, steady; will wo at any pressure of wat above 15 lb.; at 40 lb. pre sure has4-horse power, an capacity up to 10-hor



WATER MOTOR CO., NEWARK, N. J.

BUILDERS OF ALL DESCRIPTION OF PUSEY & JONES CO. MACHINERY USED BY MANUFACTURE Wilmington, Delaware.



### WOOD, TABER & MORSE Eaton, Madison Co., N. Y., MANUFACTURERS OF

PORTABLE AND AGRICULTURAL Steam Engines

Of the highest standard, in every respect, of materials and workmanship. Were pioneers in the manufacture of Practically Portable Steam Engines, And with determined policy to build only the best machinery from the best materials, and in the best manner of construction, and with continued improvements, have attained the highest standard in excellence of workmanship, simplicity of design, and capacity of power. For a quarter of a century have maintained their manufacture The Standard Portable and Agricultural Engines

of the world. Descriptive circulars sent on applicati Mention this paper.

IENKINS PACK

\* TRADE MARK %(水

VOLNEY W. MASON & CO., FRICTION PULLEYS CLUTCHES and ELEVATORS.





#### SPEAKING TELEPHONES. THE AMERICAN BELL TELEPHONE COMPANY.

THE AMERICAN BELL TELEPHONE COMPANY, W. H. Forbes, Treasurer. Gen. Manager.

Alexander Grabam Bell's patent of March 7, 1876, owned by this company, covers every form of apparatus, including Microphones or Carbon Telephones, in which the voice of the speaker causes electric undulations corresponding to the words spoken, and which articulations produce similar articulate sounds at the receiver. The Commissioner of Patents and the U.S. Circuit Court have deedled this to be the true meaning of his claim; the validity of the patent has been sustained in the Circuit on final hearing in a contested case, and many injunctions and final decrees have been obtained on them. This company also owns and controls all the other telephonic inventions of Bell, Edison, Berliner, Gray, Blake. Phelps, Watson, and others.

(Descriptive catalogues forwarded on application.) Telephones for Private Line, Club, and Social systems can be procured directly or through the authorized agents of the company.

All telephones obtained except from this company, or its authorized licensees are infringements, and the makers sellers, and users will be proceeded against Information furnished upon application.

Address all communications to the AMERICAN BELL, TELEPHONE COMPANY, 95 Wilk Street. Boston, Mass.

Clark's Steel Cased Rubber Wheel, FOR ROLLER SKATES. For use in dwellings, public halls, etc. Will notehip or injure common floors. Noiseless. Geo. P. Clark.
(Box L.) Windsor Locks, Ct.

#### The Best in the World.

Welmake the Best Packing that can be made regardless Users will sustain us by calling for the "JEN KINS STANDARD PACKING."

Our "Trade Mark" is stamped on every sheet. None genuine unless so stamped. EF Send for Price List "B.

JENKINS BROS.,

71 John Street, N. Y. 79 Kilby Street, Boston

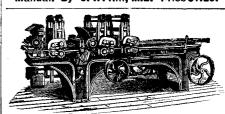
# Portable Storage Batteries POCKET SIZES. FULLY EFFICIENT.

90 Per Cent. of Current Returned. SEND FOR CIRCULAR.

Electric Storage Current Company, Constant 80 BEEKMAN STREET.

### BRANCH HOUSES IZ WARREN ST. IZ WAR COLUMBIA BICYCLES CHICAGO. BOSTON, MASS

HARRIS - CORLISS ENGINE, With Harris Pat. Improvements, from 10 to 1,000 H. P. Send for copy Engineer's and Steam User's Manual. By J. W. Hill, M.E. Price \$1.25.



WITHERBY, RUGG & RICHARDSON. Manufacturers of Patent Wood Working Machinery of every descripof Patent Wood Working Machinery of every description. Facilities unsurpassed. Shop formerly occupied by R. Ball & Co., Worcester, Mass. Send for Catalogue.



W, F. & Jno. Barnes Co. Rockford, Ill. Address No. 1999 Main St.

TELESCOPES Sreetacles, Barometers, Thermometers, Photographic Outfits for Amateurs, Opera Glasses, Microscopes. W. H. WALMSLEY & CO. successors to R. & J. Beck, Philadelphia.



## The Scientific American.

THE MOST POPULAR SCIENTIFIC PAPER IN THE WORLD.

Published Weekly, \$3.20 a Year; \$1.60 Six Months.

This unrivaled periodical, now in its forty-first year. continues to maintain its high reputation for excellence and enjoys the largest circulation ever attained by any scientific publication.

Every number contains sixteen large pages, beautifully printed, elegantly illustrated; it presents in popular style a descriptive record of the most novel interesting, and important advances in Science, Arts, and Manufactures. It shows the progress of the World in respect to New Discoveries and Improvements, embracing Machin-ery, Mechanical Works, Engineering in all branches, Chemistry, Metallurgy, Electricity, Light, Heat, Architecture, Domestic Economy, Agriculture, Natural History, etc. It abounds with fresh and interesting subjects for discussion, thought, or experiment; furnishes hundreds of useful suggestions for business. It promotes Industry, Progress, Thrift, and Intelligence in every community where it circulates.

The SCIENTIFIC AMERICAN should have a place in

every Dwelling, Shop, Office, School, or Library. Workmen, Foremen, Engineers, Superintendents, Directors, Presidents, Officials, Merchants, Farmers, Teachers, Lawyers, Physicians, Clerymen, people in every walk and profession in life, will derive benefit from a regular reading of The Scientific American.

Terms for the United States and Canada, \$3.20 a year \$1.60 six months. Specimen copies free. Remit by Postal Order or Check.

MUNN & CO., Publishers, 361 Broadway, New York.

# Scientific American Supplement.

THE SCIENTIFIC AMERICAN SUPPLEMENT is a separate and distinct publication from The Scientific Am-ERICAN, but is uniform therewith in size, every number containing sixteen large pages. The Scientific American Supplement is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geo-graphy, Archæology. Astronomy, Chemistry, Electricity, Light. Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Techhnology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horti-culture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information pertaining to these and allied subjects is given, the whole profusely illustrated with engravings.

The most important Engineering Works, Mechanisms, and Manufactures at home and abroad are represented and described in the SUPPLEMENT.

Price for the SUPPLEMENT for the United States and Canada, \$5.00 a year, or one copy of the SCIENTIFIC AM-ERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Address and remit by postal

MUNN & Co., 361 Broadway, N. Y., Publishers Scientific American

To Foreign Subscribers.-Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America, Terms, when sent to foreign countries, Canada excepted, \$4, gold, for Scientific American, one year; \$9, gold, for both Scientific American and Supplement for one year. This includes postage, which we pay. Remit by postal order or draft to order of

MUNN & CO., 361 Broadway, New York.

PRINTING INKS. HE "Scientific American" is printed with CHAS ENEU JOHNSON & CO.'S INK. Tenth and Lom bard Sts. Phila., and 47 Rose St., opp. Duane St., N. Y