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

Vol. XLIII.—No. 26. [NEW SERIES.]

NEW YORK, DECEMBER 25, 1880.

[\$3.20 per Aunum, [POSTAGE PREPAID.]

AMERICAN INDUSTRIES.-No. 63.

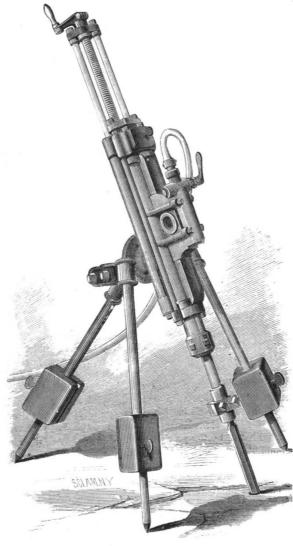
THE MANUFACTURE OF POWER DRILLS FOR MINING. EXCAVATING, ETC.

Although mining, tunneling, etc., have been of more or less importance, as calling for the labor of large numbers of men, in all ages and in nearly every quarter of the globe, it is only within a few years that the tools and appliances with which such work can be prosecuted have shown any great improvement over those employed in early times. After the use of gunpowder for blasting purposes had been commenced, it seemed for a long period as though there was a complete cessation of all idea of improvement in this direction, until the comparatively recent introduction of the power drill in connection with more powerful explosives. It is not too much to say, however, that from these two causes, but more particularly from the introduction of the power drill, the past twenty years has shown greater improvement in the means and appliances for the rapid and economical prosecution of this class of work than all the years that had gone before. Besides this, also, many projects which were heretofore entirely impracticable have been brought well within the scope of modern engineering ability, and mines which could never have been made to pay under the old system of hand drilling are now contributing to the substantial wealth of the world.

The power drill may be worked with either compressed air or steam, but in many cases, from the location where the drill is operated and the inconvenience attending the getting rid of the exhaust steam, it would be only at a great disadvantage that steam could be employed, while the circulation of pure fresh air provided by the working of the drill with compressed air affords a most valuable result in the way of ventilation for the shafts of mines, in tunnels, and all kinds of ordinary underground work. The manufacturers of the Rand Little Giant rock drill, of the practical working of which we present illustrations on this page of the paper, are also manufacturers of an improved air compressor for use in connection therewith. They have recently furnished the most powerful air compressing plant employed in mining in the world, and it is now in successful operation at the Calumet and Hecla mines on Lake Superior. These compressors furnish cool and perfectly dry air, the last particular being abso lutely essential in cold climates or at great elevations.

The requirements for a perfect rock drill are numerous, but it should first of all be simple in construction and strong in every part, the parts, as far as possible, being so arranged that any broken or worn portion may be easily removed and a new part substituted without causing delay in the work. It should occupy but little space, with the striking part relatively of great weight, and to give the blow directly, so that

only the piston should feel the shock of concussion. Of course the piston must be so arranged as to make a variable stroke, so that no damage will result from the sudden re-



THE RAND ROCK DRILL

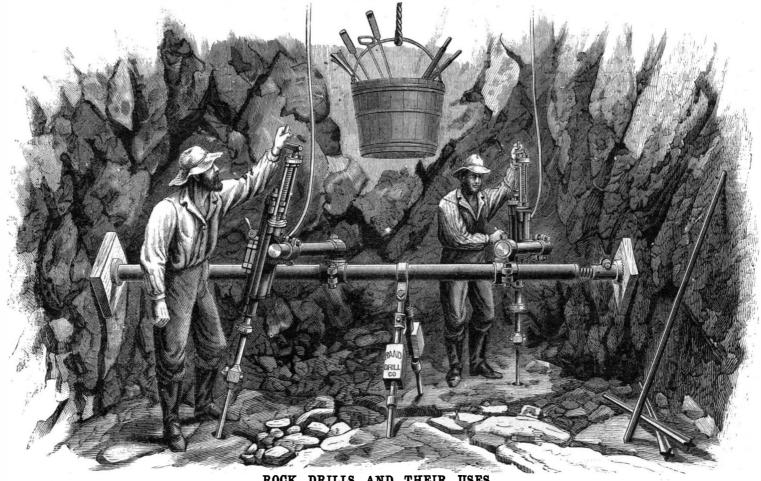
moval of resistance, which often occurs in boring through rocks of different density, or where flaws or breaks occur. Such a machine, if disconnected from frame or carriage, should be as light as possible, and so arranged that it may be readily put up and taken to pieces.

The Rand Little Giant rock drill is the result of many years of experiment for the attainment of these ends, and from the testimonials of some of our largest mining companies who are using the drills and compressors of this company with the utmost satisfaction, it is believed that success has been practically attained. The first point to notice in the construction of this machine is its simplicity, there being no connecting rod or other device outside the steam chest and cylinder to get out of order, the valve being thrown in the same direction the piston is moving, and the port remaining open until the full stroke has been made. The lever for operating the valve is placed in a recess between the ends of a double headed piston, and is struck at the ends as the piston reciprocates, the arm of the lever driving the valve. The valve is of steel, and the whole mechanism is so simple and direct that there is never any difficulty in running at any desired speed, as high as 600 to 700 double strokes per minute having been made, the double stroke meaning the forward and backward motion of the piston.

In the working of this drill the full force of the compressed air or steam is brought to bear directly at the point where the stroke is delivered. The piston rod enters the piston on a taper, and the rotation bar, which is nearly triangular in cross section, is made very strong; the ratchet wheel for rotating is proportionately large, and the teeth strong. This piston is hardened and then ground to a perfect fit on an emery wheel.

These drills are used either mounted on a tripod or attached to a vertical column or a horizontal duplex swiveljointed bar, according to the location in which the boring is to be performed. In vertical work, either the horizontal bar or the tripod may be used, the former, however, only between comparatively narrow side walls, against which the bar can be made firm. The legs of the tripod are arranged to telescope, so that they can be lengthened or shortened at will, thus allowing holes to be bored in very difficult places and at almost any angle. The column, with an arm, is particularly advantageous in all kinds of tunnel work, and the horizontal bar is more especially advantageous in shaft sinking. The latter is one of the most valuable inventions which has been brought out for some time. It allows two drills to operate simultaneously at any angle by means of the supplemental jointed bars. The rapid blows given by the drills upon the solid rock.cause great vibration; this would tend to loosen the bar by turning the jack screw in the nut; to prevent this a lock nut is used, which keeps the screw in place and prevents any loosening of the bar after it is once set up. It can be readily adjusted, the arms folded parallel to the bar, with the drills mounted upon them, and

[Continued on page 402.]



Scientisic American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 87 PARK ROW, NEW YORK.

O. D. MUNN

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included.... One copy, six months, postage included

Clubs.-One extra copy of The Scientific American will be supplied gratis for every club of five subscribers at \$3.20 each: additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 37 Park Row, 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 news dealers 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., 37 Park Row, N. Y.

Scientific American Export Edition.

The Scientific American Export Edition.

The Scientific American Export Edition is a large and splendidperiodical, issued once a month. Each number centains 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. (2.) 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., 37 l'ark Row. New York.

NEW YORK, SATURDAY, DECEMBER 25, 1880.

Contents.

(Illustrated articles are n	narked with an asterisk:
Agricultural inventions 403	Lubricants, oil 404
American industries* 399	Mikania guaco 404 Mining drills, etc* 399 Mirror holder, hand* 403 Motors, sewing machine. 406
Bandannas, how they are dyed 404	Mining drills, etc* 399
Boilers, setting of (18) 409	Mirror holder, hand* 403
Boiler tubes, leaks in (29) 409	Motors, sewing machine 406
Bomb lance, improved* 403	Mustard, French, to prepare (27), 409
Bronze for hardware (21) 409	Oil lubricants 404
Carriage, steam, novel, a 406	Petroleum for harbor defense 401
Cistern filter, new* 403	Polishing machine, new* 403
Compressed air 401	Power, transmission of (20) 409
Deafness, temporary 401	Railways, measurement of 407
Dials, to plate (7) 408	Rain by cannonading 405
Diphtheria, spread of the 401	Rosin oil (6) 408
Drills for mining, etc* 399	Rubber cement (2) 408
Electric light on Broadway 401	Sains to protect from mildew (9) 409
Engineering inventions 406	Sand and water spouts* 407
Engravings, to clean (26) 409	Scientific American for 1881 400
Fair of 1883, site of the 401	Sewing machine motors 406
Filter, cisterns, new* 403	Sheep skin, to cure (16) 409
Food adulterations, rarity of, 403	Sidewheelers, Western* 402
Getting rich—\$2,300,000 a day 404	Siphon, capacity of (30) 409
Gun, new, of remarkable power. 402	Site of the N. Y. fair of 1883 401
Harbor defense, petroleum for 401	Snake bite, a remedy for 404
Hudson river tunnel, progress* 401	Steamboat, steel, for Venezuela. 403
Industries, American* 399	Steam carriage, novel, a* 406
Injecting veins (14) 409	Steel, to temper (17) 409
Ink, green (13) 409	St. Gothard tunnel, the 405
Inventions, agricultural 403	Street lamp, improved, Burton's* 406
Inventions, engineering 406	Tree, age of (1) 408
Inventions, miscellaneous 405	Tunnel, Hudson river, progress*. 401
Inventions, recent 407 Lacquer (23)	Tunnel, the St. Gotnard 405
Lacquer (25)	Tunnel, the St. Gothard
Lamp, street, improved, Burton's * 406	western sidewheelers* 402
Lance, bomb, improved* 403	Wood, to protect from worms (5) 408
Lead, test for (15) 409	1880
Light, electric, on Broadway 401	

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 260,

For the Week ending December 25, 1880.

Price 10 cents. For sale by all newsdealers.

Price 10 cents. For sale by all newsdealers.
PAGE 1. ENGINEERING AND MECHANICS.—The Terminal Facilities of a Great Railway
Fisher's Stamping Mill. 2 figures. Fisher's Rotating Stamping Mills
Steel Steamships of the Future
page illustration
Horizontal Engine
A Week's Work in Birmingham, England
Glucose. Continued from No. 259. Wolff's process of manufacturing glucose.—Turbish's process.—Pigeon's process. 2 figures 4139
Detection of Coal Tar Colors. 4140 Phosphorescent Lamp for Mines 4140
Colors in Patterns. 4140 Jute Dveing 4141
A Transformation of Woolen Fiber
III. PHYSICS.—The Fourth State of Matter
MILLAR
figure
IV. NATURAL HISTORY, ETC.—The Orang-Outang. 1 figure 4141
The Kaloula. 1 figure
Sea Cucumbers and Ascidians. 2 figures
The Movement of the Diatomese
V. GEOGRAPHY, GEOLOGY, ETC.—Vesuvius in Eruption. 1 fig- ure. Eruption of Vesuvius in July, 1880. 4143 The Turquoise in New Mexico. 4143
Cruising in High Latitudes. 4145 Formation of Icebergs. 4145
The Ascent of Chimborazo
VI. METEOROLOGY, ASTRONOMY, ETC.—Clouds. By Prof. S. A. MAXWELL
On the Great Southern Comet of 1880
A Wonderful Jersey Cow

THE LAST NUMBER.

This issue closes another volume of this paper, and with it several thousand subscriptions will expire.

It being an inflexible rule of the publishers to stop sending the paper when the time is up for which subscriptions are prepaid, present subscribers will oblige us by remitting for a renewal without delay, and if they can induce one or more persons to join them in subscribing for the paper, they of the railways which are pushing across the continent to will largely increase our obligation.

By heeding the above request to renew immediately, it will save the removal of thousands of names from our subscription books, and insure a continuance of the paper without interruption.

The publishers beg to suggest to manufacturers and employers in other branches of industry that in renewing their own subscriptions they add ... 1 60 the names of their foremen and other faithful employes. The cost is small, and they are not the only ones that will derive benefit. The benefit to the employe will surely reflect back to the advantage of the employer. The hints, receipts, and advice imparted through our correspondence column will be found of especial value to every artisan and mechanic, as well as to students and scientists.

For terms, see prospectus

EIGHTEEN HUNDRED AND EIGHTY.

With this issue the year's work of the Scientific Ameri-CAN comes to an end. If anything signally memorable has happened or been done during the year, anything calculated ond millennium of the Christian era, our point of view is too in its true relations to the present and the future. At this moment the year seems to be an ordinary average year in every respect, a year signalized by no exceptional achievements in any sphere of human activity. Nevertheless it has been a highly satisfactory year, certainly to all Americans.

The promises of increased business prosperity and general industrial activity, so apparent at the beginning of the year, have been amply fulfilled. The crops have been good, in most respects above the average. Our mines and factories have been made to yield more than their customary products. Labor has been abundant and wages fairly good. Our internal commerce was never in a condition of greater activity; the passenger traffic has equaled, if it has not surpassed, what is usual. The largely increased work of the Post telegraph bears abundant evidence of progressive commercial and industrial prosperity. The relatively few failures among business men furnish additional evidence of the satisfactory condition of our commercial and industrial affairs. Foreign trade has been active, and the steady flow of gold this way from Europe is proof enough that we have the amount of ocean freight carried in American bottoms is the one dark spot in the otherwise bright picture. The coming year should see a decided turn of the tide in this branch of national effort.

Of the purely scientific achievements of the year the most promising is probably the photophone of Messrs. Bell and Tainter, since it opens up a new line of investigation from which practical results of great utility can scarcely fail to flow. In other departments of scientific investigation there has been a reasonable measure of progress, but no signally important discoveries. A vast multitude of small advances have been made in a thousand different directions, advances whose significance may not yet be fully apparent; yet at this moment we fail to recall any that are likely ever to rank among era-making discoveries or achievements.

In the applications of electricity considerable progress has been made. The practical substitution of dynamo-electric machines for galvanic batteries in telegraphing is a decided step in the direction of economy. Recent improvements in harmonic telegraphy, and in devices for rapid telegraphing, promise to add materially to the usefulness and cheapness of electric communication. The development of telephone lines and telephonic exchanges has gone on with considerable rapidity. We fail to discover, however, any marked improvement in the character of the service. There seems also to be a decided lull in the work of improving the range and efficiency of the telephone itself. Has the limit been reached in this direction? It was reported a few weeks ago that the problem of telephoning through considerable lengths of submerged cable had been solved in England, but nothing seems to have come of it. Equally wires will be carried from the top of one post to the top of speedy connection of distant cities; that is, cities from one the system, when they will be sunk under ground. Each to two or three hundred miles apart, by means of the tele- lamp will, it is promised, give a two thousand candle power phone. Quite a number of new telephones have been pallight, equal to about one hundred gas lamps. tented during the year, but as yet they have given no evidence of superiority.

shown signs of real progress, and possibly great utility since the year began. The same may be said of the electric steadily extended. In several American towns they have been successfully introduced for public lighting; and preparations are making for their speedy trial on a considerable scale in this city.

The incandescent lamp of Mr. Edison has been practically tested during a voyage around Cape Horn, on the steamer Columbia, and by continuous use at Menlo Park. working of the Sawyer lamp in one or more public build- part of the globe.

ings in Philadelphia. Before the coming year is done with, we may expect to see one, perhaps several, forms of the incandescent lamp in pretty general use in the business part of

Among the larger engineering operations and undertakings of the year mention may be made of the rapid progress make new connections between the Atlantic and the Pacific; the junctions of the two sections of the St. Gothard Tunnel; the revival of the Hudson River Tunnel project, and its prosecution in the face of difficulty and disaster; the completion of the preliminary work in connection with the proposed tunnel under the British Channel, and the begin ning of what claims to be a serious attack upon the main work; the railway up Vesuvius; the rapid progress of the great East River Bridge; the successful transference of Cleopatra's Needle from Egypt to Central Park; the laying of several new and important Atlantic and other ocean cables: the final acceptance of the Panama route for the proposed ship canal, and the vigorous prosecution of that work (on paper) by De Lesseps; the theoretical development of Capt. Eads' plan of a ship railway at Tehuantenec.

In naval architecture we have the completion of the Czar of Russia's huge novelty the Livadia, and the launching of the Italian war ship Italia, the largest, most powerful, most heavily armed and armored floating fortress in the world. to give 1880 especial prominence in the calendar of the sec- By contrast mention may be made here of the completion of the loftiest and one of the most beautiful and costly of near to enable us to discern the fact or perceive the event temples of worship, the Cathedral at Cologne, after centuries of intermittent construction.

> The dephosphorizing processes by means of which the immediate conversion of certain refractory iron ores into steel has been made possible, are not new; but not until within a few months have they proved to be practical and economical on a large scale.

The De Bay propeller is not new; but not until this year has it been tried on a vessel large enough to furnish an assured demonstration of its superior value and efficiency. In like manner the Perkins system of steam boilers belongs to a period earlier than the past twelvemonth; but it was left to the recent successful voyages of the Anthracite across canals and railways have been crowded with freight, and the Atlantic Ocean to illustrate if not to demonstrate the advantages of high-pressure steam for seagoing vessels. We recall no radical improvements made this year in machinery Office Department and of the competing systems of electric for the artificial production of ice; yet the scarcity of ice due to the unusual openness of last winter has given a remarkable impetus to the construction and use of such ma-

It was our purpose to speak in this connection of the very creditable records made by American arts and industries in the international competitions at Sydney, Australia; at Bernot been losers by the year's traffic. The steady decline in lin, in connection with fish and fisheries; at Cincinnati, in the Millers' Exhibition; at the exhibition of sheep and wool in Philadelphia; but there is no room for it here, and probably no need, for they are fresh in every mind. There is no room either, and possibly no occasion, for saying much about our work in the past or our intentions for the future. The steady annual progress which the Scientific Ameri-CAN has made for nearly two score years is the best guarantee that no pains will be spared to make the paper more and more worthy of the large and increasing favor bestowed upon it by an intelligent and highly appreciative public.

ELECTRIC LIGHTS IN BROADWAY, NEW YORK.

Last year the New York Board of Aldermen passed a resolution requesting the Gas Commission to cause experiments to be made with electric lights, with a view to testing their adaptablity for lighting streets, avenues, parks, and squares. No action was taken by the commission until recently, when permission was granted to the Brush Electric Light Company to test their system at their own expense on Broadway, from 14th to 34th street, a distance of a mile. The posts for the new lamps are now being set up, and it is promised that the lights will be in operation by Christmas. The iron lamp posts are twenty feet high from the base to the foot of the lamp. Their upper portions are supplied with projecting teeth, which are intended to be used as steps by the men assigned to keep the lamps in good condition. The lamps are constructed in accordance with the Brush patent, being from four to five feet in height and surmounted with an iron hood.

The whole number of lamps will be twenty-two; the appointing have been the promises so often made of the the next for the present, or until the city decides to adopt

The central station will be at No. 133 West 25th street. where the Corliss engines and boiler which operate the elec-Though not a product of the year, the electric railway has tric generators have been placed. About twenty-five horse power will be required for the twenty-two lamps, and one wire will convey the current to the entire series. It is light. The use of lamps employing the voltaic arc has been promised that the light will be much cheaper than gas light of equal power. The success of the Brush system elsewhere reduces this experiment to a test of cost and the ability of the lamps to satisfy the requirements of the public

SUBSCRIBE for the SCIENTIFIC AMERICAN and SCIEN-TIFIC AMERICAN SUPPREMENT, for 1881-\$7 a year for both The Maxim lamp is doing good service in the Equitable papers—and you will have all the latest and best scientific, Building in this city, and good reports are received of the engineering, and mechanical news of the day from every

THE SCIENTIFIC AMERICAN FOR 1881.

A new year-the thirty-seventh since the publication of the Scientific American began-will be entered upon with our next issue.

It is gratifying to believe that, during all these years of varying national prosperity, there was never one that opened with broader or more substantial grounds for expecting the largest measure of national well-being-the largest activity in all the useful arts, under the most favorable conditions for success-than are promised for the year about to begin.

Never in their history have the United States presented so cheerful and hopeful an aspect; and in common with all other worthy American institutions the Scientific Ameri-CAN enjoys a bountiful share of the general prosperity. Manufacturers, merchants, farmers, artisans-indeed all classes of men to whom this paper is addressed, are busily employed and are making money; and the number who regularly look to its pages for information, suggestion, or entertainment, is larger than ever before. With such abundant and hearty support, the proprietors can confidently pursue their set policy of striving continually to increase the useful ness of the paper to its readers and advertisers. Having no rivals in this field the only competition they can enjoy is in a constant endeavor to surpass their own best achievements. Whoever will take the trouble to compare this volume just finished with any that has preceded it, cannot fail to be impressed with the manifest fact that the publishers' policy has not been altogether fruitless of results calculated to make the SCIENTIFIC AMERICAN increasingly worthy of the popular favor bestowed upon it.

The Scientific American Supplement will continue to put within easy reach of American readers the best contributions to the practical literature of the sciences- and industrial arts that the public journals afford, besides a large amount of original matter of special value to scientific and practical men. As heretofore, a full table of contents of each issue of the Supplement will be printed in the corresponding issue of this paper, in which every reader of the Scientific American is kept informed of all important papers bearing on the subjects or industries he is specially interested in, should he not feel able to subscribe to both papers. Scarcely a week passes in which the Supplement does not contain special articles worth more than the year's subscription to readers interested in the subjects treated. The ample pages of the Supplement enable us to present full details pertaining to topics discussed with working drawings where such illustrations are useful.

SITE OF THE NEW YORK FAIR OF 1883.

The Executive Committee of the World's Fair of 1883 have at length agreed upon Inwood as a site. The tract selected lies in the extreme northern part of New York city, eleven miles from the City Hall, and has a mile frontage on Broadway or King's Bridge Road, and a mile frontage on Harlem River. It contains 250 acres, the free use of which the owners have offered to give to the Commission for the purposes of the Fair. The ground is already served with gas and Croton water, and is level or gently undulating. The water along the Harlem front is from 18 to 40 feet deep at low tide. There is also an admirable water front along the Hudson river, which is separated from the Fair site by a ridge, in which is a convenient depression for a railway for passengers and freight. The least distance to the Hudson, where abundant docking privilege has been secured, is 1,400 feet, and the exhibits from foreign ports can be landed at Inwood pier, within half a mile of the grounds. The only objection to the site is its distance from the lower part of the city. The means of access to it, however, are the best. Its drives are park roads. The old track of the Hudson River Railroad passes one side, the new track lies just across the Harlem. It is nearer than any other site proposed to all the other railroads tributary to New York except the Long Island Railroad. The Western lines terminating at Jersey city can deliver their passengers at the grounds by means of ferryboats. All the elevated roads can readily be called into requisition in carrying passengers, and the facilities for water transit and the accommodation of shipping are abundant. The ground is ample, naturally drained, and well suited to the needs of the fair; and the location is one of the most beautiful in New York. It has many historic associations, the site being bounded on the east by Harlem River and heights, on the south by Fort George, formerly Washington, Nelson, and Tryon, and on the north by In the work on both tunnels can go on unhindered.

COMPRESSED AIR AS A MOTIVE POWER.

It is very well known that in the matter of the consumption of fuel, the most economical steam locomotive compares very unfavorably with first-class stationary engines, the difference being so great as to admit of allowing a large margin for loss in applying the power of stationary engines to the propulsion of trains.

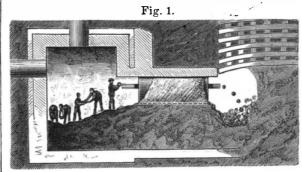
The use of electricity for this purpose has its advocates, and wire rope transmission is believed by some to meet the requirements for short lines, but among the various practicable methods of applying power from a fixed source to the propulsion of trains, nothing has been developed thus far that promises better than compressed air. It is cleanly, safe, and free from the many objections raised against steam, and seems in every way adapted to railway purposes, especially on short routes and for underground roads.

A new method of using compressed air, and a novel locomotive for carrying out the method, is being introduced by Mr. R. Ten Broeck, who is located at the Windsor Hotel, in this city. The new system is the invention of a wellknown English engineer, who has studied the capabilities of compressed air as a motive agent, and has devised machinery for utilizing it to the best advantage.

PROGRESS OF THE HUDSON RIVER TUNNEL.

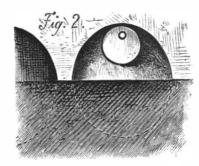
The crib-work of the river bulk head, which has been the source of so much delay in the prosecution of the tunnel under the Hudson River, is again giving trouble.

As a matter of prudence the work on the north tunnel, which was in no way injured by the influx of water, has been suspended until the south tunnel can be carried past the crib-work. This tunnel had been driven as far as the inner edge of the crib-work when the fatal break occurred; and when the water had been pumped out after the sinking of the caisson and the work of tunneling began again, it



was discovered that the inrush of water through the loosely constructed crib-work had not only washed out much of the earth which had filled the spaces between the timber and stones, but had excavated the large hole shown in our engraving. Two serious hinderances were thus placed in the way of the work: the absence of support for the timbers of the crib on their original inclination caused them to drop below the upper line of the tunnel, necessitating their removal before the tunnel shield could be pushed forward, and the washing away of the protecting silt allowed the water to flow in, and the compressed air of the tunnel

The cavity was discovered by sounding. Instead of clearing out the original tunnel at once, a small pilot tunnel, six feet in diameter, was first driven through the washed-in silt almost to the cavity. Then a six inch tube was thrust through the remaining wall of silt, and an attempt was made to pass through the tube a sufficient quantity of mudballs to fill the opening. It was thought that this had been accomplished, and the mud wall was removed only to discover a leak through the crib that defied the usual means of stoppage by the use of bags of bran and the like. At this stage of the work the recent serious inflow of water occurred, compelling a change in the plan of procedure.



The new plan involves the construction of a movable bulkhead fitting the pilot tunnel like a piston. This is to be driven forward by means of a jack-screw, placed as shown in our engraving, until the inner edge of the cribwork is reached. Meantime through a 31/2 inch tube piercing the piston bulkhead, balls of mud are to be forced by the pressure of the air, until the opening under the crib is completely filled. When this has been done, the work of excavation can be narrowed to a small area, the obstructing timbers removed in detail, and any considerable leakage prevented by pushing forward foot by foot the iron shield of the tunnel. The troublesome cribwork being safely Fort Clear View; on the southwest and west by Forts | passed, and the second tunnel-heading fairly under the river,

THE SPREAD OF DIPHTHERIA.

The unusually large number of fatal cases of diphtheria, now occurring in this city and Brooklyn, and in many in rural districts as well as in our larger towns, call for especial care and intelligence in preventing the generation and spreading of this terrible disease. The following statement of the symptoms of the disease, and the precautions to be taken where it prevails, is being distributed by the Health Department of this city. Everybody should read it and attend to its warnings.

Cleanliness in and around the dwelling, and pure air in living and sleeping rooms, are of the utmost importance where any contagious disease is prevailing, as cleanliness tends both to prevent and mitigate it. Every kind and source of filth around and in the house should be thoroughly removed; cellars and foul areas should be cleaned and disinfected; drains should be put in perfect repair; dirty walls variety of other useful subjects.

and ceilings should be lime washed, and every occupied room should be thoroughly ventilated. Apartments which have been occupied by persons sick with diphtheria should be cleansed with disinfectants, ceilings lime washed, and wood work painted; the carpets, bed clothing, upholstered furniture, etc., exposed many days to fresh air and the sunlight (all articles which may be boiled or subjected to high degrees of heat should be thus disinfected); such rooms should be exposed to currents of fresh air for at least one week before reoccupation.

When diphtheria is prevailing, no child should be allowed to kiss strange children nor those suffering from sore throat the disgusting custom of compelling children to kiss every visitor is a well-contrived method of propagating other grave diseases than diphtheria); nor should it sleep with nor be confined to rooms occupied by or use articles, as toys, taken in the mouth, handkerchiefs, etc., belonging to children having sore throat, croup, or catarrh. If the weather is cold, the child should be warmly clad with flannels.

When diphtheria is in the house or in the family, the well, children should be scrupulously kept apart from the sick in dry, well-aired rooms, and every possible source of infection through the air, by personal contact with the sick, and by articles used about them or in their rooms, should be rigidly guarded. Every attack of sore throat, cough, and catarrh should be at once attended to; the feeble should have invigorating food and treatment.

The sick should be rigidly isolated in well-aired (the air being entirely changed at least hourly), sunlighted rooms, the outflow of air being, as far as possible, through the external windows by depressing the upper and elevating the lower sash, or a chimney heated by a fire in an open fireplace; all discharges from the mouth and nose should be received into vessels containing disinfectants, as solutions of carbolic acid or sulphate of zinc; or upon cloths, which are immediately burned, or if not burned, thoroughly boiled or placed under a disinfecting fluid.

PETROLEUM FOR HARBOR DEFENSE.

A correspondent in York, Pa., Mr. D. K. Naell, suggests the use of burning petroleum for repelling hostile fleets from harbors like those of Baltimore, Philadelphia, and New York. A hundred thousand barrels of oil poured upon an out-flowing tide would cover a large area of water, and when set on fire would sweep a fleet with a torrent of destruction that nothing could resist. When a stream of burning oil ran down the Allegheny River last winter the flames sometimes leaped up nearly a hundred feet, and threw out lateral tongues of fire terrible to see. Such flames around an ironclad fleet would asphyxiate all on board.

Another plan would be to link together long lines or rafts of oil barrels and send them against the fleet by small swift steam launches that could be steered by electricity from the shore. The barrels could be exploded and the oil fired by the same agency at the proper moment; and, if necessary, line after line of the fire rafts could be drifted or driven against the enemy until every vessel was destroyed. Such an application of floating fire might also be used to protect a system of torpedoes in a ship channel, by making it impossible to operate any counter system for exploding or removing the torpedoes by men in small boats.

Obviously this plan would not do to rely upon generally; though in certain emergencies it might be resorted to with terrible effect.

A Cup of Tea.

In a recent lecture by Mr. G. R. Tweedie, F.C.S., London, on "A Cup of Tea," the speaker divided his subject into four sections—the tea, the water, the milk, and the sugar. The lecturer first drew attention to tea drinking with everyday life, and showed that the principal components of tea were theine and the essential oil of tannin, which latter possessed astringent properties. He informed the audience that the best time to take tea was about three hours after dinner or any other heavy meal, and deprecated in the strongest terms the excess to which tea drinking is carried by some people, asserting that such a practice induced a nervous disorganization and impeded digestion. He showed that the sole difference between black and green tea was one of preparation, and that both kinds could be obtained from the leaves of the same plant. After asserting that the adulteration of tea had very much decreased of late years, which the tea drinking public will be glad to know, the lecturer proceeded to treat of the various kinds of shrubs grown in different parts of the world and the countries where the different kinds of teas were consumed, the lecturer came to the consideration of the milk, its value as a nutritive agent, and referring to its adulteration he made the astounding assertion that in London alone every year no less than £70,000 was spent on water which was sold as milk. Passing on to regard the sugar, the lecturer denied the common error that sugar was injurious to the teeth, bringing forward as an example the negroes of Jamaica, who, he said, though they were the greatest eaters of sugar in the world, were proverbial for their beautiful teeth.

By remitting to the publishers of this paper \$3.20 you will receive, during the year 1881, fifty-two copies of the SCIENTIFIC AMERICAN, free of postage, each issue of which will contain information and hints of practical use in all branches of manufacture, besides affording the family in structive and entertaining reading in natural history and a

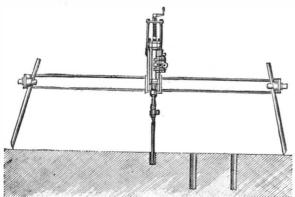
AMERICAN INDUSTRIES

[Continued from first page.]

the whole plant lowered to its place in the shaft by the hoisting rope. By the use of rock drills mounted in this manner great economy is effected in the sinking of shafts, the work being done at half the cost and in one quarter of the time as against hand labor.

For rock drilling under water, where the work is to be done from the surface and not by tunneling from a sunken shaft, it is usual to anchor a platform or scow over the site of the proposed work. The company have an improved description of drill scow for this class of work, in which the drills, in-tead of passing through the vessel as formerly, are placed at the ends, and suitable mechanism is provided for raising and lowering them in a vertical line. The bits extend down through tubes attached to movable carriages. The scow is lifted bodily out of the water, if necessary, by spuds forced down against the rock, thus forming a firm stationary platform. One of these scows was used in deep ening the St. Lawrence River near the mouth of the Lachine Canal, where the cutting amounted to 9 feet of rock under 9 feet of water, in order to make a clear channel of 18 feet in depth. Four Rand drills, of 5 inches diameter, were employed, and during 1878 and 1879 the scow worked on an average six months per year, removing in that time about 45,000 yards of rock.

These drills are regularly rated, as to size, from No. 0, which weighs 150 lb., and bores holes from 1/2 inch to 1 inch in diameter, to No. 6, which weighs 900 lb, and drills 3 to 4 inch holes 30 feet deep. These are intended to cover



DRILL MOUNTED FOR QUARRY WORK.

all ordinary classes of boring, from the lightest plug and feather work to the heaviest bores required in deep cuts, railroad tunnels, mining, and submarine drilling, the size of the drill and the speed at which it should be run differing according to the location and the quality of the rock that is to be operated on. The heavier the drill the slower are the strokes generally, but experience has shown that several other conditions must govern in regulating the speed at which the drill is worked, so that while the rock is fractured and the hole bored without quick destruction of the bits the water will wash out the débris. The machine drill is far less destructive of bits than hand drilling, for the piston end of the drill is never damaged, as is the hand drill, by the blows of sledges; but yet it has until lately been assumed that in some classes of work hand drilling was the most advantageous. In regard to this point some recent is of practical value. The agent in charge says that with these

ground." Besides the abundant proofs of superior efficiency and economy in the working of the Rand drill with the Rand air compressor, which have been afforded in practical experience, the company have had made a series of scientific tests, in which the speed of the drill and the consumption of air at different temperatures, and all the conditions governing the work, were accurately determined. The blows given by the dril! were received by a mass of iron, a blunt headed rod being used instead of a pointed drill. The maximum stroke of the piston was 634 $in ches, and the \, average \, stroke$ during these experiments was 6 inches. The indicator diagrams were taken from the drill cylinder at speeds varying from 111 to 298 double strokes per minute, and at pressures of from 12.5 to 26.5 lb. per square inch above the atmosphere, the piston of the drill being proved practically tight before commencement. When not striking the speed of the drill was controlled by the throttle valve, but for and a constant pressure maintained in the reservoir. The principal results shown by the diagrams are as follows:

2	No. of Diagram.	1.	2.	3.	4.	5.	6.
e n l	Pressure in reservoir, per sq. in No. double strokes per ninute Scale of indicator springs Mean effective pressure, pounds per sq in Ratio of pressure in cylinder working to pressure in reservoir Fraction of stroke completed to exhaust Fraction of stroke completed to cushion	5·78 	12·5 200 13 8·54 0·95 0·85	26 5 298 298 13.6 0.89 0.76 0.78	135 \$\frac{1}{8}\$ 6.66 0.72 0.84	12·5 208 13 8 0·98 0·73 0 83	26:5 298 298 24 11:5 0:89 0:76
2				l	1		1

Reducing the results obtained in ten experiments, the following facts were obtained:

placements	at reservoir pressure and tem- persture	at exhaust temperature and atmosphetic pressure Probable equiv. of air exhausted	et a	Pressure in reservoir Double strokes per minute Temperature reservoir deg Fah. valvechest, " exhaust, " Velocity of air in the exhaust	No. of Experiment.
# 1	10.4	29. 32.	246	225 225 276 276	P
12.8	12.2	ည္သ သ	358	578858	. 20
13.9	14 5	46.1	510	8885£	, co
15.8	17.9	65.4	724	809 600 600 600	4.
16.5	18.7	76.8	850	888 100 44	OT ·
17.2	19.2	91.4	1,012	348 105 42	6.
19.6	20.0	112.9	1,250	48 88 88 88 88 88 88	7.
20.5	20.8	134.1	1,484	415 135 44 44	· •
21.2	21.9	152.7	1,690	429 429 44 44	9.
22.4	. 53 . 53	161.5	1,788	458 160 444 444	10.

The air compressor which the company have built for use especially with their drills, but no less desirable for all other work for which compressed air may be needed, has met with general favor. Its cylinder is composed of three shells, forming two annular spaces around the working cylinder; the outer space affords a passage for the air after compression, and a vessel for collecting any moisture there might be testimony from an iron mining company on Lake Superior in the air, while the inner space forms passages for the water used in cooling. The heads of the cylinder, as also the pisdrills "we have no difficulty in drilling the hardest quartz or ton and piston rod, are hollow, with passages for water for jasper, though we never before have been able, with power cooling. In this way the heat caused by the air compression

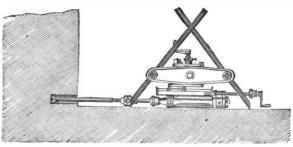
the other runs the throttle valve was pinned wide open, used, reducing friction to a minimum, and only cool dry air is furnished.

> The drills and air compressors of the Rand Drill Company have been long enough in use to have their merits abundant-



ROCK DRILL WITH COLUMN.

ly attested, as they are in the most flattering terms by some of the most extensive and successful mining companies in the country. In California, Colorado, Nevada, Utah, and in the whole Rocky Mountain region, in the Lake Superior mining districts, in Pennsylvania, New Jersey, and New York State, they have in many cases furnished the entire working machinery, and in all the different classes of mining work, as well as in tunneling and excavating of every description, their simplicity of construction, non-liability



QUARRY MACHINE.

to get out of repair, the amount of work they will do, and the economy of their operation, the machines have recommended themselves to practical men everywhere.

The New York office and sales room of the company is at No. 21 Park Row.

WESTERN SIDEWHEELERS.

The illustration is not only an accurate delineation of one of the most remarkable steamers ever built, but it may be taken as a representative of the general appearance and detail of the Western river steamers as a class. The wheels in these boats are always abaft midship, and the boilers are located on the lower (main) deck amidships.

The Bostona, shown in the engraving, was built at Cincinnati, in 1879, to ply on the Ohio between that city and Huntington, W. Va., the western terminus of the Chesapeake and Ohio Railway. She measures 302 feet long, 431/2 feet beam, 6 feet hold, and carries 1,000 tons freight, yet with steam up and fuel aboard, draws only slightly over two feet. She has complete accommodations for about 200 passengers. There are four steel boilers, 30 feet long, 47 inches in diameter, with six return flues each; two engines, horizontal, drills, to do as well as men could do with hammers in such is effectually got rid of. Self-lubricating piston rings are high pressure, 25 inches diameter, and 8 feet stroke. The

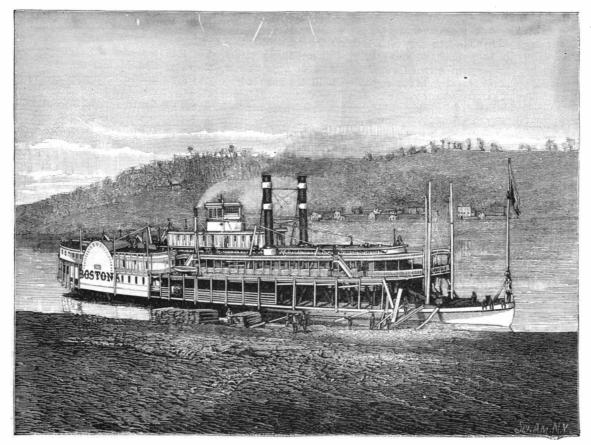
> wheel shafts are located 98 feet from the stern.

As this trade demands that the freight be handled as quickly as possible, all cargo is carried on deck. This brought about an ingenious arrangement, by which the fuel box, which heretofore had encumbered considerable space on deck, was done away with and the unused hold utilized. A double railway track is laid throughout the length of the steamer's hull, on which are a number of small cars containing the

By the shifting of these coal cars the steamer is trimmed even when running light.

H. L. BRIDWELL. Hillsboro, Ohio.

NEW GUN OF REMARKABLE Power. -Sir W. Armstrong & Co. have lately produced a five ton (95 cwt.) gun that discharges a 120 lb. projectile with a velocity of 2,064 feet per second, which is equal to 3,545 foot tons of stored up energy, or 746.3 foot tons per ton weight of gun



THE LIGHT DRAUGHT STEAMER BOSTONA."

NEW POLISHING MACHINE.

We give an engraving of an improved machine for polishing knives and other similar articles, recently patented by Mr. M. R. Chase, of Warren, R. I. The machine con- mended for each State, and both State and national legissists of two disks of yielding material having radial grooves lation on the subject of adulteration is deemed desirable. passed through the filter bed in a circuit around the man-hole. in their adjacent faces for conveying the polishing powder | The committee will endeavor to prepare and place in the

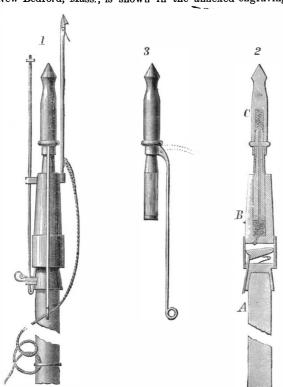
from the tubular shaft outward. These disks are inclosed by a circular casing having openings through which the articles to be polished are thrust. On one side of the machine there is a crank for turning the polishing disks, and upon the opposite side there is a smaller crank for turning a worm which carries the polishing material from the hopper into the shaft, whence it passes through lateral holes to the radial grooves in the polishing disks. To render the grooves more effective in feeding the polishing material they are slightly curved, and the grooves of one disk alternate with the grooves of the other. By this arrangement all of the polishing surface is utilized and the best distribution of the polishing powder is insured.

The polishing material used with this machine consists of any suitable polishing powder mixed with cork sawdust and moistened with soap and water. The powder thus prepared, when dry and evenly distributed on the polishing disks, forms a soft pliable surface, which is very effective in polishing all parts of the surface being operated on.

The pressure between the disks may be easily regulated, and only a few turns of the machine are required to give a knife a fine polish: convenient power.

IMPROVED BOMB LANCE.

An improved bomb lance, patented by Mr. E. Pierce, of New Bedford, Mass., is shown in the annexed engraving.



PJERCE'S BOMB LANCE.

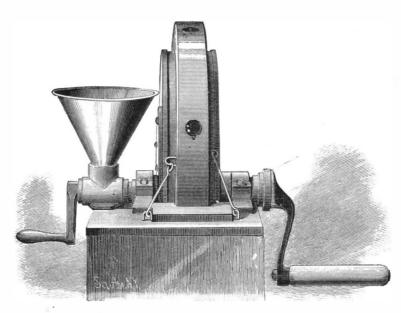
Fig. 1 is a side elevation, Fig. 2 is a longitudinal section, and Fig. 3 shows the bomb lance detached from the gun.

The invention consists of a gun mounted on a suitable shaft and adapted to the bomb lance shown in Fig. 3. The gun has a lock which is operated by impact against the body of the whale. The bomb lance has a cavity for receiving a charge of powder, and is provided with a wooden staff through which a fuse passes. The staff of the lance is received by the gun barrel. On throwing the lance the lock of the gun is released and the gun discharged as the point of the lance touches the body of the whale; the fuse of the lance is at the same time ignited, so that immediately after the lance enters the body of the whale its charge of powder is exploded, killing or injuring the whale. The bomb lance is provided with a rod having an eye in the end for receiving

The Rarity of Food Adulterations.

In awarding the prizes offered by the National Board of Trade a year ago, for essays in relation to the adulteration of food, the committee makes the gratifying announcement that none of the competing essayists produce any definite or satisfactory evidence as to the widespread existence of very dangerous adulterations in this country. Such dangerous adulterations appear to be mainly in the form of poisonous colors or coloring matters, as, for instance, in confectionery, and even these are rare. The question of the adulteration of food, with, perhaps, the exception of milk, should therefore be considered not so much from a sanitary standpoint as from that of commercial interests, as being in the nature of a fraud, in aiding the sale of articles which are not what they are represented to be. The committee is of the opinion top below outer cistern wall, is provided to take water not

country from adulterated drugs than from adulterated food, and that any legislation which is to deal with the one should also deal with the other. A Board of Health is recom-



CHASE'S POLISHING MACHINE.

The machine may be run by hand or foot or by any other | hands of the President of the National Board of Trade, as soon as possible, drafts of acts prepared in accordance with the general principles contained in its report.

NEW CISTERN FILTER.

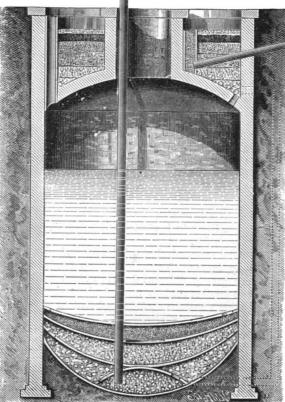
The engraving shows a filter designed to secure in any given cistern space a more thorough removal of suspended matter than is effected in the ordinary cistern filters, to eliminate from the water matters harmful to health by a process which depends mainly on the concentration of atmospheric oxygen and in part by oxygen dissolved in water.

The process of oxidation is carried on during the passage of the water through a finely divided and aerated filter bed, the aeration of which takes place during fair weather.

The filter bed in which the oxidation and aeration take place is not constantly submerged, as are those now used, but is open to air pressure, to the action of light and heat in summer, and to the disinfecting, cleansing, and healthful influence of cold and frost in winter, agencies essential to secure good water.

A tonic or mineral quanty can be given to the water by the introduction of iron filings or small scraps of iron in the filter bed, when desirable.

The engraving is a vertical section of the filter, with its walls extending from base of arch to ground surface. It has on its arch a main aerated filter bed, and on its bottom four more filter beds. In the main aerated filter bed there are six layers, as follows: First, gravel stones or pebbles at the bottom, to allow free drainage; second, a layer of coarse gravel; third, one of finer gravel; fourth, one of sand; fifth, one of coarsely granulated charcoal and fine sand; sixth, one of small pebbles on top, to keep charcoal in place and allow it to dry out between showers in fair weather. There is a space for water above the filter bed, and an overflow pipe, with



DAY'S CISTERN FILTER.

that there is much more danger to health and life in this passing through the main filter by a direct passage into the the marking devices,

cistern; there is also a pipe to allow water discharged from conduit pipe, to come from main aerated filter bed to its surface, and then spread over it. Through the arch there is an opening to carry the water into the cistern after it has The arrangement and composition of the four filter beds

on the bottom of the cistern are as follows:

The hemispheroidal filter on bottom of cis. tern is composed of granulated granite, or limestone, or cleanly washed pebble stones. This is gravel concreted an inch thick, and perforated, before concrete sets, with twenty-five to fifty small holes midway between its base and top. Around this there is a filter bed made of coarse gravel and gravel concreted in form of an inverted arch, with fifty to seventy five small holes near its outer edge, and above this there is a filer bed made of fine gravel and gravel concreted in form of an inverted arch, with a twelve inch opening at the center. The upper filter bed is made of closely compacted clean and sharp sand, and concreted with gravel an inch or more in thickness, with fifty to seventy-five small holes near its outer edge.

It will be noticed that the water is filtered as it enters the cistern, and filtered again as it is pumped out.

This invention was lately patented by Mr. Samuel Day, of Ann Arbor, Mich.

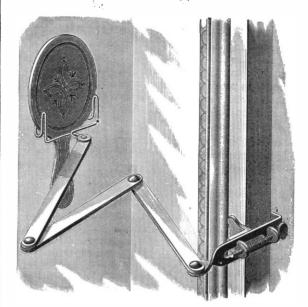
A Steel Steamboat for Venezuela.

A steel steamboat in sections was recently sent from this port to Lake Maracaibo, to be used in

the transportation of coffee and other products of Northern Venezuela. The Zulia and other rivers of that fertile basin are apt to be very shallow during the dry season, making transportation by the river craft there in use not only uncertain but expensive. The design is to substitute therefor a fleet of steamboats, of which the one lately sent is a pio-

HAND MIRROR HOLDER.

The engraving shows a simple and very convenient device for holding a hand mirror when it is desirable to use



HAND MIRROR HOLDER

both hands in making the toilet. The bracket is readily clamped to the frame of the mirror, and may be extended sufficiently for ordinary purposes.

This invention was recently patented by Messrs. Webb & Myrick, of Stockton, Cal.

AGRICULTURAL INVENTIONS.

A check row corn planter, so constructed as to drop the seed at uniform distances apart, and at the same time mark the position of the hills, so that the planting can be done in accurate check row, has been patented by Messrs. Alfred A. McIntosh and Lysander J. Lishness, of Pontiac, Ill.

Mr. Edson M. Gaskill, of Edenton, Ohio, has pater churning machine so constructed that it will be operated by giving oscillating movements to the chair upon which the operator sits.

An improved manure fork has been patented by Mr. George P. Ruhle, of Swengel, Pa. This invention relates to certain improvements on the combined scraper and fork for which Letters Patent No. 223,390 were granted to the same inventor January 6, 1880, and it has particular reference to the construction of the fork.

An improved check row corn dropper, or device for automatically planting corn in perfect check rows, has been patented by Mr. Alonzo J. Simmons, of Pana, Ill. It comprises the following features: Means for rendering the distance between the hills dropped uniform and independent of the rough character of the surface of the soil; in a peculiar mechanism for converting the rotary movement of the driving shaft into the reciprocating movement of the seed slide; and in the peculiar construction and arrangement of

How Bandannas are Dyed.

For a long time the once fashionable bandanna handkerchiefs imported from India were a great puzzle to Western dvers. The white spots on a uniformly dyed red ground were produced by tying up the cloth at those parts so tightly that when the handkerchiefs were dipped into the dye, the latter could not penetrate the protected parts. When the cloth was dyed and the tyings loosed, the white spots useful information has also been gained. He says: revealed themselves.

When the "discharge process" of figuring dyed cloth was invented by Koechlin it was at once adopted by a Glasgow house, and so successfully worked as to produce goods tion of bandannas, and the city and its neighborhood has since enjoyed almost a monopoly of this branch of manu- of the American Association for the Advancement of Science uniform color-most commonly red or blue-and a dozen ever attained before. pieces are laid one over another and wound upon a roller. This roller is placed upon bearings behind a press of peculiar construction. The press consists of a bed plate mounted on hydraulic gear, and an upper plate or "platen." The bins now in use. Our machine having been adjusted in printing, if we may so call it, is done by means of two stout plates of lead fixed to the upper and lower plates of the press respectively. If the design is to consist of, say, of four pounds, it appeared that the difference in power rewhite spots on the colored ground, the exposed surfaces of quired to overcome the resistance of the parts varied as the lead plates have cut into them a series of depressions corresponding to the size and number of the spots desired. These have to be securely placed, so that when the two machine at 100° Fah., when lubricated with Downer Oil fall exactly over those of the other. All being ready, the under the same conditions, with the exception of the subpressman takes hold of the end of the twelve-fold web of stitution of neatsfoot oil as a lubricant, the resistance cloth and lays it on the lower plate. The plates are then amounted to 2,427, or three and twenty-one hundredths brought together with a pressure of two or three hundred times as much. tons. It will be noted that now the whole body of the cloth is tightly pinched, except those parts which come between the depressions in the plates. Communicating with in excess of that at 75° Fah. each of these depressions are openings through the upper plate, and channels leading thereto. When the pressure is fully on, a tap is opened, and a stream of bleaching liquid flows along the channels in the upper plate, and finds its wav by the aperture to the cloth, through which it passes, and makes its exit by openings in the depressions of the dle frame, which could not be reduced to such precise aclower plate. To quicken the action of the liquid and cause it to penetrate the exposed parts of the cloth thoroughly, a according to the greater or less tension of the bands, other force pump is employed. As the liquid passes through the results were reached of the same general character, fully cloth it dissolves the connection between the mordant and the coloring matter, and carries off the latter, leaving the parts it has come into contact with purely white. A press attended to by one man is capable of producing 700 handkerchiefs per day. There is no limit to the variety of forms that may be given to the cleared spaces, and many beautiful effects are produced by printing various colors into these. The effect of the adoption of this process of producing the ordinary limits of modern practice, or in the length of bandannas was (it need scarcely be said) to reduce the cost enormously, and consequently bring them into greatly extended use.

The Mikania Guaco as a Remedy for Snake Bite.

In South America, under the name of "guaco," several plants enjoy a considerable reputation as remedies against snake bites. Most of them are species of Aristolochia, but tions in the temperature and condition of the atmosphere one, the Mikania guaco, is a composite plant. Notwithstand ing this reputation, very little trustworthy evidence has been published as to the real efficacy of any of them, and an at tempt made by Dr. Schomburk a few years since to introduce the Mikania guaco into South Australia, with a view of clearing up the doubt, does not appear to have led to a definite result. In a letter, however, recently received by the Director of the Royal Gardens at Kew, from Mr. Robert B. White, of La Salada, New Granada, the writer gives his personal testimony as to the value of the remedy, and some other information which, by the courtesy of Mr. Thiselton Dyer, are made available for the readers of this journal.

Mr. White says the Mikania guaco is the true "guaco," and forms the basis of all the preparations of the snake bite doctors of the district. There are two varieties, one with green stems, the other, called "morado," with purple, the latter being the most prized. There are several species of snakes in the country whose bite is deemed mortal, some of in ten hours, at a heat of 140° Fah., is hazardous in proporthem killing in a very few hours, but Mr. White, who has lived in the Choco and other snake infested regions many years, testifies that the guaco, properly and promptly administered, is a cure for the bite of the most venomous.

In cases of snake bite, when the guaco leaves can be ob tained fresh, an infusion in sugar water is made, in the proportion of one leaf to a large cupful, and this quantity is given hot every hour. It is said to stop the vomiting usually occurring. The leaves are also preserved by bruising and placing them in alcohol, and of the tincture thus formed a teaspoonful is administered every half hour for one hour and a half, and then every hour, and afterward the dose is gradu ally diminished. Hot poultices of the bruised leaves and stem of the plant are applied to the wound, taking care not to use sufficient heat to drive off the volatile principle of the plant. If there be swelling and pain the limb is fomented with hot water to which some tincture of guaco has been added.

The Mikania guaco is described as growing from seed in any good soil where there is a temperature of 24° to 25° C. and would appear to be a plant deserving of physiological and chemical experiments to determine its true character. It is worthy of note that it was at one time said to be the ${\bf source} \,\, {\bf of} \,\, {\bf condurango.} \\ - {\it Pharmaceutical} \,\, {\it Journal.} \\$

Oil Lubricants.

The experimental investigations undertaken two years ago by the Boston Manufacturers' Mutual Insurance Company, with a view to the abatement of the losses from fires occasioned through oils, has been attended with much success. Mr. Edward Atkinson, the president, in a recent circular esti mates a saving already of \$180,000 a year. Much new and

Another result of this work has been the invention of the machine on which we can now ascertain the anti-frictional properties of any oil with absolute certainty, and by the use of which we have obtained measurements of the coefficient exceeding in beauty the famous bandannas of India. Seve- of friction with an accuracy and uniformity that have ral other Glasgow firms turned their attention to the produc- never been approached before. The results of Mr. Woodbury's experiments presented by him at the recent meeting facture. The cloth intended for bandannas is dyed of a have been accepted as a long step in advance of anything

> One issue of these experiments may perhaps be to settle some points in respect to the power required or power saved by the use of the different kinds of spindles and bobvelocity and other conditions to those of a Sawyer spindle operating at 7,600 turns per minute, under a band tension follows:

The resistance or power required to operate the frictional plates are brought together the depressions in the one shall Company 32° extra machinery oil, amounted to 750; and

> In respect to the same oil at different degrees of temperature in the bearing, the resistance at 50° is about 75 per cent

> In respect to the best oil and the poorest lubricant at 100° Fah., the difference is 321 per cent.

> In respect to a difference of pressure varying from 1 lb. to 5 lb., the difference is 229 per cent.

> By means of experiments applied to a small Sawyer spin curacy, but which marked the great variations in power, confirming the above conclusions.

> The general conclusions reached are, therefore, that although as a matter of course there must be a marked difference in power needed between a well planned and constructed and a badly planned and constructed spinning frame, yet, when it is a question between two well constructed frames, varying only in the weight of the spindles within the spindles and the position of the bearings, or in the solid or open construction of the bobbin, or in the presence or absence of a chamber at the top of the bobbin-the greatest differences in these details do not make as much difference in the power required as may be made in the adjustment and tension of the bands, or in the quality and condition of the oil; and hardly as much as may be made by variaand of the machine, or in the quality and condition of the stock in use. The uniform tension of the band appears to be the factor of the greatest importance, and the structure of the bobbin of the least, provided the spindle is long enough and heavy or stiff enough to keep the bobbin true, and to prevent it from springing under the varying conditions of the atmosphere.

> In respect to the best quality of oil to be used on spindlesthat is to say, the best oil to be used on light bearings at very high velocity-a few simple rules may now be laid down dogmatically, so far as rules are to be made by experiments on a single machine, or from laboratory experi-

- 1. A mineral oil that flashes at less than 300° Fah., does not possess the best qualities for lubrication, and is unsafe in proportion to the lesser degree at which it flashes.
- 2. A mineral oil that evaporates more than five per cent tion to the increased percentage of volatile matter, and is also more unfit to be used as a lubricant the more rapidly it evaporates; because the remainder will either become thick What is the average annual income per inhabitant in various and viscous, requiring a high heat in the bearing to make it operate at all, or else, if the oil does not contain such a average annual income in the United Kingdom is \$165; in residuum liable to become thick and heavy, it will leave the United States, \$165 also, in the Low Countries, \$130. the bearing dry.
- 3. All the mineral oils—and also sperm, lard, and neatsfoot oils—appear to reach a nearly uniform coefficient of friction at very greatly different degrees of heat in the bearings. Several kinds of the best mineral oils, and sperm and lard oils, show a uniform coefficient of friction at the following degrees of heat:

4. Lubrication seems to be effective in inverse ratio to viscosity—that is, the most fluid oil that will stay in its place \$2,300,000 to the wealth of the Republic."

is the best to use. Lard oil heated to 130° lubricates as well as sperm at 70°, or the best mineral oil at 50°. But of course it is a great waste of machinery to work oil of any kind up to an excessive heat; and there must be the least wear in the use of oil that shows the least coefficient of friction at the lowest degree of heat.

- 5. The quantity of oil used is a matter of much less importance than the quality. The mill that saves gallons of oil at the cost of tons of coal, or dollars of repairs, plays a losing game. Mr. Waite's experiments on very heavy bearings at Manchester go far to prove that a considerable quantity of thin, fine oil keeps the bearing much cooler. and requires less power, than a smaller quantity of thick, viscous oil. Here let it be observed, that a superstition that prevails in favor of using castor oil to cool a hot bearing, is without any warrant. No vegetable oil is fit to use as a lubricant; and castor oil is the worst of all, because the most viscous. If used, it will surely set the mill on fire, as it did in the only case of which we have a record.
- 6. The rule of best lubrication is to use an oil that has the greatest adhesiveness to metal surfaces, and the least adherence as to its own particles. Fine mineral oils stand first in this respect, sperm second, neatsfoot third, lard
- 7. Cast iron holds oil better than any other metal or any alloy, and is the best metal to use for light bearings, perhaps for heavy.
- 8. It has been proved by Mr. Waite's experiments that a highly polished bearing is more liable to friction than a surface finely lined by filling. The lines left by the file serve as reservoirs for the oil, while the high polish leaves no room for the particles between the metal surfaces.

So far as laboratory experiments may serve as a guide in practice, it therefore appears that fine mineral oils may be made to serve all the purposes of a cotton mill, and such is the practice in some of the mills that show the very best results in point of economy.

Next, that the best animal oil to mix with a fine mineral oil, in order to give it more body, is sperm oil; this, again accords with the practice of many of the mills in which the greatest economy is attained.

Lard and neatsfoot oil are used to give body to mineral oil in some of the best mills; but the results of our work seem not to warrant this practice, unless there is some peculiarity in the machinery that makes it more difficult to keep a less viscous or tenacious oil on the bearings.

All the mixed oils sold under fancy names we believe must of necessity consist of certain proportions of the oils heretofore named, as none of the vegetable or fish oils are fit to be used, and there are no other animal oils that can be had in any quantity.

It appears that all varieties of mineral oils are or have been used in print cloth mills, and are all removed in the process of bleaching, as practiced in print works.

All mineral oils stain more or less, and give more or less difficulty to the bleacher when dropped upon thick cloth, or cloth of a close texture. On this point we have been able to establish no positive rule; but as very many kinds are and have been used in mills working on such cloths and are removed, we are inclined to the belief that this question is not of as great importance as it has been assumed

Getting Rich at the Rate of \$2,300,000 a Day.

That the people of this country are relatively well off, notwithstanding their expensive ways of living, is pretty well known. Just how rich we are, and whether we are rapidly growing richer, or merely holding our own, probably few can tell. Mr. T. M. Coan has been looking up the statistics of these matters at home and abroad, and offers the following figures in Harper's Magazine. In answer to the question, Where do we stand as to total valuation of the national wealth? he replies:

We stand near the head of the list—third on the list of all the Western nations. The United Kingdom of Great Britain and Ireland heads the list with a capital valuation of \$44,-400,000,000; then comes France with \$36,700,000,000; the United States with \$32,000,000,000; Germany with \$2?,000,-000,000; Russia with \$15,000,000,000 and the Low Countries with \$11,150,000,000 of capital collectively. These are the valuations made by those countries of their entire resources. countries? We come to the front in this comparison in France, \$125; in the British Colonies, \$90; in Germany, and also in Scandinavia, \$85. In this reckoning Russia, with her ninety millions of people, is out of sight as yet; she will not be very long.

On the score of annual accumulation our case is even better, relatively far better. The annual accumulation of wealth in Germany is \$200,000,000; it is \$325,000,000 in the United Kingdom; \$375,000,000 in France, in the United States it is \$825,000,000! Our increase of national wealth since 1850, says a good English authority, would be enough to purchase "the whole German Empire, with its farms, cities, banks, shipping, manufactures, etc. The annual accumulation has been \$825,000,000, and therefore each decade adds more to the wealth of the United States than the capital value of Italy or Spain. Every day that the sun rises upon the American people it sees an addition of

MISCELLANEOUS INVENTIONS.

An improved bob sleigh has been patented by Mr. Charles R. Walkley, of Churubusco, Ind. This invention consists ing of the cutting tool when a shaft or other piece of work in a novel construction of the knee, and the arrangement is being turned, faced off, or centered in a lathe. thereof with relation to the runner and the bolster, and of the runner with relation to the knee and to the draught bar, whereby provision is made for enabling the runners of each pair to move independently.

An improvement in underground telegraph lines has been shrinkage. patented by Mr. Stephen D. Field, of New York city. The object of this invention is to prevent the accumulation of and to remove moisture from underground tubes containing It consists in the construction of the stationary and folding telegraph wires, and thereby insure the insulation of the wires. The invention consists in the combination, with a system of underground tubes, of mechanical means for maintaining a circulation of dry air and drying or condensing chambers for relieving the air of moisture.

An improved boat plug which is simple, self-acting, and reliable, has been patented by Mr. Lewis H. Raymond, of New York city. The invention consists of a plate attached to the bottom of the boat over an aperture, and provided with a perforated neck having an external thread to receive a cap on the upper side, and with a hinged valve on the bottom side, this valve being protected by a suitable cage.

An improved baker's oven has been patented by Mr. George Brake, of Lansing, Mich. This invention is an improvement on the baker's oven for which Letters Patent No. 215,088 were granted to the same inventor May 6, 1879.

Mr. James Lidstone, of Farmington, Me., has patented an improved steam cooker for cooking meats, vegetables, etc. The novelty consists in the arrangement of parts whereby the steam and odors of the cooking food are conducted from the several compartments of the cooker into the fire space below, and thereby prevented from escaping into the room.

An improved apparatus for balancing or adjusting the running millstone upon its spindle has been patented by Mr. James Comerford, of Rathdrum, Ireland. This improved balance consists of a ring fixed in the eye of the stone by three or more radial set screws, and connected to the universal joint or other bearing on the cock head of the spindle, the ring being sufficiently smaller than the eye to admit of the stone being shifted by means of the set screws in any direction radial to the spindle, with which the ring Society in 1877; of the Royal Academy of Sciences, of Italy, remains concentric. The stone is supported on the ring by an inwardly projecting flange or lugs on a lining or a set of legs fixed in the eye and rising through it (more or less) to-versity of Leipsic in 1870, and Yale College in 1871, conward the back of the stone, it being generally preferred that ferred upon him the degree of Ph.D.; and Columbia College, the ring should be high up in the eye, so that the bearing on in 1877, the degree of LL.D. He was also appointed Judge the spindle may be at or above the center of gravity of the of Awards at the International Exhibition of 1876. stone, although it is not limited to this position.

Mr. George Oliver, of London, England, has patented improvements in the apparatus for use in gymnastic or theatrical performances for which two applications for Letters Patent in the United States were filed by the same inventor on the 19th day of June, 1880; the invention consists in the combination, with the springs and the wire by which the performer is raised, of a drum and brake interposed between the springs and the wire for the purpose of taking up the slack of the wire after the performer has received an upward impetus from the springs, and of retaining the performer at any height to which he may be raised and check-

An improved self-inking stamp, which is simple, convenient, and effective, has been patented by Mr. Louis K. Scotford, of Kansas City, Mo. The invention consists in a self-inking hand stamp mechanism by which the die is pressed against the ink pad when the handle is raised, and is oscillated by depressing the handle.

Mr. James V. Pomeroy, of Boulder, Col., has patented a process of amalgamating ores containing gold and silver, which consists in introducing chlorine gas or chloride of lime with an acid into the pulverized ore with the mercury.

An improved eyeglass has been patented by Mr. Gideon C. Hilpert, of Hill, N. H. The object of this invention is to provide eyeglasses that are adjustable upon the nose in a straight horizontal line instead of with the rolling motion common in other eyeglasses. The improvement consists in lenses connected with each other by means of a straight rod, and adjustable with respect to each other by means of a spiral spring encircling the rod.

An improved can opener, so constructed that it can be readily adjusted to cut larger or smaller openings as required, has been patented by Messrs. George A. Snow and Franklin L. Coe, of New York city.

A wrench especially adapted to the unscrewing of bolts and nuts where but little room is given for the movement of the wrench handle, has been patented by Mr. Leslie P. Hiatt, of Peru. Iowa.

A device for preventing the lateral vibration of a circular saw while running, has been patented by Mr. Clarence A. Sherman, of Plover, Wis. The invention consists of a pair of laterally adjustable guide arms and guides fixed on an adjustable bar that passes laterally through a centrally mortised sliding block, which together with its attachments are held in place by means of a cam-operated bar.

Mr. Jacob R. Scott, of Nyack, N. Y., has patented a ma chine for sewing boots and shoes that will meet the peculiar requirements of that class of work without complicated mechanism; and the invention consists, specially, in the mechanism for tightening the stitch, whereby the layers of leather are tightly drawn together, and also in the looping mechanism for forming the stitch.

An improved lathe tool has been patented by Mr. Joseph diminish the hazards of railway travel.

V. Hoffman, of Raritan, N. J. The object of this invention is to prevent the springing of the work and the chatter-

Messrs. Stephen H. French and William J. Maltby, of Belle Plain, Texas, have patented a vehicle wheel whose spokes may be adjusted radially outward, and also forced tightly together around the axle box to compensate for

An improvement in the class of wardrobe bedsteads has been patented by Mr. Ernest N. Doring, of New York city. parts which adapt them to close together and in the means 13,057 meters; of the west side, 9,830; and of the east side. for connecting and balancing the folding part.

James C. Watson.

James C. Watson, Professor of Astronomy in the Wisconsin State University and Director of the Washburn Observatory, died at Madison, Wisconsin, November 23. For a week or more Professor Watson had been suffering from a severe cold contracted while superintending the construction of a large addition to the observatory and a new solar observatory which he was constructing at his own cost. He was better the day before his death, and unwisely exposed himself to chill, which in his exhausted condition he was unable

Professor Watson was born, in 1838, at Elgin, Canada, of American parentage; and when he was still a child his par ents returned to the United States, settling in Ann Arbor, Mich. At the age of fifteen he entered the State University at that place, and took his first degree at the age of nineteen. Two years later he was elected Professor of Astronomy and Instructor in Mathematics in the university where he had studied, and rapidly rose to eminence as an original discoverer and contributor to scientific periodicals.

In the course of his connection with the university he added twenty-three planets to the list of those already known. besides the more important discovery of the planet Vulcan. For these contributions to the world's knowledge he received, in the year 1870, the award of the gold medal of the French Academy of Sciences; was made member of the National Academy of Sciences in 1867; the American Philosophical in 1870; and in 1875 Knight Commander of the Imperial Order of the Medjidich, of Turkey and Egypt. The Uni-

Professor Watson was also repeatedly called upon to take charge of government expeditions for astronomical observation., In this capacity he went to Mount Pleasant, Iowa, in 1860, to observe an eclipse of the sun; to Carlentini, Sicily, in 1870, for a like purpose; to Pekin, China, in 1874, to observe the transit of Venus; and to Wyoming Territory, in July, 1878, where, during the solar eclipse, he discovered the planet Vulcan, and satisfied himself of the existence of another unknown planet of lesser magnitude.

In 1879 Professor Watson left Ann Arbor to take charge Madison. The private solar observatory which he was building at the time of his death, was on a plan suggested long ago by Bacon, but never tried. A cellar twenty feet deep had been sunk below the surface of the ground at the bottom of the first hill slope, in front of the entrance of Washburn Observatory. Over this a fine stone building was being erected at the top of the hill, which is about sixty feet above the bottom of the cellar. Powerful reflectors were to have been placed to throw rays of light down a long tube which ends in the cellar, where the observer would be stationed.

Professor Watson believed that in this way better observations of the sun could be taken than ever heretofore obtained. All these projects and plans for the future are, however, brought to their end by his untimely death.

Among his best known publications are a "Popular Treatise on Comets," published in 1860; "Theoretical Astronomy," 1868; "Report on Horological Instruments," 1878; and "Tables for the Calculation of Simple and Compound Interest and Discount," 1878. Since 1872 he has been president of the Ann Arbor Printing and Publishing Company, and for several years has been actuary of the Michigan Mutual Life Insurance Company.

Extension of Telephonic Facilities.

have recently placed in a number of their offices telephones moonlight nights I ever saw. The next week was also for public use. By means of this extension of facilities clear, except a very light shower the second day after. parties who wish to talk with subscribers of telephone ex-, Very few of the battles of the Atlanta campaign were folchanges in New York City, Brooklyn, Jersey City, Newark, Paterson, Elizabeth, Orange, Yonkers, and Coney Island, can do so under certain restrictions for five minutes, on paying a fee ranging from twenty to forty-five cents, according to distance. The next improvement will be the establishment of telephone stations, through which conversation may be had by appointment with non-subscribers.

Thomas S. Hall.

Mr. Thomas S. Hall, inventor of the automatic electric railway signals bearing his name, and in use on many of the railways of this country, died at Hartford, Conn., Dec. 1, at the age of 52 years. Mr. Hall was a man of great

The St. Gothard Tunnel.

The Geneva correspondent of the London Times writes, under date November 3: "The 94th monthly report of the St. Gothard Railway Company, which has just been presented to the Federal Council, bringing the history of the undertaking to September 30, contains details which, in view of its approaching completion, are more than ordinarily interesting. As for the great tunnel, the enlargement of the upper part is complete over a length of 14,872 meters. There remain now only 40 meters to be enlarged. The excavation is finished and continuous for a distance of 9,530 meters. The completed masonry of the roof measures 9,891; and the length of tunnel entirely finished, with aqueducts, rails, and niches, is reckoned at 9,300 meters, about two-thirds of the whole. The average number of men employed inside the tunnel during the month of September was 3,031. The total outlay on the tunnel to the date in question was estimated at 49,853,545f. The mean maximum temperature of the tunnel was 87° Fah., the mean minimum 85°. The average daily consumption of dynamite was 235 kilogrammes, of oil 578. Good progress is being made with the lines of approach. Between Immensee and Lugano there are five stretches which, taken one with another, are completed, as touching excavations and embankments, in the proportion of 72 to the 100; as touching masonry and rail laying, 67 to the 100. The average monthly rate of progress is about 6 per cent. Of the fortynine smaller tunnels, thirty-four are pierced and several quite finished. The outlay on the lines of approach to September 30 reached a total of 32,781,000f. The average number of workmen employed in the making of these lines is 13.420. It results from the foregoing particulars that, should no unforeseen delays occur, the St. Gothard line in its entire length can hardly fail to be ready for traffic in the first half of next year. Meanwhile, the differences between the company and the contractors for the great tunnel are being fought out before the Federal Tribunal. The contractors, while expressing their intention to have the tunnel completely finished by the end of April next, contend that, but for the company's sins of omission and commission, it would have been finished 780 days before that time. For this loss of time they claim heavy compensation. The company, on the other hand, disclaim all responsibility for the delays in question, and demand the enforcement of the penalty stipulated in the contract-£200 for every day beyond October 1, 1880, by which the completion of the undertaking is protracted."

Rain Not Produced by Cannonading.

To the Editor of the Scientific American:

Your issue for November 27 has a notice of an invention for causing rain, with a satisfactory engraving of the inventor bringing down a heavy shower simultaneously with the explosion of his patent dynamite balloon. The inventor assumes that it is "well known" that cannonading is always followed by rain.

Now I don't know how that comes to be so "well known" by people who never witnessed the effects of of the new observatory of the Wisconsin State University at heavy cannonading, and I think it is time that they should know that it is not the case. It may rain after a heavy cannonade, or may not, or may rain just before the cannonade. The cannonade has no effect whatever. The cannon explosions in a battle exceed the explosion in the inventor's patent balloon twenty thousand times or more, and if the former does not cause rain, the patent balloon will not do it.

I was at the battle of Shiloh, which lasted two days, April 6 and 7, 1862. The cannonade was as rapid as the strokes a man could give a base drum with two drum sticks, and it was continuous, to say nothing of the musketry fire, which was not a roll or rattle at all, but a continuous, even roar. What was the effect on the weather? It rained before the action opened, and rained all the first day and night. The second day of the battle was clear and sunny, and so were several succeeding days.

The battle of Corinth was fought in a dry, hot spell, October 3 and 4, 1862. There had been no rain for two weeks. This was a good chance to test the thing. The cannonading was heavier than at Shiloh, and lasted for ten hours. It was a perfect hell on earth. No rain followed the battle. The dry hot weather continued for two weeks more.

The two battles of Lookout Mountain, November 24, 1863, and Missionary Ridge, November 25, which followed were not followed by rain. The American District Telegraph Company, in this city, Missionary Ridge was one of the clearest and loveliest lowed by rain, and in such as were, it would have come anyhow. If there is a popular delusion that heavy cannonades cause rain, it might as well be dispelled, as experience shows there is not the slightest foundation for the notion.

Cincinnati, Nov. 22, 1880. ANDREW VAN BIBBER.

By subscribing for the Scientific American, a new volume of which commences with the next issue, you will have illustrations and descriptions of the most extensive manufacturing establishments of the country, as well as engravings of the newest and best iron and wood-working machinery and implements made, besides all the most novel and important inventions patented in this and other counforce and persistence, and his inventions have done much to tries during the year. Remit \$3.20 to Munn & Co., 37 Park Row, New York.

Sewing Machine Motors.

That there is a large field for a good practical sewing machine motor cannot be denied; but, like perpetual motion, many have tried the "perplexed thing," but failed. A motor, to be practical and popular, must be a part and parcel of the sewing machine-not a heavy, cumbersome contrivance that costs more, and occupying more space, than the sewing machine itself. How it is to be accomplished chains; these chains extend into the base, where their inner must be left to the inventive genius of the country, which in time may solve the question. Of course these remarks refer to motors for family use. For factories and workshops, water and steam solve the question.

So far the best motor for sewing machines is the common treadle. Such devices as those which imprison one hand in their operation are useless—as far as practicability and usefulness are concerned. A person might as well have but one arm, as it leaves but one hand to direct the work. Whenever a sewing machine motor is invented that will do the ordinary work of a family, without the aid of steam, water, or electricity, and run a reasonable length of time without replenishing the power exhausted, a step will have been made toward solving this question. But, where more power is expended in storing up what is wanted for use than it takes to operate the machine for a given period of time, such devices are worse than useless—they are time lost. We expect, yet, to see this problem solved.—The Sewing Machine Journal.

A Fossil Human Skull.

Dr. T. G. Horn, of Colorado Springs, Colorado, favorsus with a photograph of "a petrified human skull," picked up near Gothic, Gunnison County, Colorado. The doctor says that the skull has been examined by quite a number of the medical profession, and all pronounce it the greatest curiosity ever discovered. Every bone, suture, and outline is perfect. As shown in the photograph the posterior half of the skull seems to justify the description; the forepart is less clearly exhibited. The jaw is gone, and a mass of stone resembling a hot spring deposit obscures the facial outline.

No account is furnished with regard to the conditions under which the skull was found, so that no estimate can be made of its probable age. If found in connection with hot spring deposit, it might easily be quite modern. On the other hand, it may be the skull of an "original settler," ancient enough to have used the implements found in the inter-glacial or pre-glacial gold gravels.

A NOVEL STEAM CARRIAGE.

A great many steam wagons and carriages have been devised and built for transporting loads on our ordinary highways without tracks, but although some of the devices were masterpieces of ingenuity, the practical results obtained were never perfectly satisfactory. Walter Hancock, the most persistent of inventors and constructors in this line, built a steam phaeton in 1838, and obtained a maximum speed of 20 miles and an ordinary speed of 10 miles per hour. Within the last few years the interest in steam wagons has been renewed, and some very successful experiments have been made with them, the trip by M. Schmid, M.E., who traveled from Zurich to Paris, in 1878, on a self-propelling steam fire engine of his construction, being an example. A steam carriage, invented and built by the French engineer Bollé, of Le Mans, and exhibited at the Paris Exhibition of 1878, was an the chains running freely through the arms, and the weight

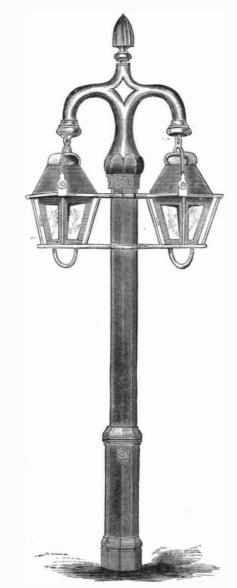
surpass that of any ordinary vehicle drawn by horses. The inventor named his carriage "La Manselle," in honor of his native city Le Mans.

This carriage is shown in the annexed cut, taken from the Leipziger Illustrirte Zeitung. The casing in the front part of the carriage contains the driving engine, which is controlled by the engineer seated above it, who also operates the steering gear and the powerful brake levers. The rear axle is driven by spur wheels and chains. The boiler is placed above the rear axle, the coal bins are at each side of the boiler, and the water truck is below the seat of the engineer. Experimental trips have been made with one of these carriages on the road from Berlin to Charlottenburg. The average speed attained, according to the above authority, was 18 miles per hour, but a maximus of 22 miles per hour was reached. Coke was used as fuel, which produced but very little smoke, about 8½ to 10 pounds being consumed per hour. The carriage rounded the curves in an excellent manner, and the entire experiment proved most satisfactory.

BURTON'S IMPROVED STREET LAMP.

The engraving shows a lamp for lighting streets, parks, and other places where gas lamps are not used. It is a novel arrangement, and has the advantage of simplicity and cheap

more downward curving hollow arms, carrying a series of



BURTON'S IMPROVED STREET LAMP.

ends are attached to a weight or counterbalance, their outer ends being secured to the sliding lamp frame. 'There is a pin or bolt threaded to work in a nut at the top of the base; its inner end is shaped to fit a groove in the weight, and forms a key or stop to secure the lamps at any desired elevation. When the key bolt is withdrawn the lamps may be readily raised or lowered by sliding the frame on the post,

not necessarily be made fast by the key or bolt, as the weight counterbalances the lamps so that they will remain in any desired position.

The post is made of cast iron, in two parts, firmly united by a set screw at the top. The weight weighs 20 pounds, Projecting from an opening in the cap there are one or and is secured to the bail of the cage by a three-quarter inch chain. The sliding frame is of cast iron, of sufficient strength to hold and guide the lamp along the body of the post. The lamp is well made of the best material, and may be adapted to either kerosene or gasoline.

> With this post the inconvenience of carrying a ladder is avoided, and there is no danger of dropping the chimney or spilling of oil. After the lamps are once filled, a small crooked handle, which is furnished with each post, is all that is required to equip the lamp-lighter for his evening journey to light the streets for one month. All that is required is to draw the lamp down, trim, and light it; a slight push upward replaces it, when it remains in the proper position.

> This lamp has been manufactured and sold extensively for the past two years, and we are informed that it is meeting with great favor in the New England States. It has been patented in the United States and in Canada. It was awarded a silver medal at New England Fair, 1878. For cities, towns, surburban villages, and private use, and for other purposes where outdoor lighting is required, it fills a great want.

> Further information may be obtained by addressing the inventor, Mr. Geo. D. Burton, New Ipswich, N. H.

ENGINEERING INVENTIONS.

Mr. William H. Weeks, of Dartmouth, Nova Scotia, Canada, has patented a device for the safe and economical burning of liquid hydrocarbons under boilers, evaporators, etc., whereby the combustion is made perfect and the control over the flame absolute.

Mr. Orlando S. Emerson, of Elkhart, Ind., has patented improvements in steam valves. These improvements relate to puppet valves which have heretofore been constructed with an adjustable lip, fitted for movement by a screw ring to adjust the lip, and held in place by screw pins entering notches in the ring. In such valves the screw pins become loose or are jarred off, so that the adjustment is unreliable, The object of this invention is to avoid these difficulties. The invention consists in a spring pin used in place of a screw for retaining the adjustable lip in place.

An improved egg beater has been patented by Mr. George A. Schmidt, of New York city. The object of this invention is to provide an effective and durable device designed especially for use by confectioners, bakers, hotels, etc., when a large number of eggs are to be beaten at a time.

A machine for grinding mower and reaper knives has been patented by Mr. Charles Askew, of Madison, Wis. The invention consists in a novel rest and carrier for the sickle bar and combination and arrangement thereof with relation to the grindstone, whereby provision is made for adjusting the sickle bar to the grinding surface.

Messrs. Leonard A. Cooper and Oliver F. Bostwick, of Atchison, Kan., have patented a combined listing plow and seed planter, so constructed as to open the ridge or clear a space for the row of hills, open a furrow to receive the seed, drop the seed, cover the seed, and roll down the soil. It is object of more than ordinary interest. Its speed was said to rising and falling in the body of the post. The weight need simple and readily adjusted and controlled.

An improved injector and condenser has been patented by Mr. Gaspare Mazza, of Turin, Italy. The invention consists in combining a boiler pipe, cones, and connected eccentrics having different throws with a feed water pipe and a steam inlet pipe having a cock.

An improved steam engine governor has been patented by Mr. Walter E. Crane, of Alma City, Minn. The object of this invention is to dispense with all devices depending on centrifugal action or the force of gravity for their operation in the regulation of the speed of steam engines or other motors. The invention consists in a governor wherein the straight line movement for regulation of speed is obtained by the variations in speed between mechanism operated by the engine and mechanism moved by a separate motor at a regulated speed.

Mr. Alexander C. Lewis, of Fayetteville, Ark., bas patented an improved rotary engine of theclass in which a rotary valve is employed. The novelty consists in a combination of parts which cannot be clearly described without engravings.



STEAM CARRIAGE AT BERLIN. TRIAL TRIP OF THE NEW

SAND AND WATER SPOUTS.

It is a well known fact that all atmospheric changes winds, thunder storms, tornadoes, etc., originate in changes of temperature; and sand and water spouts are also due to the same cause.

The annexed engravings, showing sand and water spouts, are taken from "Die Erde und ihr organisches Leben. Dr. Klein und Dr. Thomé. Stuttgart: Spemann."

Sand and water spouts are formed when the air rises upward and assumes a rotative movement. It then draws upward the bodies or liquids over which it rises, and moves forward, retaining its longitudinal axis. In many cases these spouts occur during thunder or showers, then clouds and rain descend to unite with the upward moving spouts, as is shown in the representation of the water spout. The

sand spout destroys everything in its path, uprooting the largest trees, demolishing strong buildings, carrying the débris upward and distributing it overlarge areas. As these spouts always appear simultaneously with thunderstorms, they have been attributed to the action of electricity. But as whirlwinds are often produced, for instance above fires or on a small scale at almost every corner on a windy day, without the co-operation of electricity, it will be safe to say that electricity is generated by the action of the whirling and rising

Dr. Th. Reye has shown, by careful calculations, that an unstable equilibrium necessary to the formation of spouts or whirlwinds exists only when the decrease in temperature is 3:42° C.

case the ascending column of air being considerably lighter than the air into which it passes, the air ascends with great rapidity.

If the ascending air passes into a layer of air that is so cold as to condense its moisture, the heat will be liberated, and that will expand the ascending air. The unstable equilibrium also causes the upper layers of air to sink into the lower layers; in this case descending spouts are produced.

Generally the air that enters into the column of rarefied air from the side produces the rotative movement. The condensation of the vapors produces rain, and a sudden contact with cold air may produce snow or hail, all accompanying the spouts.

In the engravings the spouts are grouped rather closely in order to show the various forms to the greatest advantage. each end of the whiffletree and extends forward a short dis- the product to a semi-liquid form by heat, then grinding

The spouts, as a rule, do not approach each other nearer than half a mile.

Measurement of Railways.

Measurements for mile posts have been made recently on the New York, Pennsylvania, and Ohio Railroad over its whole line in a somewhat novel way, says the Railroad Ga-A velocinede hand car, with a four foot wheel, was fitted with a revolution counter, and after determining carefully the number of revolutions per mile, the distances were rolled off by running it over the track. There was found to be a slight irregularity in the measurement, owing to the play and coning of the wheels, but the error was far within the limits of ordinary careful chaining and very much more rapid as well.

Thirty-five to forty miles per day were made without much tance alongside the shafts or thills. The short leather difficulty under the interruption of a heavy traffic, setting a marked with a small stone for convenience of employes It was judged from the result that a still better way, especially if stakes were to be set only at every mile or half mile. would be to put the counter on an engine. As six miles an hour was made with the hand car, setting stakes every quarter mile, there should be no difficulty in making ten or fif teen miles with a locomotive, which might thus be able to make an ordinary freight run, without too many "lay outs." This very method, by the way, was used, we believe, by the government inspectors on the Pacific railroads, or some of them, to measure off the length of their subsidy bills, and certainly it is vastly more accurate than the chaining which

stake every quarter mile—the quarter-mile points being of keys or eyebolts, which may be withdrawn, for the purmariner can in most cases avoid the water spouts, but the preceded them, or, in fact, any but the most careful and

traces are attached to the front ends of these rods by means pose of releasing the horse from the vehicle, by means of cords or straps that pass through a ring on the crupper or back strap of the harness, and extend back over the dasher of the vehicle, so as to be easily accessible to the driver. A billiard table cushion of improved shape has been patented by Mr. Samuel May, of Toronto, Canada. The invention consists of a rubber billiard table cushion having a broad steel ribbon embedded in the rubber and running longitudinally through the entire length of the cushion, and extending from a socket in hard rubber at the bottom of the cushion upward in the elastic rubber to a point above where: the ball comes in contact with the cushion.

A simple and durable device, by means of which the rain

water flowing through the rain water conductors to the cistern may be cut off and made to flow in another direction when the cistern is full, has been patented by Mr. John Straszer, of Manchester, Mo.

Mr. Jean M. Berger, of St. Etienne, France, has patented improvements in magazine firearms of that class in which the magazine is in the nature of a supplemental cylinder or barrel just beneath the firing barrel, and from which the cartridges: are projected as fast as: they are used up by the expansion of a spiral spring within, having a cartridge pusher on its end.

A device to be attached to a vehicle for the purpose of equalizing the draught of three or four horses, has been patented by Mr. Herman E. Schmidt, of Rapidan,

(6:16° F.) for every 325 feet of vertical distance. In this accurate measurements with corrections for temperature. Minn. The invention consists of several bars or levers for carrying the double and single trees, arranged upon the tongue or pole of the vehicle in such a manner that the draught or pull of one horse on the long arm of the main lever will equalize the draught of two or three horses at the

> Mr. William J. Dawson, of Lawrence, Kansas, has patented an improvement in the front running gear of wagons which permits of the independent lateral oscillation of the

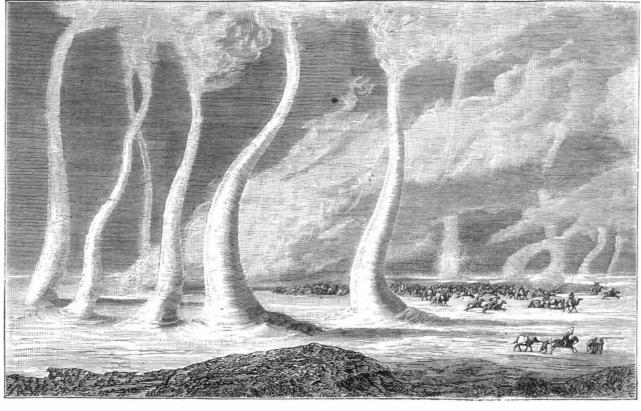
Messrs. Jules Schmerber and Charles Schmerber, of Paterson, N. J., have patented a process for obtaining a plas-An improvement in that class of devices that are designed tic compound by the treatment of the nitro-derivatives of for releasing a horse instantly from the vehicle to which he cellulose, dextrine, and glucose mixed with gums, balsams. may be attached, has been patented by Mr. Whitefoord S. or pigments, which consists in first treating the material Martin, of Maybinton, S. C. An iron rod is attached to while in a wet state with a liquid solvent, then reducing

> and mixing the semiliquid mass, and finally drying the compound to a plastic consistency.

> Mr. Claude Varlot, of Grenoble, France, has patented an improved lacing staple which can be firmly attached to the leather or other material, and permits of lacing without passing the lace or string through apertures in the article to be laced.

Mr. Heinrich Baum, of Höchst-on-the-Main, Germany, has patented a red coloring matter, formed by subjecting the diazo compound derived from amidoa- ${\bf zo\text{-}benzole}\ to\ the\ action$ of disulphobetanaphtholic acid.

An improved fireescape which is simple, safe, and reliable, and does not deface the building to which it is attached, has been patented by Mr. Felice Tocci, of New York,

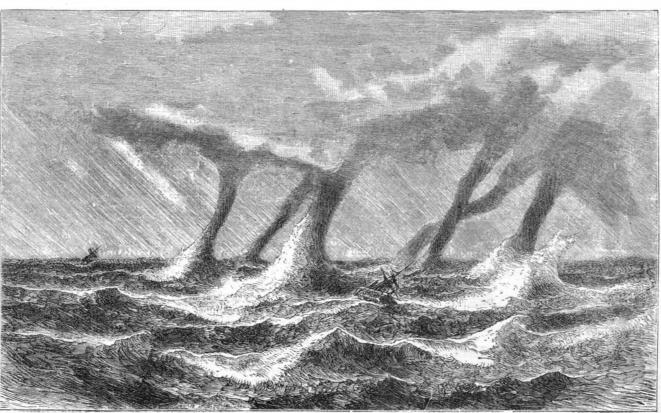


SAND SPOUT.

Measuring wheels for ordinary surveying purposes, working on the same principle as the above, have long been in

RECENT INVENTIONS.

An improved device, whereby the wind wheel may be thrown from a vertical to a horizontal position, has been patented by Mr. Adam W. Haag, of Fleetwood, Pa. The invention consists in journaling the horizontal axle of the wheel in a box that swings on trunnions and is adjustable in a vertical plane.



WATER SPOUT,

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 a. early as Thursday morning to appear in next issue.

Wanted-Superintendent for six thousand spindle cotton yarn mill. State salary and references Rosalie Yarn Mills Natchez Miss.

Astronomical Telescopes, first quality & low prices, Eye Pieces, Micrometers, etc. W. T. Gregg, 75 Fulton St., N.Y. Hotchkiss' Mechanical Boiler Cleaner, 84 John St.,

N Y. will keep your boiler free from all sediment or mud prevents scale, no cost save first. Engineers make 10 per cent selling other parties than employers Circular on application.

Notice — Alden Crushers & Pulverizers manufactured & sold only by patentee. Farrelly Alden, Pittsburg, Pa Use Vacuum Oil Co.'s Cylinder Oil, Rochester, N. Y.

Samples of Asbestos Liquid Paints, Roofing, Roof Paints, Steam Pipe and Boiler Coverings, Steam Pack , will be sent free on application to the H. W Johns M'f'g Co., 87 Maiden Lane, New York, sole manufacturers of genuine Asbestos materials.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J

A perfect Mowing Machine is an absolute necessity to a farmer. The best made is the Eureka. It has the lightest draught, and will cut at least one-third more grass per hour than any other mower. Simple in construction and durable. Prices reasonable Send for illustrated catalogue to Eureka Mower Co., Towanda, Pa

Wren's Patent Grate Bar. See adv. page 397.

Exporters of Machinery for Plantations. Sugar Ma chinery. Coffee Huller and Cleaners Information and estimates on all classes of American machinery and patented devices. Agricultural Implements and Hardware Jos. H. Adams & Son., 283 Pearl St., New York.

Stereopticon for Sale. See adv. last page.

Steam Cylinders bored from 3 to 110 inches. L. B Flanders Machine Works, Philadelphia, Pa.

For Sale.-A Berryman Patent Heater, very little used : cost \$200; will sell for \$50, f.o.b. Davis & Watts.

Every Machinist and Manufacturer in the country should send to G. B. Grant, Boston. for his list of gears.

Wanted-To hear from an Engine and Mach'y Manuf. Co., to whom the services of an energetic young man with experience and some capital, would be an object. J. B. R., Box 773, New York,

Improved Speed Indicator Accurate, reliable, and of a convenient size Sent by mail on receipt of \$1.50 E. H. Gilman, 21 Doane St., Boston, Mass.

The Mackinnon Pen or Fluid Pencil. The commercial pen of the age The only successful reservoir pen in the market. The only pen in the world with a diamond circle around the point. The only reservoir pen supplied with a gravitating valve: others substitute a spring, which soon gets out of order. The only pen accompanied by a written guarantee from the manufacturers. The only pen that will stand the test of time A history of the Mackinnon Pen: its uses, prices, etc. free. Mackinnon Pen Co 200 Broadway, New York.

Fragrant Vanity Fair Tobacco and Cigarettes. 7 First Prize Medals-Vienna, 1873 · Philadelphia, 1876 : Paris 1878 Sydney, 1879—awarded Wm S. Kimball & Co. Rochester, N. Y.

Superior Malleable Castings at moderate rates of Richard P Pim Wilmington, Del.

Wood Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O. The "1880" Lace Cutter by mail for 50 cts.; discount

to the trade. Sterling Elliott. 262 Dover St., Boston, Mass. The Tools, Fixtures, and Patterns of the Taunton Foundry and Machine Company for sale, by the George Place Machinery Agency, 121 Chambers St., New York.

Improved Rock Drills and Air Compressors. Illus trated catalogues and information gladly furnished. Address Ingersoll Rock Drill Co., 1½ Park Place, N. Y.

Experts in Patent Causes and Mechanical Counsel Park Benjamin & Bro., 50 Astor House, New York.

Corrugated Wrought Iron for Tires on Traction Engines etc. Sole mfrs., H. Lloyd, Son & Co., Pittsb'g, Pa. Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

Power, Foot, and Hand Presses for Metal Workers. Lowest prices. Peerless Punch & Shear Co. 52 Dey St., N.Y. Recipes and Information on all Industrial Processes. Park Benjamin's Expert Office, 50 Astor House, N Y.

For the best Stave, Barrel, Keg, and Hogshead Ma chinery, address H. A. Crossley, Cleveland, Ohio.

National Steel Tube Cleaner for boiler tubes. Adjust able, durable. Chalmers-Spence Co., 40 John St., N. Y.

The Brown Automatic Cut-off Engine; unexcelled for workmanship, economy, and durability. Write for information. C. H. Brown & Co., Fitchburg Mass.

Gun Powder Pile Drivers. Thos. Shaw, 915 Ridge Avenue, Philadelphia. Pa

Best Oak Tanned Leather Belting. Wm. F. Fore paugh, Jr., & Bros., 531 Jefferson St., Phi'adelphia, Pa. Stave, Barrel. Keg, and Hogshead Machinery a spe-

alty by E & B Holmes, Buffalo, N. Y Diamond Tools. J. Dickinson, 64 Nassau St., N.Y.

National Institute of Steam and Mechanical Engineer ing, Bridgeport, Conn. Blast Furnace Construction and Management The metallurgy of iron and steel. Practical Instruction in Steam Engineering, and a good situation when competent. Send for pamphlet.

Clark Rubber Wheels adv. See page 381.

Downer's Cleaning and Polishing Oil for bright metals. is the oldest and best in the market. Highly recommended by the New York. Boston and other Fire Departments throughout the country. For quickness of cleaning and luster produced it has no equal Sample five gallon can be sent C. O. D. for \$8. A. H. Downer, 17 Peck Slip, New York.

The "Fitchburg" Automatic Cut-off Horizontal Engines The "Haskins" Engines and Boilers. Send for pamphlet. Fitchburg Steam Engine Co., Fitchb'g, Mass. Split Pulleys at low prices, and of same strength and

appearance as Whole Pulleys. Vocom & Son's Shafting Works. Drinker St., Philadelphia, Pa.

Presses Dies and Tools for working Sheet Metal. etc. Eclipse Portable Engine. See illustrated adv., p. 382. some of them amusing.

ng. By T. P. Pemberton Sent on receipt of price, \$1 Address T. P. Pemberton, 5 Dey St., Room 13, New York Nickel Plating.-Sole manufacturers cast nickel an odes pure nickel salts importers Vienna lime crocus etc Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

For Yale Mills and Engines, see page 381.

Wright's Patent Steam Engine, with automatic cut The best engine made. For prices, address William Wright Manufacturer, Newburgh, N. Y.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's Parallel Vise. Taylor Stiles & Co., Riegelsville, N.J. Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 366. Steam Engines, Boilers, Portable Railroads, Sugar

Mills Atlantic Steam Engine Works, Brooklyn, N. Y. Blake "Lion and Eagle" Imp'd Crusher. See p. 397.

Apply to J. H. Blaisdell for all kinds of Wood and Working Machinery. 107 Liberty St., New York. Send for illustrated catalogue.

4 to 40 H. P. Steam Engines. See adv. p. 381,

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 15,000 Crank Shafts, and 10,000 Gear Wheels. now in use, the superiority of their Castings over all others. Circular and price list free.

Brass & Copper in sheets, wire & blanks, See ad. p. 397. The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. For best Indirect Radiators, see adv., page 397.

Eagle Anvils, 10 cents per pound. Fully warranted Gear Wheels for Models (list free); experimental and model work, dies and punches, metal-cutting, manufacturing, etc. D. Gilbert & Son, 212 Chester St., Phila., Pa

The best Truss ever used: Send for descriptive circuar to N. Y. Elastic Truss Co., 683 Broadway, New York.

H. A. Le e's Moulding Machines, Worcester, Mass. Pays well on small investments.-Magic Lanterns and stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions and parlor entertainments. Send stamp for 116 page catalogue to Mc-Allister. M'f'g Optician, 49 Nassau St., New York.

New Economizer Portable Engine. See illus. adv. p. 397 For Shafts, Pulleys, or Hangers, call and see stock

kept at 79 Liberty St., N. Y. Wm. Sellers & Co. Wm. Sellers & Co., Phila., have introduced a new njector, worked by a single motion of a lever.

Saw Mill Machinery. Stearns Mfg. Co. See p. 397. Skinner & Wood, Erie, Pa., Portable and Stationary

Engines, are full of orders and withdraw their illustra ted advertisement. Send for their new circulars

Ore Breaker, Crusher, and Pulverizer. Smaller sizes un by horse power. See p. 397. Totten & Co., Pittsburg. Bracket Woods.-Wm. E. Uptegrove, Saw Mills, 463 East 10th St., New York, offers to the trade a choice stock of these woods. Send for price list.

Houston's Sash Dovetailing Machine. See ad., p. 397.

NEW BOOKS AND PUBLICATIONS.

LEARNING TO DRAW; OR, THE STORY OF A YOUNG DESIGNER. By Viollet-Le-Duc. Translated from the French by Virginia Champlin. New York: G. P. Putnam's Sons. \$2.

A story with a purpose, the purpose being primarily to contrast the conventional method of teaching the art of drawing and incidentally everything else with a method that may fairly be called rational. A secondary purpose of the book is evidently to enforce the important truths that industrial art is worthy of high honor, and that its advancement is not likely to be much helped by would-be cultivators of "high" art, or art for its

SUNLIGHT AND SHADOW; OR, GLEANINGS FROM MY LIFE WORK. By John B. Gough. Hartford: A. D. Worthington & Co. 8vo, cl., pp. 542. Price (by subscription) \$3.25. Probably no man living has been seen and heard by

so many as John B. Gough; and it would be safe to say that no other man living could find ready made so comprehensive and eager a market for the printed story of his life's work. The book is eminently characteristic of the man.

THE UNITED STATES BLUE BOOK; COMPILED FROM OFFICIAL SOURCES. By J. H. Soulé. 75 cents. Washington, D. C. J. H. Soulé.

A register of Federal officers and employments in each and every State and Territory in the United States. with their salaries and emoluments, with much other information relative to public officers and employments

THE HOME WORLD. A MONTHLY MAGA-ZINE FOR THE HOME. Edited and published by Rev. Elijah C. Baldwin. New Haven, Conn. \$2 per annum. 8vo, pp. 64. Vol. 1. No. 1.

This new venture proposes to make a specialty of home affairs, cultivating the whole field of home interests, social life, health, domestic comfort and thrift, noral and mental advancement, and the like. It comes with a tidy make up and a wholesome table of contents.

DIAGRAM FOR FINDING DISTANCES AND HEIGHTS. By H. von Bayer, C. E. Washington, D. C. Price 40 cents.

The object of this diagram is to enable seamen to readily and easily make use of the heights of prominent coast marks, as commonly set down on sailing charts, in determining their ship's position. It has been approved by the Navy Department and adopted for use on all United States Government vessels. Its simplicity and handiness would seem to make it especially serviceable to our merchant marine.

LYRA BICYCLIA: FORTY POETS ON THE WHEEL. By J. G. Dalton. Boston. Published for the author. Sold by Hall & Whiting, 32 Bloomfield street. 60 cents.

A book of verses anent the bicycle, mostly parodies. Fruit & other can tools. Bliss & Williams B'klyn. N. Y. Enthusiastic riders of the machine may possibly fin'

The Student's Illustrated Guide to Practical Draught
ag. By T. P. Pemberton Sent on receipt of price. \$1

Address T. P. Pemberton, 5 Dey St., Room 13, New York.

Nickel Plating Sele manufacturers cost picked and

Buffalo, N. Y.: Matthews Bros., and the others have been recalculated or enlarged. Bryant.

Dr. Gregg combats the fungus theory of diphtheria, holding that the supposed bacteria found in diphtheritic exudation are non-living particles of fibrin in various stages of coagulation and disintegration. The fibrin so thrown off is not a cause of the disease, but the result of an effort of the system to expel the excess of fibrin in the blood, an excess brought on by a waste of albumen, the real cause of the physiological disturbance. According to Dr. Gregg, diphtheria is a form of albuminuria, allied to Bright's disease and also to consumption of the lungs, the waste of albumen throwing the constituents of the blood into disproportion, the resulting excess of fibrin, salt, etc., acting poisonously like any other foreign matter in the blood. Where the disease seems to be sudden and violent its malignancy is attributed to the circumstances that the system has previously been subjected to a serious loss of albumen through colds or other causes pr ducing an excessive excretion from mucous surfaces. Local treatment is deprecated, particularly harsh measures likely to irritate the mucous membrane of the fances. The positive treatment advised is as amazing as the reported results of such treatment. For a virulent "constitutional disease" to yield invariably to single doses of lycopodium, 6,000th potency, or lachesis, 2,000th, is quite miraculous. Yet by following the practice indicated, avoiding all local treatment, young practitioners are assured by Dr. Gregg that they can save all their cases of this terrible disease

PARACENTESIS OF THE PERICARDIUM. CONSIDERATION OF THE SURGICAL TREAT-MENT OF PERICARDIAL EFFUSIONS. John B. Roberts, A.M., M.D. Philadel-phia: J. B. Lippincott & Co.

A valuable monograph on an operation rarely performed and on which very little has been written. A very careful search discovers sixty recorded cases in Europe and America, the table collated by Dr. Roberts Territories 190, Canadian provinces 574. giving the name of the operator in each, the date, sex, and age of patient, mode and site of operation, results, etc. The record, Dr. Roberts concludes, fully justifies the adoption of the operation into the family of accepted surgical procedures.

THE SCIENTIFIC ENGLISH READER. By Dr. Wershoven. Leipsic: F. Brockhaus

In this work Dr. Wershoven has carried out an idea which we should like to see adopted by some intelligent maker of German readers for English students. He has brought together some forty or more selections from standard scientific English writers in the departments of physics, chemistry, and chemical technology, giving in footnotes the German equivalents for all the technical terms and expressions used, and for a large number of related terms. The book thus furnishes a valuable technical vocabulary for English readers of German works of science.

SURGERY IN THE PENNSYLVANIA HOSPITAL. By Thos. G. Morton, M.D., and William Hunt, M.D., with papers by Drs. John B. Roberts and Frank Woodbury. Philadelphia: J. B. Lippincott & Co.

Since the foundation of the Pennsylvania Hospital in 1752, its medical officers have recorded more or less fully nearly all the operations performed, with notes of the more interesting cases received. Since 1873 full clinical notes of all cases have been kept. The vast amount of valuable material thus accumulated has now been digested by the surgeons and physicians of the hospital, and published in handsome style by direction of the liberal managers of the institution. The cases are classified according to their nature; and in many instances the progress made in surgical means and methods, during the period covered by the hospital records, has been critically reviewed. The work is illustrated by nearly a hundred engravings and phototypes. It is a positive addition to the literature of surgery, and is in every way a credit to the institution, the results of whose benevolent work and professional experience it

A PRACTICAL TREATISE ON NERVOUS EX-HAUSTION (NEURASTHENIA), ITS SYMPTOMS, NATURE, SEQUENCES, TREATMENT.
By George M. Beard. Second Edition.
New York: William Wood & Co.

The value and timeliness of Dr. Beard's essay are well attested by the call for a second edition within a month after the publication of the first edition. The only novel feature of the new issue is a cleverly written preface giving the author's answer to the question: What Constitutes a Discovery in Science?"

Was Man Created? By Henry J. Mott, Jr. New York: Griswold & Co. 8vo, cl., pp. 151.

In this expanded lecture Dr. Mott has endeavored to set forth briefly vet broadly the lines of observation and deduction by which science has arrived at the idea of stain of nitro-muriatic acid from dark woolen goods. man as a natural growth. Its title should rather be A. Nothing-aqua regia destroys the coloring matter. "How Man was Created." creation being regarded as a slow evolution by natural processes, not as a spasmodic or miraculous exhibition of supernatural power. The publisher's work is well done, and the numerous illustrations have been judiciously chosen.

FIELD ENGINEERING. A HAND BOOK OF THE THEORY AND PRACTICE OF RAILWAY SURVEYING AND CONSTRUCTION. By William H. Searles. New York: John Wiley & Sons.

The author's aim has been: To present the general subject of railway field work in a progressive and logical order; to classify the problems of railway engineer ing so that they may be easily referred to: to discuss all the main practical questions of railway engineering, avoiding matters non-essential, etc., employing throughout a uniform and systematic notation easily understood and remembered; to express the resulting formula of every problem in a shape best adapted to convenient in which these purposes have been carried out is in keep- powder,

A HISTORY OF THE JETTIES AT THE MOUTH OF THE MISSISSIPPI RIVER. By E. L. Corthell, C.E., Chief Assistant and Resident Engineer during the construction. New York: John Wiley & Sons.

Our high opinion of the purpose and character of the great undertaking which Captain Eads and his associates have brought to successful issue at the mouth of the Mississippi has been repeatedly expressed during the progress of the work. It is gratifying, now that the victory over physical, financial, and professional obstacles has been grandly won, to have the history of the complex struggle so worthily recorded as it is in this volume by Mr. Corthell. Though it appeals directly and professionally to engineers, the wider range of interest and should find a place in the library of every man who cares for the development of the resources of his native land or admires American boldness, energy, pluck, and endurance in the prosecution of works of utility. These attributes of American manhood never had a more commendable object, nor were ever exhibited on a more heroic scale, than in the opening of the Mississippi to commerce.

N. W. Ayer & Son's American Newspaper Annual for 1880. Philadelphia: N W. Ayer & Son, Newspaper Advertising Agents. 8vo, pp. 616.

A remarkably well-made catalogue of American newspapers, giving their names, frequency of issue, politics, or other distinguishing features, date of establishment, (approximate) circulation and advertising rates, together with statistics of population, political majorities, etc., of the State, county, and town of publication of each. Special lists are also given of class journals. The catalogue includes 10,674 periodicals, of which the new England States have 818, New York 1,241, other Middle States 1,267, Southern States 1,730, Western States 4,855,

THE COMPEND OF ANATOMY. FOR USE IN THE DISSECTING ROOM AND IN PREPARING FOR EXAMINATIONS. By John B Roberts, A.M., M.D. Philadelphia: C. C. Roberts & Co.

A concise statement of the more important facts of human anatomy. The descriptions are clear, though necessarily brief, and the matter is well arranged, Gray being followed for the most part.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the

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

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

a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. Persons desiring special information which is purely

Correspondents whose inquiries do not appear after

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

Any numbers of the Scientific American Supple-MENT referred to in these columns may be had at this office. Price 10 cents each.

- (1) T. W. F. writes: After cutting down a large pine tree I counted 124 rings. How old does this make the tree? Some claim that one, and others say that two rings are made each year, and some that none are made the first ten years in the growth of the tree. A. One ring is formed each year. The tree is 124 years old.
- (2) W. H. C. asks: What will dissolve rubber and evaporate readily so that it can be used in mending rubber boots? A. Cut the rubbber, gum rubber (common vulcanized rubber cannot be used), into thin shreds, digest it in a corked bottle with eight or ten times its weight of warm benzole. Shake the bottle occasionally, and after several hours add more of the solvent if necessary.
- (3) C. D. A. asks how to remove the bone from the inside of a buffalo's horn. A. The bone may be loosened by soaking the horn in soft water for some
- (4) C. G. H. asks: What will remove the
- (5) G. L. K. asks: In what way can wood be prepared to prevent worms from working in it in salt or sea water? A. Impregnate with creosote water or the "heavy oil" from coal tar distillation
- (6) J. M. asks how rosin oil and spirits of rosin are made. A. Heat the rosin in a metal retort provided with a large condenser. The rosin yields about 74 per cent of liquid distillates. The first portions are yellow, strong smelling, and mobile, called sence of rosin or rosin spirit. Later in the distillation a viscid fluorescent oil (pinolin) passes over. This is called rosin oil.
- (7) J. F. asks how steam gauge dials are plated; and what kind of black cement is used in filling. the figures. A. Electroplate with silver and immerse for a few moments in a mixture of equal measures of water and nitric acid, to frost; rinse in running water, dry in hot sawdust, when thoroughly dry use a soft numerical computation, and to furnish a larger variety brush to clean and burnish the parts required to be of tables especially adapted to the wants of field engi- bright. For filling the figure mix fine oil asphaltum neers than has heretofore been published. The manner with a sufficient quantity of ivory black in impalpable

- (8) S. W. P. asks (1) how to toughen a as there are hundreds, if not thousands, so set that are lithogram so that the surface will not peel or rub off. A. Use less water and more glycerine, or expel the excess of water by heating for some time over the water bath. 2. Is there any chemical which will aid in removing the writing? A. No chemical aid. Try the addition of a small quantity of soap to the composition.
- (9) S. F. S. asks how to treat sails so that they will not mildew. A. Impregnate with strong hot soap suds, press out the excess, and immerse in strong alum water or in weak lead acetate solution, rinse and repeat the soap, if necessary.
- (10) E. S. F. asks for a receipt for making a greenink. A. Dissolve one of the soluble coal tar (aniline) greens in hot water to proper shade and add a few drops of clove oil.
- (11) E. E. C. writes: We are running a saw mill composed of one 72 inch circular saw, one muley saw, one gang carrying 42 saws, besides edgers, butting saws, lathe mill, etc. We have seven two-flue boilers, 42 inches by 22 feet; engine, 24x28, running 95 revolutions with 80 to 90 lb. of steam; main driving pulley is eleven feet in diameter. When the saws are all in the cut the mill lags and the motion of the engine drops down as low as sixty. Now, what I want to know is this: can we increase our power by running the engine to 120 revolutions, reducing the diameter of the driving pulley in proportion to offset the increase motion? Can we do it without increasing our boiler surface? How much would the power be increased if such a change were made? A. Your power would be increased in proportion to the increased speed of the engine, provided you have boiler sufficient to maintain the pressure. The demand for steam will also be increased in proportion to the increased speed of the engine.
- (12) J. C. writes: Take a given quantity of the atmosphere at its normal pressure, say at 40° Fah., then raise the heat 300°; what would be its volume? or if confined in an air-tight vessel, what pressure would it show on pressure gauge? A. The increase of volume or pressure would be about 1-480 part for each degree of increase of temperature.
- (13) M. M. asks: 1. Are engineers required to have a license to run an engine in a factory isolated from other buildings, in Iowa? A. It depends upon the law of the State, or municipal regulations, if in a city. 2. If so, is the law requiring it a State or United States law? A. State or municipal. 3. Where and to whom in Iowa must application for a license be made? A. The law should give you this information.
- (14) W. H. L. asks: What is the material and how prepared and used, that anatomists use for injecting the veins and arteries of the cadaver to make them stand out bold and clear and appear as if they were full of blood as in life? A. Chloride of zinc, arenious acid, and mercuric chloride in aqueous solution have been used most successfully.
- (15) E. H. B. writes: Some time since the SCIENTIFIC AMERICAN referred to the danger of lead poisoning from the use of improperly prepared "granite ware," and in the manufacture of citric acid. 1. How can I apply some simple test to detect the presence of lead in the juice of acid fruit or vinegar pickles cooked in such ware? A. Mix a small sample of the suspected liquid with some freshly prepared sulphureted hydrogen water (strong). A black precipitate or coloration indicates lead. 2. I have used citric acid in place of lemons very much this summer, but fear it was harmful. In what way would the lead affect the system if present? A. When taken in any considerable quantity it produces violent spasmodic colic.
- (16) R. T. asks how to clean the wool on a sheep's skin and how to cure the skin? A. Nail on a board stretched, wool out, and scour with good soap suds and fuller's earth until properly cleansed. Then rinse thoroughly in hot water, and comb. Nail, wool down, stretched taut on a board, rub in plenty of salt, stand in warm place, and finally scrape off the softened of moist alum powder, and let it stand several days or a week in a dry place. Soften, if desired, by rubbing with hot flour paste and the yolks of a few eggs, or with
- (17) J. A. C. writes: I have a piece of ordinary steel, one and a half inches in length, half inch wide, and one-sixteenth inch in thickness. Now, I wish to temper half of its length and not the other half. How am I to proceed? A. Harden throughout, then place half of its length in a vise Depends upon the purpose; the hydraulic accumulation of between two heavy blocks of lator is the best for many purposes. 2. How can the flame, or by means of blacksmith's tongs made hot.
- (18) J. W. G. writes: 1. I have a battery of two flue boilers set in the usual manner, the furnace walls extending up to the water line. Would it be any advantage to extend the furnace walls higher and let the bot air and gases extend nearly or quite around the boilers before returning through the flues? Wouldn't it to some extent superheat the steam? A. It would tend to superheat the steam, but would be likely to damage the boilers in a short time. 2. My engine is 16x24 cylinder, slide valve cutting off at one-third of the stroke, making 75 revolutions; the exhaust port is cut out what is called line and line. Would it be any advantage to give the exhaust a little lap, and if so, how much? A. You cannot cut off with an ordinary slide valve so short as one-third with advantage. As a rule exhaust lap is not advantageous in a quick running
- (19) J. H. C. writes: We have two batteries of boilers, 42 inches diameter, 22 feet long; one battery is covered over the too, the other is not covered; and we have had considerable trouble with this set of boilers cracking the sheets through the seams of the underside or belly of the boilers. I claim it is due to the difference of expansion between the top and bottom of the boilers on account of the top of the boilers being exposed to the air. What are your views? A. We do not think your trouble arises from the difference of expansion, rock contains no precious metals.

- not covered. It is probably due to poor iron. or careless firing when the boilers are cold. Still it is a good plan to cover the boilers.
- (20) G. W. D. writes: I have an excellent water power with 30 feet head, located 4 miles from a railroad. I propose to utilize it for manufacturing purposes, but find some difficulty in deciding whether to build the factories at the dam, or on the railroad; the latter plan would save the labor and expense of hauling the raw materials—grain and wool-and manufactured goods to and from the depot and mills. I am considering the question of transmitting the power from the dam to the railroad, either by wire rope, compressed air, or electricity, and shall thank you for such light as you can throw upon the subject, whether it would be advantageous, and, if so, which system would be most effective and economical? The ground is perfectly level. A. Of the modes named, wire rope would probably be the cheapest and easiest maintained; although, if you have a surplus of power at the dam, electricity might be used to advantage.
- (21) G. E. T. writes: Please state formula for mixing the alloy used in bronze butts, door knobs, and other similar articles of hardware. A. Copper, 89; tin, 8; zinc, 3.
- (22) A. A. asks how to remove nitric acid stains from dark clothes. A. Nitric acid, if strong, or if permitted to remain long in contact with the fabric, destroys the coloring matter. Ammonia water, if used immediately after the contact, will prevent this action and restore the color.
- (23) L. P. asks (1) how to make a solution to plunge small brass articles in to give them a light red color. A. You might try a bath of thin alcoholic shellac suitably colored with aniline red. We know of nothing that will give the metal itself a bright red color. 2. What is the best lacquer for polished brass and how is it applied? A. 1. Seed lac, dragon's blood, annato, and gamboge, each 4 oz.; saffron, 1 oz.; sprit of wine, 10 pints. 2. Alcohol 1 pint; turmeric, 1 oz. (powder); annatto 2 drs.; saffron, 2 drs.; agitate occasionally for a week, filter and add seed lac 3 oz., and let stand for two weeks with occasional agitation. Keep well stoppered. 3. Is there a cheap way to gild small articles; if so, how? A. If the work is small coat with the lacquer properly thinned, and dry in an oven at about 250° F.
- (24) J. D. H. writes: I am engaged in the business of preparing and gilding wooden mouldings, and my preparer is very much troubled with pin holes caused by the formation of small bubbles of gas immediately after the application of each coat of the preparation. I have been told that the addition of a little oil to the mixture (of whiting, china clay, glue, and water) would cure the evil, but this remedy does not seem to be reliable. Any information tending to give relief in this respect will be gratefully received. A. The imperfections are probably due to the sizing used in the first coating. Add to it a few drops of ammonia before using. You will find a good article on the subject, on pp. 301 et seq., Spon's "Workshop Receipts."
- (25) J. E. M. asks how to make an analysis of phosphate to find the percentage of ammonia, soluble and precipitated phosphoric acid, insoluble phos phoric acid and potash. A. Consult Fresenius' "Quan titative Chemical Analysis."
- (26) W. M. B. asks how to clean and whiten engravings which have become dirty by hanging in a smoky room. A. Moisten with a strong clear solution of chloride of lime until white, then soak in running water. Steep for half an hour in water containing a very little hyposulphite of soda to neutralize any trace of adhering, bleach and dry between bibulous paper
- (27) C. W. H. asks: How is commercial French mustard prepared? A. The following is M. Lenormand's recipe: Flour of mustard, 2 lb.; fresh parsley, chervil, celery, and tarragon, of each % oz.; garlic, 1 clove (or head);12 salt anchovics (all well chopped); grind well together, add salt 1 oz., grape juice or sugar to sweeten, inner membrane with a blunt knife. Then rub in plenty and sufficient water to form the mass into a thin paste by trituration in a mortar. When put into pots a red hot iron is momentarily thrust into the contents of each, and a little wine vinegar poured upon the surface. 2. Also how is chow-chow made? A. Chow-chow, as usually prepared, is a mixture of various pickles, cucumbers, cauliflower, onions, etc., chopped and mixed with mustard and a small quantity of vinegar.
- stickiness be taken from adobe or clay soil so as to temper the protruding end by applying a gas or alcohol make it loamy and easy to plow? A. The addition of sand alone can accomplish this.
 - (29) G. L. L. asks how to ping leaky boiler tubes. A. If the leak is near the head, fit and and put in a new tube.
 - (30) D. D. asks: 1. How far will a siphon draw water perpendicularly, when there is no limit to the discharge? A. If the pipe is perfectly tight it will draw 20 to 22 feet. 2. How much lower should the dis charge end be than the other to get the siphon started after it is filled with water? A. A very small difference in height of the two ends will discharge water, but the greater the difference the greater the quantity discharged in a given time.

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

G. D. M.-1. An impure clay-some of this would probably make good brick. 2. Kaolin containing much silica and some lime carbonate-useful in the manufac ture of Dottery. They are of sedimentary origin, not suit able for building purposes, Consult Dana's Geology .-A. C. R.-It is composed chiefly of infusorial silic -not derived from any mill waste.-A. F. McC.-The [OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

November 23, 1880,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifleations not being printed, must be copied by hand.

Air, apparatus for using compressed, C. E. Buell.	234,751
Air compressor, J. M. Stockman	234,733
Aluminous cake, manufacture of white, G. F.	
Rihn	004 704

Bihn	234,704
Amber, working, A. R. Davis	234,756
Auger, hollow, GN. Stearns	234,693
Bale band tightener, S. Stucky	234,734
Bale tie, J. I. Knight234,786,	234.787
Bale tie, T. B. Taylor	234,822
Barb bender and cutter, J. S. Hayne	234,671
Belt coupling, I. N. Hinderliter	234,776
Belt shifting mechanism, T. Peat	234,802
Berth for vessels, self-leveling, D. Huston	234,673
Beverages under pressure, receiver, regulator,	
and cooler for, W. L. Roorbach	234,726
Dollar alconor and purifice II Char-	001

Boiler cleaner and purifier, T. Sharp	234,7
Boot and shoe fastening, H. F. Whidden	234,6
Boot treeing machine, Copeland & Crisp	234,6
Boring machine, D. F. Forniraseo	234,7
Boring tool, F. Pentlarge	234,6
Bottle, E. P. Putnam	234,8
Box nailing machines, nail feeder for, Perkins,	
Bozorth, & Marble	234,8

Bridle blinder, A. Hosack 234,779
Buckle attachment for trace clips, A. Kearful 234,784
Button, A. Milliken
Button, separable, F. W. Clarke 234,754
Buttons, etc., machine for moulding. W. F. Niles. 234,800
Cable, pipe inclosed underground, D. Brooks 234,748
Can and bottle opener, I. N. Arment 234,646
Car brake and starter, C. J. Bell 234,648
Car coupling, P. W. Bradburn 234,652
Car coupling, J. W. Page 234.685
Car coupling, W. H. Roundy 234,727
Car heater and ventilator, hot air, H. A. Gouge 234,666
Car stake, J. W. Marden 234,681
Car wheel, A. Wibur 234,699
Card cutting or stripping machine, J. Whitelaw . 234,829

Carding engines, condensing cylinder for, J.
Greaves (r) 9,477
Catarrh, compound for, M. A. Reaves 234,808
Check row machine, G. J. Hyer 234,780
Chimney cap, metal, J. Bates 234,647
Chisel, mortising, R. Hackett
Cigar cutter, F. C. Miller 234,797
Cigar mould, Miller & Peters 234,796
Cloth sizing, stretching, and drying machine, Gray
& Cushing
Coating surfaces, composition for, C. M. Jacob. 234 675

Collar, cuff, and front, celluloid and other imita-

.. 234,665

Corn sheller, J. L. Woods 234,831	
Corset stiffener, Warner & Tallman 234,757	•
Crossing frog, A. R. Roberts 234,809	ı
Culinary apparatus, F. T. Hotine	
Deodorizing noxious gases, A. W. Louth 234,793	
Dish, baking, T. Leach	,
Dish, butter, W. C. Beattie 234,739	,
Door spring, W. W. Yokom 234,832	
Doors, hanging, W. F. Berry	
Draught equalizer, W. Bayley 234,702	
Drawer pull, G. W. Tucker	
Dredging bucket, W. H. Seward	
201,001	

	Electric light, J. E. H. Gordon
	Electric lights, apparatus for distributing cur-
	rents to, G. Sweanor
	Electroplating, holder for, R. B. Herskell 234,775
	End board, wagon, L. Van Alstyne 234,697
	Eyelets, die for making, G. O. Schneller 234,690
i	Fan, G. Brueck
	Fan, M. Rubin 234,813
	Fan, fly, S. W. Lambeth 234,713
	Fare indicator, R. M. Rose 234,811
į	Fare register, J. B. Benton

 Drill press attachment, J. G. Pope.
 234,637

 Dust pan, U. D. Alexander
 234,644

 Electric alarm, L. F. Fouts
 234,765

Trested
Faucet for sheet metal vessels, P. Heitzelman 234,710
Feed water heater and pump, combined, D. E.
Rice (r) 9,476
Fence, W. R. Shields 234,692
Fertilizer, Johnson & Giddings 234,782
File or holder, bill and letter, T. E. Gould 234,667
Filter, G. W. Dawson 234,660, 234,661
Firearm lock, A. T. Brown. 234 749

Faucet and gauge cock, celluloid coated, R. H.

Firem nock, A. I. Diown	~34.(49
Fire escape, T. Wherritt	234,828
Fishing rods, line guide for, F. Richardson	
Flax, hemp, etc., machine for breaking, G. Milliken	234,715
Food, cattle, B. N. Payne	234,718
Furnace linings, converter bottoms, tuyeres, etc.,	•
fireproof compound for, Althans, Junkhann &	
Ulsmann	234,737
	,

Gan topsan rigging, F. B. Cort	234,700
Gas, apparatus for administering nitrous oxide,	
G. H. Hurd	234,672
Gas by electricity, apparatus for lighting, E. N.	
Dickerson, Jr	234,662
Gate, J. Beezley	
Glassmaker's crane, W. Hirt	

Glassmaker's crane, W. Hirt	
Grain binder, H. E. Pridmore	234
Grain drill. J. H. Shreiner	234
Grain, etc., machine for separating foreign mat-	
ter from, F. Prinz	234
Harness, T. C. Churchman	234
Hat finishing machine Kearcher & Edgett	

d	ter from, F. Prinz	234
	Harness, T. C. Churchman	
	Hat finishing machine, Kearcher & Edgett	
t-	Hay rake and loader, J. L. Beightle	234.
ι-	Heating apparatus, steam, N. Coombs.	924
_	Hoisting machine, W. H. Lotz	234.
a	Horse detacher, J. Fisk	234
ie i	Horse power, J. R. Massey	234.
į	Horseshoe, J. N. Navin	294

	Hose leak stop, T. A. Neely	
	Hub lock, T. H. Outerbridge	
	Ice machine, F. Littmann	234,792
	Iron and steel, manufacture of, A. Krupp	
	Ironing table, W. G. Lindsay	284,791
	Lamp burner, T. Fitzgerald, Jr	234,762
	Lamp, electric, H. S. Maxim	234,835
	Lamp, gasoline street, H. Wellington	234,827
	Lamp shade and reflector, T. P. Forsyth	
	Lantern, C. H. Fry. Jr.	234.767
	Leveling instrument, J. W. Harmon	234,709
	Liquids, apparatus for drawing off, H. Weber	234,735
	Loom, hand, C. A. Fish	234,761
ĺ	Loom, power, P. Dorgeval	
	Magnetic separator, G. Schaeffer	
	Malt. extracting, J. A. Schaefer	234.815
İ	Measure and register, grain, J. A Porter	
1	Medicine, cough, J. A. King	
i	Metals, plating, Wheeler & Chapman	
ļ	Microphone, E. Berliner	
	Middlings purifier, J. H. Redfield	283,688
į	Middlings purifiers, etc., automatic feeder for,	
I	F. C. Boynton	
į	Milk skimming apparatus, F. H. Hall	
ł	Music leaf turner, J. A. Kline	
	Nut lock, W. J. French	
	Oil tank, W. H. Birge	234,745
1	Oil tank, storage, C. Kennedy	234,678
F	Ore roasting furnace, Napier & Thompson	
Į	Ore washer, dry, J. Waugaman	234,926
ĺ	Packer for well tubing joints, clasp, B. F. Walker	
ŀ	Packing box or case, L. Racouillat	
	Packing, piston, W. W. St. John	
	Paper bag, D. Appel234,837 to	234,840
	Paper, cloth, etc., coating and ornamenting the	
	surfaces of, F. Beck (r)	9,473
l	Paper making machines, screen plate for, Pinder	
	& Hardy	234,719
l	Paper pulp, machine for making frames or casings	
l	for lamps from, Stevens & Chisholm	
ĺ	Penholders, guide for, M. A. Iliff	
	Pipe cutter, A. Saunders	
	Planter, seed, H. F. Baker	
	Plow, sulky, A. F. Bergqvist	234,743
!	Plow, sulky, J. R. McCormick	224,683
	Pocketbooks, etc., fastening for, C. Posen	
į	Pocketknife, N. B. Slayton	
	Pump, double-acting, R. Bean (r)	9,475
ì	Railway signal apparatus, electrical, O. Gassett	234.707
	Reaper, swathing, B. Blood	234,651
l	Refrigerating purposes, apparatus for producing	
l	cold for, K. Knot, Jr	234,788
ĺ	Sample exhibitor, D. K. Hocker	234,778
	Scale beam, recording, E. A. Chameroy	234,656
	Scraper, G. D. Matcham	234,834
	Screw, wood, J. Eckford	284,759

soll & Ayerst 234,674 Sewing machine, D. M. Smyth 234,732 Sewing machine fan attachment, C. D. Stewart 234,818 Sewing machine plaiting attachment, C.L.Kellogg 234,677 Ships, construction of, C. G. Lundborg....... 234 794 Shoe, E. B. Preston 234 723 Shoe, rubber, D. R. Pratt 234,720 Shoe, snow, Caldwell & Huss 234,655 | 234,738 | 234,734 | 234,734 | 234,734 | 234,734 | 234,734 | 234,734 | 234,734 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234,738 | 234, Soldering machine, Dillon & Cleary (r)... Spinning machine spindle bearing, J. Birkenhead (r). Spoons, making sheet metal, M. Fowler (r)...... 9,474

Sealing vessels, method of and device for, Inger-

	or come, making sheet mother, M. Powice (1)	9,400
	Springs, making spiral, A. R. Wilbur	
	Starch polish compound, liquid, S. Lima	234,680
	Steam engine for traction vehicles, A. H. Wagner	234,824
į	Steam power car brake apparatus, G. Westing-	
	house, Jr. (r)	9.478
	Stone, artificial, G. W. Mason	
	Strainer for tea and coffee pots, W. J. Johnson	
	Stump extractor, J. C. Sharp	
ı	Monning apparetus I Davis	

Stump extractor, J. C. Sharp	234,728
Tanning apparatus, J. Davis	234,659
Telephone call, C. D. Haskins:	234.772
Telephone line switch, C. D. Haskins	234,773
Telephone signal and switch apparatus, W. J.	
Dudley	
Thill coupling, D. S. Blue	
Thill coupling, L. S. Edleblute	234,760
Thrashing machine, D. Geiser	234 708

- Hitashing Machine, 2. Geisel 204,700
Tobacco pipe, G. Römisch 234.810
Track circuit closer, J. I. Conklin, Jr 234.657
Truck, H. B. Rorke 234,836
Turn table, C. A. Greenleaf 234 668
Valve, balanced slide, J. J. Le Bean 234,679
Valve, steam actuated, W. J. Boland 234.649
Vehicle platform gear, C. R. Wilson 234,700
Vehicle wheel, H. F. Smith 234,817
Velocipede, G. W. Pressey 234,722
Vessel, wooden, H. K. Carter 234,752
Watch pendants, bush for bow holes for, Brower
& Schlesinger 234,654
Watch, stop, C. Gantzhorn 234.768
Water heater, D. K. Allington 234,645
Wheel making machine, W. Casady 234,753
Whip, M. A. Gilman
Wick tube for lamp and stove burners, N. Crot-
senburg
Wringing machine bench, Brackett & Bailey 234,653
manigua moonino bonon, brackett & battey 234,653

DESIGNS. Statuary, group of, J. Rogers

Wall paper, E. Leissner	12,03
	

TRADE MARKS.

Butter, P. Pupin	
Cigars and snuff, Bischoff. Schultz & Co	8,101
Cigars, cigarettes, smoking and chewing tobacco,	
and snuff, P. Whitlock	8,103
Needles, sewing, J. Thornton, Jr8,099,	8,100
Sugar and glucose, grape, H. W. Peabody & Co	

English Patents Issued to Americans.

From November 16 to November 19, 1880, inclusive. File holder for letters, W. Downie, Chicago, Ill. Firearms, D. Kirkwood, Boston, Mass. Generators for hydrocarbon engines, I. R. Blumenberg, Washington D. C.

Glaziers' tacks, G. W. Hubbard, Windsor, Vt. Heat, generating. B. N. Huestis, Phelpstown, N. Y. Lamps. W. B. Robins, Cincinnati, Ohio. Lamps. W. B. Robins, Cincinnati, Ohio

Paper folding machinery. L. C. Crowell, New York city. Ships, H. K. Carter et al., Camden, N. J. Wagons, apparatus for dressing arms of, R. R. Miller, Plantsville, Conn.



ILLUSTRATIONS.	H <u>H</u> alter to prevent cribbing 182	Shower bath, portable, new 6 Shower of angular hailstones 373 Sidewheelers, Western 402	Apples, exportation of	Cattle drive, Texas	E Eads' ship railway*303. 306
A	Halter to prevent cribbing. 182 Hame, improved 118 Hammer, flanging 355 Hammer, welding 365 Hammer, welding 365 Hammer, welding 365 Hamres buckle, improved 178 Harvester, improved an 83 Hen's wire nests 194 Hercules beetle, the 391 Hill climbing modern 175 Hints to young steam fitter. 213, 258 Horology, report of judges 36 Horse power and stable floor 294 Horseshoes, improvement in 18 Hudson river tunnel 225	Slate washer, novel 5 Sled, corn, novel 22 Spider, mouse-eating 55 Spiral springs, renairing 36	Aquarium	Cattle, fancy, sale of. 56 Cement, Arizona 324 Cement, hydraulic 340 Cement for wood (2)	Eagle. golden, the Early rising. Earth, causes of present figure of Earthquake warnings.
brake, novel	Harness buckle, improved. 178 Harvester, improved, an. 83 Hen's wire nests. 194	Spotted triton, the	Arctic winter, characteristics of. 398 Are sharks viviparous?	Cement, rubber. (7) 378 Cements. American. 136 Chandelier clock. *361	Earthquakes and vol. eruptions. Earth's magnetism, the Eating of clay, the
erican industries15, 20, 34, 53, 69, 84, 100, 117, 149, 211, 228, 229, 239, 290, 322, 351, 367, 373, 399	Hill climbing, modern	Starch, manufacture of	Arisy world natural Arsenic in wall papers	Charcoal, sponta. combustion of, 243 Cheese, facts about	Electrical machinery, some new Electrical motor
hracite, the	Horse power and stable floor 294 Horseshoes, improvement in 18 Hudson river tunnel 225 Hudson river tunnel progress 401	Steam appliances, manuf. of	Artificial stone	Chemical manufactures in Phila. 105 Chimney cap and ventilator*275 Chinese funeral, a	Electricity affected by a magnet Electricity, atmospheric
B	Hudson river tunnel 225 Hudson river tunnel 225 Hudson river tunnel, progress. 41 Hudson rivertun, safety app, for 121 Hunting falcon, the. 11 Hydraulie works, Worthington. 143 Hydro-carbon retort, Hollands. 54	Steam pipe, coverings for	Astronomical notes, 11, 74, 154, 213, 276, 377 Astronomical obs. at high elev 100	Chinese women's feet	Electricity from river currents. Electricity on the stage. Electric discharges
ance attach., automatic 371 ance attach. for valves 386 d saw, hand nower 387	Hydro-carbon retort, Hollands 54	Steamships, Improvements in 86 Steel, manufacture of 95, 100 Step of man, the 325 Stone crusher, Improved 358	Atmosphere, what it contains 72 Atoms and molecules, invis. of 260 Aurora borealis	Chloral hydrate, simple test for 7 Chloroforming during sleep 5 Chromium sesquichlor., crys. of. 339 Churn. improved. a*330	Electric lamp, focusing, Maxim Electric lamp, improved Electric lamps of M. Tchikoleff. Electric light. Edis on's, at sea
ksian cockatoo 263 ometer and thermom, comb 246 ometer, glycerine 134	I lce, removing from railroads 387 Index, reference, new	Stormy petrel. 343 Stove attachment, new 338 Stovepipe, extension, new 210 Stovepipe, extension, new 210	В	Cigars, infected	Electric light experi extensive. Electric light for marine use Electric light of West, steamers
ning apparatus, portable	53, 69, 84, 100, 117, 149, 211, 223, 229, 239, 230, 322, 351, 367, 373, 399 International exhibition, Sydney 8	Street lamp, improved	Baby elephant takes a bath	Cities, leading, our	Electric light on Broadway Electric light wires Electric light. by incandesence
tle, Hercules, the	Inventor, first, of steam gauge 195 Italy, coral signet of the King 231	Submarine gun, new	Baking powder controversy 292 Balance attachment, automatic. *371 Balance attach. for valves *386 Ballooning	Clock, chandelier*361 Clocks, pneumatic*19 Closets, improved*67 Clothes-line pulley novel*89	Electric lighting, developments Electric machine, large, Holtz. Electric telegraph
ard tables, improvement in. 198 king brush, improved. 210 d and deaf, born. 375 d, novel, a 339 t, folding, new. 98 er cleaner, new 291 er explosions, prevention of. 4, improved, for double doors 310 be lance. improved. 403 es, monster. 71 k making—Am. Book Ex. 207, 211 k rack, improved. 133 les, new mach, for washing. 374	Japanese art	T Table knife, new 68	Balloon photography 324 Balloons, shooting at 313 Banaca fiber 67	Clothing in its relation to health. 136 Clutch for bow-strings*130 Coal, American, formation of*104	Electro-platers' wax(1 Elements, decomposition of the Elephant, baby, takes a bath
er explosions, prevention of. 4 , improved, for double doors 310 b lance improved. 403	Kettle, tea, improved 146	Table knife, new	Bandannas, how they are dyed. 404 Banksian cockatoo	Coal in Manitoba	Elephants, rare Elevated railway for Costa Rica Elevated railway traffic
es, monster	Kettle, tea. improved	Telephone, electro-thermo	Barometer and thermome, comb. *246 Barometer, chemical	Cockatoo. Banksian*263 Cock, cylinder, automatic safety. *85 Cod liver oil, tasteless	Elevated railways, history of Elevated railways, Philadelphia Elevator, Brooklyn, new
strings, clutch for	Lace cutter, improved	Terebella and Hermella, the	Bartholdi Statue of Liberty. 49 Basal plane quartz crystals 33 Bateham, M. H. 175	Coins, to clean	Elevated railway for Costa Rica Elevated railway irrafic. Elevated railways, history of. Elevated railways, Philadelphia Elevator, Brooklyn, new. Elevator, Eric. new. Elevator, Eric. new. Elevator, improved. Emery whee; exportation of. Employer's liabilities. Employer's reponsfolity of. Employment, win., for amateur Energy develowed during rains
ness colleges	Lamp, street, improved	Tunnel, Hudson river, progress 401 Tunnel, the Hudson river 177 Turpentine, etc 279	Bath for acid colution	Colleges, bus., and their sys*383, 388 Colliery fire	Employer's liabilities Employers, responsibility of Employment, win., for amateur Energy developed during rains
new	Leadville mines and railroads 6 Leadville mines and railroads 6 Leather carp, the	U	Bathing 230 Bathing apparatus, portable *148 Batoidei, or rays *264	Color blindness, examination for 233 Color blindness in Connecticut 128 Color blindness in dyeing 278	Engineering inventions. 10, 19, 3 50, 88, 98, 115, 187, 150, 185, 19 112,230, 243, 34
e Cod canal	Lens with variable focus	Urbana Wine Company79, 84	Battery, Leclanche, to refill(6) 378 Battery, Leclanche, to renew.(13) 334 Battery, sand(4) 378	Comet, a five hundred dollar 289 Comet, Gould's 261 Comet, new, the 261	Engine, air, new
wheels, securing to axles	Live stock on cars, feeding	Vacuum pan, large	Bee keepers' convention	Comet, the, in Pegasus	Engines, pumping, manuf. of Engines, small
le pen, improved	Magnet. big, Prof. Henry's 370	Valves, balance attach. for	Beetle crop of Southern Russia. 199 Beetle, Hercules, the*391 Beetles, water, shower of	Compressed air	Engraving wood, American Epidemic at Adams, Mass Epidemic, strange, a
nney cap and ventuator	Making wine	W	Bell rope, inventor of the	Conscientious workers	Eruption of Fuego Eruption of Mauna Loa
erns, filtering	Mechanics, amateur	Wagon jack, im proved	Benzole 200 Berlin fisheries exhibition. *119, *167 Bessemer, Sir Henry, honors to 330 Billiard tables improvement in *108	Copper mines, Lake Superior	Etching ground
hes line pulley, novel	Mirror holder, hand 403 Model making, hints on 370 Mollusks at the Berline xhibition 231	Watches, adj. balance wheels 307 Watch key, self-adjusting 162 Water gauges, improvement in 217 Water meters, manufacture of 149	Blacking brush, improved \$210 Blanket brigade, the 277	Corn sled, novel	Excursions, summer, New York Exhibit, an, on wheels Exhibition, Am. Institute, 49th
catoo, Banksian	Motor, electrical 52 Motor, simplex, Davey's 278 Motor, steam, novel 6 Mouse-eating spider 55	Watering dipper, improved. 5 Welding hammer. 355 Western sidewheelers. 402	Blind and dear, born *375 Blind man a, climbs Mont Blanc. 292 Blind, nove, a *339 Boat, folding, new *98	Corton compressor, improved 128 Cotton crop, the, to tie 148 Cotton figures about 160	Exhibition, internet, Berlin Exhibition, international, Sydne Exhibition, Melbourne, the Exhibition milling, the recent
munity, marine, a	N Navigation in fors	Whate, the granty 215 Wheelbarrow, novel, a. 35 Window screen, novel 339 Wine making 79, 84	Bogus sugar 85, Boiler cleaner, new 291 Boiler explosions, prevention of 42	Cotton packing, new style of 218 Cotton seed oil manufacture 241 Cottons, American, fraudulent 241 Control packing of the company spirit of the control of the co	Exhibition of bathing appliances Exhibition of gas and elec. app. Expedition, Arctic, Howgate.
erings for steam pipes 239 nk, a substitute for 133 ss tie, improved 101	Nermertes, or striped polia 23 Ni ckel plating 153 Nu rsing bottle, new 307	Wire apparatus for laboratories 354 Wire fence, toothed wheeled 274	Boiler tubes, leaks in	Coupler, new*131 Courage necessary to success 74 Covering for steam surfaces*257	Explosions, boiler, prevention of Explosions of gas, remarkable. Explosives
D D	Nutrition of roots		Bollers, steam, inspection of	Coverings for steam pipes*239 Covington, Iowa, threatened 83 Cows, our, and their value 73 Crank, a substitute for*132	Exposition and fair, Pittsburg Exposition and fair, Pittsburg Exposition, indus Cincinnati
dell cell, modified	Oil tank, lightning-proof 308 Ore separator new 36	MISCELLANY.	Bandannas, how they are dyed. 404 Banksian cockatoo 263 Barley, rice, and maize, analy. of 185 Barometer and thermome, comb. 246 Barometer, chemical (15) 394 Barometer rlube, to clean (2) 43 Barometer rlube, to clean (2) 43 Barometer rlube, to clean (2) 43 Barometer rlube, to clean (3) 43 Barometer rlube, to clean (2) 43 Barometer rlube, to clean (3) 43 Bartholdi Statue of Liberty 49 Basal plane quartz crystals 33 Batcham, M. H 175 Bath for acid solution (3) 75 Bath for acid solution (3) 75 Bath, shower, portable, new 46 Bath, spray, novel 121 Bathing 230 Bathing apparatus, portable 1448 Batoidel, or rays 286 Battery, Leclanche, to refill (6) 373 Beet keepers' convention 43 Beer faucet, new 493 Beet faucet, new 493 Beet faucet, new 493 Beet seepers' convention 493 Beet seepers' convention 493 Beet sugar making in Delaware 369 Beetle, Hercules, the 483 Beetle, Hercules, the 483 Beetle, Sapacity of (12) 394 Bell rope, inventor of the 334 Bell rope, inventor of the 334 Bell rope, inventor of the 330 Bellind, ray a, climbs Mont Blane 329 Bell and tables, improved 493 Billiad tables, improved 493 Billiad man, a, climbs Mont Blane 329 Blind, or a, climbs Mont Blane 329 Boots, folding, new 493 Boots, rodaling, new 493 Boots of cleaner, new 493 Boots of counter of the 494 Boots, see still proved 493 Boots of counter of the 494 Boots, see still proved 493 Boots of counter of the .	Cotton compressor, improved. 128 Cotton crop, the, to tie. 148 Cotton, figures about. 218 Cotton seed oil manufacture. 241 Country gains to summer visitors 218 Couplen, new. *181 Couplen, new. *181 Couplen, new. *181 Couplen new. *182 Covering for steam surfaces. *357 Coverings for steam pipes. *292 Covington, Iowa, threatened. *292 Covington, Iowa, threatened. *293 Covington, Iowa, threatened. *293 Covington, Iowa, threatened. *393 Cramks, a substitute for. *133 Cranks, a substitute for. *133 Cranks, to balance. (3) 394 Creamery, centrifugal. (3) 394 Creamery centrifugal. (3) 394 Cremation of the dead. *205 Cresoto plant, the. 120 Cross tie, improved. *101 Crystallization, designs prod. by 257 Crystallizat Prussian blue. 58 Crystals of hæmine 343 Cucumbers, to pickle. (3) 43 Cucumbers, to pickle. (3) 43 Cucumbers, to pickle. (3) 43 Cure for drunken., Dr. Unger's 73 Curiosities of the voice. 55 Cyclones, laws of. *288 Cyprus reed stems, new use for. 104	Express trains, catching
stock, improved	Oil tank, lightning-proof	Figures preceded by a star (*) refer to illustrated articles.	Borax, analysis of	Creosote plant, the 120 Crosby, C. O., Dr 370 Cross tie, improved *101	Fabrics, vulcanized rubber*15 Factory laws in Switzerland Fair, American Institute 226
ble treadle attachment	Packard's Business College383, 388 Panel planer, the Williamsport 164	A Academy of Sciences, National 372	Bottle stopper, improved*310 Bottles, new machine for washing *374 Bow strings, c utch for*730	Crystallization, designs prod. by. 257 Crystallized Prussian blue	Fair, world's, in 1883
ls for mining, etc	Pantelephone, De Locht's	Acident, R. R., remarkable387 Acid proof vessels(10) 155 Acid, citric, artificial129 Acid, proving and its adultantions. 729	Boy, small, nature of the	Cup of tea, a	Farming, Am., Eng. views on Farming in Japan Farms, big, on the Pacific coast.
s'ship railway303, 306, 308	Parasites, fish	Acids, fatty, contained in oils 338 Adulteration of artists' materials 321 Adulterations and substitutions 176	Bread making in Spain. 178 Breakbone fe ver in the South 281 Bre wers' patent suits. 246	Cyclones, laws of*288 Cyprus reed stems, new use for 104	Fast, great, Dr. Tanner's Fasting experiment, Dr. Tanner' Fasting horses
trical machinery, some new. 150 trical motor 52 tricity from clouds 163	Phyllirhoe Bucephala	Agricultural inventions1, 55, 69, 106, 120, 165, 178, 218, 245, 276, 330, 403 Agriculture, machinery for	Bridge, great. reconstructed	D Daddy long-legs in England 263	Faucet, beer, new Feet, Chinese women's Fence post and sill, concrete
tric lamps of M. Tchikoleff. 116 tric light for marine use. 127 tric lighting, developments. 255	Point bridge	Air brake, novel*166 Air gun, new	British Association meeting	Dangers of elevated railways 133 Daniell cell, modified *181 Dead, the, cremation of	Fence, wire, toothed-wheel Fern pictures, how to make Ferry boats, fireproof Ferry house, new
onant seal, the	Ponton steamer, safety, Olsen's. 86 Poodle, fan-tailed	Air, moistening, in cotton mills. 58 Air, open, for consumptives. 282 Air, the, breathed in Leadville. 74	Buildings, high, of the world 84 Bunsen battery, improvement 266 Burning of a fire-proof building 208	De Buffon, Benjamin Madault 54 Decisions of the courts 229 Decisions, patent	Fight bet. a whale and its enemier Filter, cistern, new
ibition, international, Sydney 8 losions, boiler, prevention of 4	Protective suit for firemen. 292 Pulley, clothes line, novel. 98 Pulping machine. 358 Pulsometer support 368	Alarm telephones	Business colleges*383, 388 Business, concentration in 330 Butler colliery fire	Deep sea sounding apparatus. *310 Dea sea trawling. 265 Defenses, naval, American. 224	Fire caused by an elec. light wire Fire damp, destroying
F rics, vulcanized rubber15, 20	Pump, acid, new 232 Pump, rotary, improved 50 Pumping engines, cal., Ericsson's 326	Alcohol, poisonous effects of	Butter and cheese, rise of, at sea. 42 Butter industry, Danish 233 Butter, yield of, from cream 58 Butterflies, evolu. of species in 151	Dental Association, National. 128 Dental attach. for telephones. *82 De Pourtales, Louis Francois. 201 Designs by crystallization. 257	Fire hose, improvements in Fire in a coal mine Firemen, protective suit for
-tailed poodle	Pumping engines, manuf. of 149 Pumps, pulsometer, manuf. of.63, 69 Punching press, new 83	Amateurs, winter employ. for 356 Amber varnish	Buttermilk as summer food, etc. 121 Buttonball, the, injur. effects of 113	Dextrine, to make	Fireproof canvass(7 Fires—causes and revention Fires, harbor, appliance for Fires in New York
ce, wire, toothed-wheeled 274 tt bet. a w hale and its enemies 295 er, cistern, ne w	R Railroad cars, running70	American Chemical Society	Cable, Atlantic, another new 196	Diamond mines of India	Fires, origin of
parasites 39 way, improved 22 ging hammer 355	Railway crossings, impt in	American industrial 1 ir. 175 American industries. *15, *20, *34, *53, *69, *84, *100, 117, *149, *211, *223, *229, *239, *290, *322, *351,	Cable towing, steam, Erie Canal. 137 Cables, elevator, dangers of	Diastase, composition of 227 Die stock, improved 220 Digestive ferment in the fig. 352	Fish parasitic, curious. Fishes, culture of
ng squirrei Taguan 135 s, navigation in 3 ling boat, new 98 ling stand, novel 147	Recording galvanometer, new 271 Rectangular vibrations, comb 259 Reference index, new	*367, *373, *399 American Industries, illus. series. 32 American Institute Exhib.,49th 49 American Institute fair	Cadmium	Dika bread	Fishes, Pacine coast
tt gatherer, novel	Road wagon, new	American Institute of Architects 389 American inventions abroad 244 American machines in England 162	Canal boat, large. 22 Canal, new, in Chili. 49 Canal, ship, Florida projected. 42 Can c	Disaster, Tay bridge	Fleet, quar. for the Mississippi. Flies, repelling. Flies, traveling.
G	Rubber fabrics, vulcanized15, 20	American manuractures	Cape Cod canal *289 Capillary phenomena, curious. 49 Carbons, to solder(20) 895	Disease, spread of by earthworms 135 Diseases, virulent, prevention of 97 Diseases of plants, malignant 296	Flord Rock, operations at Flora, the of volcanoes Flour manufacture, science in.
vanic battery, improved	Safety nut, improved	American wood engraving	Bom blance, improved	Dish washer, new	Flower, changing the color of Flower roots, wintering Flowers, Cal., brilliant tints of Flowers, old-fashioned
making, simple process	Salts of sodium, extraction of 102 Sand and water spouts 477 Sash holder and fastener, new 246	Andes, the, Mr. Whymper among 85 Anthracite at the Navy Yard 352 Anthracite, steamer, the	Car wheels, cast iron 122 Car wheels, securing to axles 70 Carriage, steam, novel, a 406	Double treadle attachment. *198 Dowd tunneling system. *279 Drake, E. L., Colonel. 344	Flying squirrel, Saguan Fog, dry
iges, wire, standard	Scale, automatic, Stoner 371 Scales, standard, manuf. of 287, 290 Seal, elephant, the 295 Seals 190	Anthracite, the	Cars, railroad, running*70 Cargo, large, a	Drawings, to fix	rogs, navigation in. Folding boat, new Folding stand, novel Food adulterations, rarity of
nny w hale, the	Sea otter, or kalau. 23 Separator, magnetic. 291 Sewers, improvement in 82	Ants, slave making	Carriage, a, how to preserve	Drinking waters, impurities of 250 Driven well for fire purposes 89 Drying a specific gravity bottle. 151 Drowned person with the	Food, human, unfit for
ami, the	Sheep protector, new	Apple jelly	Catamaran steam, trial of 96 Catakilla, geological hist, of the	Dyes, coal tar, manufacture of 42 Dying fish of Lake Ontario 170	Frame makers putty(1)

DECEMBER 25, 1880.]	Scientific American	• .	411
Freight car, the load of a	Millers, the, and the patent laws. 16 Milk an, Improved. *294 Milk, rich, to get a larger yield of 36 Milk supply, London. 325 Milk supply, London. 325 Milk supply, London. 325 Milling, American. 331 Milling exhibition, the recent. 36 Milling exhibition, the recent. 36 Milling industry in America. 333 Milling industry in America. 333 Milling industry in America. 334 Milling industry in America. 335 Milling industry in America. 336 Milling industry in America. 337 Milling industry in America. 338 Milling industry in America. 338 Milling industry in America. 339 Milling industry in America. 339 Milling industry in America. 330 Mineral belt, hydraulc, Texas 113 Mineral discoveries, new. 330 Mineral specification in Milling industry in Milling industry in Milling in Millin	111 387	Telegraphy, Am., progress in 358
Gas and elec. app., exhibition of. 149 38, 51, 67, 89, 114, 123, 146, 164, Gas burner, improved*312 182, 198, 214, 227, 262, 297, 309, 404	Mining debris in California		Pemperature of the sun.
Gas, explosions of remarkable. 113 Gas machine, Maxim's *11 Gas machine, Maxim's *12 Gas machine, Simple process *13 Gas machine, Simple process *13 Gas machine, Maxim's *13 Gas machine, Simple process *13 Gas machine, Simple process *13 Gas machine, Simple process *13 Gas well, natural, near Boston 138 Gate closer, novel *13 Gaines well, natural, near Boston 138 Gate closer, novel *13 Gaines, Steam, Inst inventor of *195 Gaines, Steam, Inst inventor of *20 Gaines, Steam, Inst inventor of *20 Gelatine, to render insoluble. (119 Generator, steam, Improved *114 Genesee Falls, utilization of *21 Genesee Falls, utilization of *22 Inventors, a opening for *23 Inventors, a opening for *23 Inventors, a opening for *24 Inventors, a opening for *25 Inventors, a opening for *26 Inventors, an opening for *27 Inventors, an opening for *27 Inventors, an opening for *28 Inventors, an opening for *29 Inventors, an opening for *20 Inven	Mississippi jetties, a result of the 223 Model making, hints on	(4) 107 Sheep and wool show Phils. 240 of 266 Sheep skin, to cure	Fime, fastest on record
Glass, Iridescent. 168 Glass making, American. 193 Glass, plate, largest sheets of 26 Glass spining and weaving. 385 Glass, to remove scratches. (11) Glue, insouble (19) Glycerine barometer 193 Glycerine barometer 193 Glycerine barometer 193 Glycerine in gastric troubles. 101 Gold bearing newspaper, a. 89 Gold rock 193 Gold, to amalgamate (14) Gold, to precipitate (10) Glycerine barometer 193 Gold, to precipitate (10) Gold, to precipitate (10) Glycerine barometer 193 Gold, to precipitate (10) Gold, to precipitate (10) Glycerine barometer 193 Gold, to precipitate (10) Glycerine barometer 193 Gold, to precipitate (10) Glycerine barometer 193 Glyce	Mouse-eating spider	sen's '96 Sidewheelers, Western '402 sen's '97 Silex, to calcine (8) 314 sesent '90 Silk, inflammable, new (28) silver, to oxydize (28) silver, to oxydize (29) silver, to recov, from solutions(3) silver, to precipe the silver, silve	ranis, fast, English
Grain meter, new	New York, could a fleet bombard 192 Niagarariver bridge 261 Nicaragua canal concession 42 Nickel, acetate of (2) 107	17y. 69 Skating rink, artinicial ice for . (8) 14 42 42 42 43 44 45 44 45 44 46 46 47 47 46 47 47 47 47 47 47 47 47 47 47 47 47 47	ree struck by lightning 80 rick, clever, a 85 rip, quick, clever, a 85 rip, quick, clever, a 85 rip, quick, clever, a 86 rip, quick, clever, a 86 rotting, fastest or record 145 rotting match, fastest time. 115 rotting, the fistest. 137 ubes, pneu, supersede cash boys 266 unnel, Hudson river. 148 unnel, Hudson river. 225 unnel, Hudson river, accident. 80 unnel, Hudson river, progress. 401 unnel, Hudson river, progress. 401 unnel, St. Lawrence river. 129 unnel, the Hudson river. 177 unnel, the St. Gothard. 405
Greasespots, removal of. 2375 Green corn, to can (16) 378 Grimmer's prophecy 149 Grinder, the Universal 305 Grimmer's prophecy 149 Grinder, the Universal 305 Gustemala's exhibition 310 Gustemala's exhibition 310 Gustemala's exhibition 310 Gustemala's exhibition 310 Gun, air, new 134 Gun, air, new 134 Gun, air, new 134 Gun, eight-inch, powerful 198 Gun, new linesthrowing 166 Gun, new linesthrowing 166 Gun, new linesthrowing 166 Gun, new of remarkable power 402 Gun, one hundred ton, England's 263 Gun, submarine, new 3837 Gun, submarine, new 3837 Gun, submarine, new 3837 Ladic patentee, a, pleads her case 9 Lamp, eter (e, mproved ** Lamp, eter (e, improved ** Lamp, street, improved ** Lamp, eter (e, improved ** Lamp	Nickel plating		unneling machine, Brunton
Gurami, the. "359 Gutta percha, bleaching 374 Gutta percha industries *183 Gutta percha industries *183 Leaves, variegation of 38 Lens making 5 Lens making 5 Lens with variable focus *13	Drake, E. L., Colonel	Spystass novel, s	V Taccine virus, cultivation of
Hammer langing	30 In parreis, manufacture or. 34 Railway, trans-salara. 10 Ill reg, cause of . 25 10 Ill thricants. 404 10 Ill tank explosions, theory of 40 10 Ill tank explosions, theory of 40 10 Ill tank a question, the 40 10 Ill tank a question, the 40 10 Ill tanks, burning of by lightning 33 10 Ill tanks, cannonading of 38 10 Ill tanks fired by lightning 33 11 Railways, trans-salara. 12 Railways, underground, Lon Railways, underground, Lon Railways, lorgers, and partended and partend	10, 300, 308	e-sels, sunken, raising, 386 inlegar, good, 282 ine, promising, a 295 olce, the, curiosities of 335 ulcanized rubber fabrics. *15, 20
Harvester, improved, an. 83 Hatching spanish mackerel. 83 Hatching spanish mackerel. 83 Hatching spanish mackerel. 83 Hatching spanish mackerel. 83 Hats, Panama. 20 Hear spanish mackerel. 83 Lightning rods, comecting. 20 Hear spanish mackerel. 83 Lightning strokes. 20 Heur spanish mackerel. 83 Lightning rods, comecting. 10 Lightning strokes. 20 Heur spanish mackerel. 83 Lightning rods, comecting. 10 Lightning rods, comecting. 10 Lightning rods, comecting. 20 Lightning strokes. 20 Heur spanish mackerel. 83 Lightning rods, comecting. 20 Lightning strokes. 20 Heur spanish strokes. 21 Lightning rods, comecting. 20 Liquting, frement., freezing pts of 25 Heur spanish strokes. 21 Livadia, the	10 Oil tanks, protection of 10 Ull Rainfalls, precipitating 10 Oil tanks struck by lightning 40, 163 oil wells, shooting. 201 One hundred ton gun, England's 263 Orang-outang, new, in London. 23; Orang-outang, new, in London. 23; Ore separator, new *56 Ore separator, new *56 Ore separator, new *56 Organic matter in theair. 240 Organic matter in theair. 240 Organic matter in theair. 240; Oven, portable, new *193 Oven, portable, new *194 Rectangular vibrations, con Couring error to prepare. (8) 376 Ovygen, to prepare. (8) 376 Ovygen, to prepare. (8) 376 Oysters, or operation, new or operation, new and over the course of t	106 Steamboas be to Area 107 108	/ages and earnings in Pa
Homicide in the United States 223 London inter mill, exhibition 224 Honey, artificial, to distinguish 235 London's Stock Co. s, Limited 235 Lo	Oyster canning in New Orleans. 321 g Oysters, American, transplanting 18 g Oysters, American, transplanting 18 g Oysters, Gestruction of 273 g Oysters, Importing 210 g Oysters, Staten Island and 88 d Ozone experiment 355 d Ozone, liquefaction of 339 d Ozone, liquefaction of 339 f Ozone, the color of 288 g Ozone, the color of 888 g Ozone, the color of 988	80 Steel, manufacture of. **95, *100 W and s *5teel, to color blue. (17) 378 wand s *54 Steel, to temper. (17) 409 W f. *55 Steel, to tin. (88) 895 W f. *26 Steel, to tin. (7) 187 W f. *26 Steel of man, the *325 W f. *325 Steel of which is the steel of which is th	ater gauges, improvement in *217 ater meters, manf. or *149 ater supply, New York 101 atersupply for Oakland 367 atersupply for Oakland 367 aterny of the provided 56 aterny of paste 105 aterny of paste 7 378 aterproofing cloth (3) 107 aterproofing paper (3) 107 aterproofing paper (1) 91 atson, James C (1) 92 ax, winte, industry 2.68 eakness, human, mak, profit of 145 caving sheds, low 218 celding by oressure 181
Horses, fasting	Oysters, importing 210 Oysters, Staten Island and. 82 Oysters, Staten Island and. 83 Ozone experiment. 356 Ozone experiment. 356 Ozone, liquefaction of 338 Ozone, liquefaction of 338 Ozone, liquefaction of 388 Ozone, the color of. 288 River improvements. 357 River waters, are they safe 388 Rivers, purfication of, 80 Road wagon, new. 80 Road wag	tains. 329. Starc, manufacture of	Vages and earnings in Pa
Hydro-carbonretort, Holland's. *54 Marble, to remove stains from (9) 9 Hygiene of photography 297 Marking ink for leather. (15) 60 Mastodon, another. 266 Mastodon, Chicago 177 Matches, phosphorus in 18 Ice and cold, production of 277 Ice at high temperatures 260, 373, 393 Icegorge at Newton, N. J. 57 Ice, hot. 276 Matter, indestructibility of 17 Ice next summer, how to have. 305 Matter, the structure or 41	Patent case, a, or general interest as a safety nut, improved Patent decisions. 106, 116, 176, 251, 258, 318, 316 Patent laws, progress of the 336 Patent laws, con.p. about 180, 313 Patent laws, English 150 Patent pants 150 Patent pants 17 Patent sand science 276 Patents, an English magistrate on 212 Patents, cheap 256	Sut, protective for firemen 222 William Sulphide of Carbon 343 Sulphide of Carbon 343 Summe, extract of 228 William 227 335 William 237	re apparatus for aboratories .*354 re fence, toothed-wheeled .*274
lce, removing from rainoads. *387 Maxim's gas machine 1 1 26 Maxim's gas machine 28 Max Muller (Prof.) on progress. 36 1 26 Metay, Donald 22 22 23 Metay, Donald 22 24 Metay 24 25 Metay 25 Metay 26 27 29 26 26 27 29 26 27 27 27 27 27 27 27	Patents, cheap Patents, decisions relating to. 21, 8 Patents, decisions relating to. 21, 8 Patents, Government use of 32 Patents, Government use of 32 Patents, Government use of 32 Patents, Francis Government use of 32 Patents, Government		ooden R. R. rails (18) 346 pod products of Norway 285 ood, to protect from worms (5) 488 ood, to render fireproof 327 ood work, protection of 99 ool clip, the world's 243 ool sorter's disease 281 orkers, conscientious 288 orkers, conscientious 280 ord a, life and death of 230 orld a, life and death of 230 orld s fair of 1883, (34, 128, 369) orm army, further notes on the 152 orm army, notes and obs 6 rong journal credited, the 261
Indian summer, cause of haze. (27) 363 Induction coil for transmitter (14) 394 Induction coil, small. (26) 395 Industries American. *15. *20. *34. *53. *89. *34. *10. *117. *149. *211. *223. *229, *239, *239, *232, *351. *36. *373. *389 Industries, American illus. series 32 Industries, American illus. series 32 Industries, extile, Philadelphia. 38 Industry, North Carolina, a. 135 Infernal machine, Peruvian 127 Infinx the source of invention. 129 Infinx the source of invention 130 Inf	Patents, decisions relating to. 21, 941, 333 Patents, Government use of 32 Patents, Discourage of 32 Patents, Discourage of 32 Patents, Discourage of 32 Patents, Discourage of 32 Periole in New Zealand 55 Pear trees, Dilght of 273 Pencil drawings, to fix (1) 59 Pencil drawings, to preserve (6) 107 Perpetual snow, cause of 165 Petroled may be supposed	70f 372 Tea, britis unsater. 88 V 70f 372 Tea, britis unsater. 88 Tea, britis unsater. 88 Tea, britis unsater. 88 Tea, britis unsater. 90 Tea, new varieties of the 192 Tea, new varieties of the 193 Teeth, oxychloride filling for (26) 347 V 70f 193 Telegraph Co., the Anglo Am., 193 Telegraph, Harmonic. 388 Telegraph, insulator, new 387 (11) 394 Telegraph wires underground. 385 Telegraph wires underground. 385 Telegraphic progress, recent. 282 Zi (11) 394 Telegraphing, rapid. 245 Zi	Y oung men's lesson to

Adrertisements.

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. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.



ECONOMY ORGAN—NEW STYLE 109—THREE AND A QUARTER OCTAVES; in BLACK WALINUT CASE, decorated with GOLD BRONZE. Length, 39 inches; height, 33 in; depth, 11 in.

This novel style of the MASON & HAMLIN CABINET ORGANS (ready this month) has sufficient compass and capacity for the performance, with full parts, of Hymn Tunes, Anthems, Songs, and Popular Sacred and Secular Music generally. It retains to a wonderful extent, for an instrument so small, the extraordinary excellence, both as to power and quality of tone, which has given the MASON & HAMLIN Cabinet Organs their great reputation and won for them the HIGHEST D'STÎNC-TIONS at EVERY ONE of the GREAT WORLD'S IN-DSTRIAL EXHIBITIONS for THINTEEN YEARS. EVERY ONE WILL BE FULLY WARRANTED. CASH PRICES \$22; on receipt of which it will be shipped as directed. If ON INSCRIPT AND TRIAL IT DOES NOT THE MONEY THE FUNCHASER, IT MAY BE RETURNED AND THE MONEY WILL BE OF ORGAN EAR PRICE \$22; on the CHASER IT MAY BE RETURNED AND THE MONEY THE FURCHASER, IT MAY BE RETURNED AND THE MONEY THE FURCHASER, IT MAY BE RETURNED AND THE MONEY THE FOR THE SECONOMY ORGAN at \$22, to large CONCERT ORGANS at \$900 and upwards. The EVEN MEDICAL CONCERT ORGANS at \$900 and Upwards. The EVEN MEDICAL STREET AND LISTS free.

MASON & HAMLIN ORGAN CO., 154 Tremont St., BOSTON, 46 East 14th St., NEW YORK; 149 Wabash Ave., CHICAGO.

FOR SALE.

Any one, from the 20th inst., up to the 24th inst., from 10 A.M. to 4 P.M., for the sum of ten dollars, can buy the receipt of a cheap process, easy to be made and to be employed, and superior to any one already in existence, for soldering together, or one with the other indistinctly, at a heat approximating Red Brick, the following metals: Iron, Steel, Malleable Cast Iron, or ordinary Cast Iron. The same process can be used for copper with the above metals. Samples can be seen at Mr. GASSARD's, 82 Macdougal Street, New York, at the dates and hours above mentioned. Through correspondence, and upon the receipt of the nodlars, the receipt of the process with the particulars about using it will be sent free of charge.



BURGESS' PORTABLE

supersedes the Bellows Forge, and Mouth Blow 1'tpe by saving Time, Labor, and Breath. Will give the Gentlest Flame or Hottest Blast without exertion. Its construction is simple and durable, its pite greatly reduced within the last year to meet the wants of every artisan. The Pump weighs 12 pounds, is 24 inches high, cylinder 2½ inches, with 3 inch stroke; has been in use by Jewelers, Dentists, Chemists, Machinists, Gas Fitters, Locksmiths, Metal Workers, etc., for the last EIGHT YEARS, and in that time have heard reports of it only of the most favorable nature. Manufacturers find it only of the most favorable nature. Manufacturers find it indispensable for the repair of light machinery.

J. El.LIOTT SHAW, 154 South 4th St., Phila, Pa. 29 is made to the above in SCIENTIFIO

N.B.—Reference is made to the above in SCIENTIFIC AMERICAN of February 14, 1880.

ICE-HOUSE AND REFRIGERATOR Directions and Dimensions for construction, with one illustration of cold house for preserving fruit from season to season. The air is kept dry and pure throughout the year at a temperature of 30 to 35° Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 116. Price 10 cents. To be had at this office and of all newsdealers.

WANTED.—A PRACTICAL MACHINIST wante. — A FRACTICAL MACHINIST as foreman of a machine and wood shop. Must under-stand the use of saws and wood-working tools; also, the management of Engines, Boilers, and Steam. A perma-nent place for the right man. Address BOX 2164, Boston P. O.

Address BOX 2164, Boston P. O.

SCIENTIFIC AMERICAN SUPPLEMENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at this office for 10 cents. Also to be had of newsdealers in all parts of the country.

A Child's Square Toy Piano for Only \$1.



The predicted toy that has seer been made. It is a perfect representation of a fine square Fiano. Flays like any Plano, producing yery aweet music. The "Child's Square" is handsomely designed, with tasty music scroll, imitation rosewood case, and many pretty little tunesand airs can be played on it, the tone of it being very aweet and pleasing. It will give any little child a good idea of fingering the Plano, and amuse her the whole winter long. It is a most desirable present, and we have put the price at a figure that will ensure a sale in every household. Price only \$1; boxing, 25 cents extra. THE MASSACHUSETTS ORGAN CO., 43 Washington Street, Boston, Mass., Sole Manufacturers,

MACHINISTS' TOOLS WANTED. MACHINISTS' TOOLS WANTED.

Best modern tools, new or second-hand. Woods' Automatic Bot Cutter, with centers, or others of equal merit;
Shaping Machine or Compound Planer, say 15 inch;
Pulley Lathe to swing 4 or 5 ft. Traverse Drill for Steam
Engine Cylinders, up to 20 in. by 3 ft., say; Radial Drill,
say 3 to 4 ft. overreach; Engine Lathes, say 5 to 10 ft.
bed. Or would buy out a good machine shop of Tools.

GEO. T. MCLAUTHLIN & CO., 120 Fulton St., Boston.

PAYNE'S FARM ENGINES.



Vertical and Spark-Arresting Engines from 2 to 12 horse power, mounted or unmounted. Best and Cheapest Engines made. \$150 upwards. Send for Illustrated Catalogue "A '2, for information and prices.

Box 1207. B. W. PAYNE & SONS, Corning, N. Y.

GEOLOGY. — INAUGURAL ADDRESS of President Andrew C. Ramsay at the annual meeting of the British Association for the Advancement of Science, August, 1880. A most valuable and interesting paper, showing some of the latest researches in Geology, and the important deductions therefrom resulting. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 248. Price 10 cents. To be had at this office and from

CORBUGATED

AND CRIMPED IRON

ROOFING AND SIDING,

Iron Buildings, Roots, Shutters,

Doors, Cornices, Skylights, Bridgees, etc. MOSELY IRON BRIDGE
AND ROOF CO., 5 Dey Street,

New York.

ICE-BOATS — THEIR CONSTRUCTION and management. With working drawings, details, and directions in full. Four engravings, showing mode of construction. Views of the two fastest ice-salling boats used on the Hudson river in winter. By H. A. Horsfall, M.E. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 1. The same number also contains the rules and regulations for the formation of ice-boat clubs, the salling and management of ice-boats. Price 10 cents.

Wood-working **M**achinery

Universal-Wood Workers. Planing, Matching Moulding, Band and Scroll Sawing Machines, etc. BENTEL. MARCEDANT & CO. HAMILTON, OHIO, U.S.A.



WANTED, BY THE SOUTHWARK FOUNDRY AND MACHINE CO., Philadelphia, a num ber of first-class fitters on engine work.

Envelopes and Note Heads, 75 of each, with address and business printed, only \$2. "CARTER'S JOB OFFICE," Plainfield, Ind.

RUBBER STAMPS. Complete outfits for Manufactur-ing. S. A. BROWN, Buffalo, N. Y.

HOW TO MAKE A TELESCOPE.—BY George M. Hopkins. Directions, accompanied by a complete set of working drawings, whereby any person may easily construct for himself at small cost, an effective telescope, capable of giving its possessor a great deal of enjoyment and knowledge of astronomy. Illustrated with 7figures of details, drawn to a scale. Contained in SCI NTIFIC AMERICAN SUPPLEMENT, NO. 252. Price 10 cents. To be had at this office and from all newsdealers.



Applied to all machinery driven by fly-wheels and liable to be broken by power stored in wheels, such as calender rolls. upsetting machines, presses, and wire drawing machines. We warrant to save gearing and all machinery from breaking by using our clutches, starts gradual, stops controlled. Friction Hoisting Engines and Drums; also, Safety Elevators. Can be run faster and stop quicker than any other friction.

D. Frisbie & Co., New Haven, Ct.

OYSTER SHELL LIME KII.N MAKERS, SEND ADdress to R. B. LAURENCE, Morgan City, La.

FREE Samples and Catalogue of best selling articles on earth. WORLD MFG. CO., 122 NASSAUST., N.Y.

BEST SELF-OPENING CATES

ICE AND ICE HOUSES-HOW TO MAKE ice ponds; amount of ice required, etc., and full directions for building ice-house, with illustrated plan. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 55.
Price 10 cents. To be had at this office and of all newsdealers.



RAPID **ADDITION!**

WONDERFUL INVENTION! Art of Adding Figures from left to right; or from Middle either way; Done as Quick as Thought! Sent to any address on receipt of Price, 50 Cents. Remit by P. O. Order or in Postage Stamps.

. F. MERRIMAN, Batavia, N. Y.

CERIAI, CANVASSERS will receive a Circular of Cone of the handsomest books, on a new subject, by addressing J. A. WAGENSELLER, Philadelphia, Pa.

Just issued. TRAUTWINE'S CIVIL ENGINEER'S POCKET BOOK, illustrated with 670 engravings from original designs. Fourteenth Thousand. Revised and Corrected. 16mo, 678 pages. Tuck, gilt edge. Price \$5. Mailed on receipt of price. E. Claxton & Co., Phila.



ICE-HOUSE AND COLD ROOM.—BY R. G. Hatfield. With directions for construction, Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 59. Price '10 cents, To be had at this office and of all newsdealers.



Langdon Mitre Box Co. MILLERS FALLS. MASS. Langdon and New Langdon Mitre Box.

THE OPEN FIREPLACE IN ALL AGES. By J. P. PUTNAM, Architect. One vol. 12mo. Price \$2. With 239 illustrations of famous fireplaces of historical and artistic interest, together with original designs and suggestions for modern use.

*** For sale by all Booksellers, or will be sent, postpaid, on receip* of pri e, by the Publishers, JAMES R. OSGOOD & CO., BOSTON.



TYSON **V**ase engine Absolutely pon-explosive under all circumstances and conditions. Cylinder, 114 inch bore, 2% stroke. Price \$50. Weight, 60 lb. Height, 41 inches. Power, 1,00 ft. lb. per minute. Fuel, 12 feet of Gas per hour. Kerosene or Gasoline may be used. For Dental Lathes, Scroll Saws, Sewing Machines, etc. See Scientific American of March 13, 1880.

Dhila dalahio

TYSON ENGINE CO., Philadelphia



ON CHRONIC MALARIAL POISONING ON CHRONIC MALARIAL POISONING.

-By Alfred L. Loomis, M.D. A Highly instructive Clinical Lecture, delivered at the University Medical College, N. Y. According to Professor Loomis the effects of malarial poisoning are manifested in a surprising variety of forms and symptoms; so numerous and various, in fact, that they cannot be tabulated. They embrace enlargement of the spleen, neuraligas of different forms, that may or may not be periodical; dyspeptic troubles which cannot be relieved by dyspeptic remedies; headaches chanato the relieved by dyspeptic diseases; confusions of mind; staggering galts; loss of a way in the control of the spleen of the control of the spleen of the control of the spleen of the control of th

THE BEST THING YET. THE Fitchburg Acoustic Telephone Co.'s New Metallic Telephone. Send for new circular.

FITCHBURG ACOUSTIC TELEPHONE Co., Box 198, Old City, Fitchburg, Mass.

INDIA-RUBBER AND GUTTA PERCHA
Industries.—By Thomas Bolas, F.C.S. An exhaustive
paper on the sources and manufacture of both Indiarubber and gutta percha. I. The Sources of Indiarubber and gutta percha. I. The Sources of Indiarubber. Early Manufacture of Rubber. Rubber-bearing
Trees. Collection and Composition of Rubber Juice.
Characteristics of Rubber. Contraction by Heat and
Oxidation of Rubber. Best Solvents for the Gum. II.
Purification of Raw Rubber. How Rubber Toy Balloons
are made. Rubber Cements and Rubber Gilves. III.
Vulcanization of India-rubber. The Vulcanizing Heaters. Mixers for Rubber. Effects of Sulphur and other
Chemicals upon Rubber. Cold Curing Process. Substances which Dissolve and Injure Rubber. IV. Special
Applications of Vulcanized India-rubber. Manufacture
of Rubber Thread. Rubber Tubing. Rubber Packing.
Rubber Belts. Rubber Toys. Rubber Sponges. Rubber
Stamps and Printing. Rubber Cements. Plates. Rubber Waterproof Goods. Kamptulicon. Hose Pipe Making Exportation of Vulcanized Oil. Substitutes for Rubber Steam Rubber Press. V. Ebonite or Vulc nife.
Dental Rubber. Vulcanized Oil. Substitutes for Rubber, mode of manufacture, and applications. This paper
contains valuable information concerning the nature,
properties, and mode of working rubber, and is believed
to be the fullest and most valuable paper on the subject
ever issued. With four illustrations. Contained in
SCIENTIFIC AMERICAN SUPPLEMENT. Nos. 249, 251,
and 252. Price II deens and follows and from all newsdealers. INDIA-RUBBER AND GUTTA PERCHA



FIFTY SIRUP RECIPES FOR HOUSE-FIFTY SIRUP RECIPES FOR HOUSE-hold purposes, Mineral Waters, etc., to wit: Simple Sirup, (2) Lemon Sirup, Mulberry Sirup, Vanilla Sirap, Vanilla Cream Sirup, (2) Cream Sirup, Sirup, Sanger Sirup, Orange Sirup, (2) Chiese Sirup, Nectar Sirup, Sherhet Sirup, Grape Sirup, Banana Sirup, (2) Coffee Sirup, Sherhet Sirup, Grape Sirup, Banana Sirup, (2) Coffee Sirup, Waple Sirup, (2) Chocolate Sirup, Coffee Cream Sirup, Maple Sirup, (2) Chocolate Sirup, Coffee Cream Sirup, Capsicum Sirup, Cherry Sirup, Scaret Sirup, Sofferino Sirup, Capsicum Sirup, Cherry Sirup, Blackberry Sirup, Orgeat Sirup, Catawba Sirup, Milk Punch Sirup, Champagne Sirup, Sherry Cobbler Sirup, Excessior Sirup, Fancy Sirup, Currant Sirup, Frambolse Sirup, Maidenhair Sirup, Currant Sirup, Frambolse Sirup, Maidenhair Sirup, Currant Sirup, Champagnon Syrup, How to make Sirups Frothy.

Colograes for the Sick Room, by Geo. Leis. With recipes for the production of preparations that serve as pleasing perfumes, deodorizers, and cosmetic lotions. Supplement 77. Price 10 cents.



WILEY & RUSSELL M'F'G COMPANY, GREENFIELD. MASS. "LIGHTNING" (trade mark),







The Complete Apparatus with SINGLE LENS, \$12.00 " DOUBLE ACHRO-MATIC, \$15.00 ADDRESS
A. HERZOG, 108 Cliff Street, N. Y. Send for Book and Cir-cular, 10 cents.

\$777 A YEAR and expenses to agents. Outfit Free. Address P. O. VICKERY. Augusta, Maine.

Magic Lantern Catalogue, 150 pp, and Lecture, 10 Ote THE MAGICAL ORGANETTE, ONLY \$8.00.

Bouble size Beeds, extra strength and finish.
Circulars and beautiful Set Fancy Cards, 8 Cents.
THEO. J. HARBACH, 609 FILBERT ST., PHILA, PA.



Wanted Manufactured on royalty, a valuable patented two-horse Corn Planter. Box 1525, Terre Haute, Ind.

SPARE THE CROTON AND SAVE THE COST. Driven or Tube Wells

furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 235 Broadway, N.Y., who control the patent for Green's American Driven Well.



PLAYS! PLAYS! PLAYS! PLAYS!
For Reading Clubs, for Amateur Theatricals, Temperance Plays, Drawing Room Plays, Fairy Plays, Ethiopian Plays, Guide Books, Speakers, Pantomimes, Tableaux Lights, Magnesium Lights, Colored Fire, Burnt Cork, Theatrical Face Preparations, Jarleys Wax Works, Wigs, Beards, and Moustaches at reduced prices. Costumes, Scenery, Charades. New catalogues sent free containing full description and prices.

SAMUEL FRENCH & SON. 38 E. 14th Street, New York.



Messrs. Munn & Co., in connection with the publication of the Scientific American, continue to examine Improvements and to act as Solicitors of Patents for Inventors.

In this line of business they have had over thirty 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, Registration of Labels, 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 moderate

We send, free of charge, on application, a pamphlet containing further information about Patents, and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

Foreign Patents .- 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. American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee, in this country is worth equally as much in England and some other foreign countries. Five patents-embracing Canadian, English, German, French, and Belgian-will secure to an inventor the exclusive monopoly to his discovery among about ONE HUNDRED AND FIFTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The expense to apply for an English patent is \$75; German, \$100; French, \$100; Belgian, \$100; Canadian, \$50.

Copies of Parents.-Persons desiring any patent issued from 1836 to November 20, 1866, can be supplied with official copies at reasonable cost, the price depending upon the extent of drawings and length of specifications.

Any patent issued since November 20, 1866, at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office \$1.

A copy of the claims of any patent issued since 1836 wili be furnished for \$1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent.

A pamphlet, containing full directions for obtaining United States patents, sent free. A handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful handbook of reference for everybody. Price 25 cents, mailed free.

Address MUNN & CO.

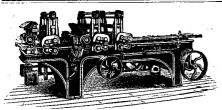
Publishers SCIENTIFIC AMERICAN, 37 Park Row, New York.

BRANCH OFFICE—Corner of it and 7th Streets, Washington, D. C.

THE PERFECTED STYLOGRAFIC.

The most convenient and economical outfit for writing. Pen, Pencil, and Inkstand in one. Can be ordered by mail, and exchanged or returned if not suited. For full description of various styles, send two cent stamp for illustrated circular.

READERS' AND WRITERS' ECONOMY CO., 25-33 Franklin Street, Boston; 4 Bond Street, New York; 38 Madison Street, Chicago,



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

\$72 A WEEK. \$12 a day at home easily made. Costly outfit free. Address TRUE & Co., Augusta, Me.

Johnson's Patent Universal Lathe Chuck,



MAHOGANY,

Rosewood, Satinwood, French and American Walnut, Ash, Red and Spanish Cedar, Cherry, Oak, Poplar, Maple, Holly, etc., in Logs, Planks, Boards, and Veneers. Sole manufacturers perfectly smooth and thoroughly seasoned.

CUT THIN LUMBER. Send for catalogue and price list.

GEO. W. READ & CO.,

186 to 200 Lewis St., foot 5th & 6th Sts., New York FOR



HEAVY PUNCHES, SHEARS, Boiler Shop Rolls, Radial Drills, Etc., SEND TO HILLES & JONES,

WILMINGTON, DEL. 50 Elegant Cards, 50 styles, with name, 10c. 40 Transparent, 10c. Stamps taken. PEARL CO., Brockport, N.Y.

AIR COMPRESSORS.

THE NORWALK IRON WORKS CO., SOUTH NORWALK, CONN.



TOOPE'S PAT. FELT AND ASBESTOS Non-Conducting, Removable Covering, as manufactured by Toope's Asbestos Covering Co., Limited, London, England. Awarded a Medal of Excellence at the late American Institute Fair. For Steam Boilers and Pipes, Steam Pans and Coppers, Hot and Cold Water Pipes, Refrigerators, Meat Cars, etc. Samples free. A few first-class agents wanted. Address Clis. TOOPE, Sole Manufacturing Agent in U.S. Office and Works, 353 East 78th Street, New York City.



SWEEPSTAKES, WITH THE ELLIS SWEEFSTAKES, WITH THE ELLIS
Patent Journal Box. The best Planer and Matcher ever
made. Planing 20 in. wide, 6 in. thick, weight 2,200 lbs.,
\$300; planing 24 in. wide, 6 in. thick, weight 2,600 lbs.,
\$350. Beading, Arbor, and Head, extra, \$20. Sash, Door,
and Blind Machinery a specialty. Send for descriptive
catalogue to Rowley & Hermance, Williamsport, Pa.



Pulley Blocks.

TOOPE'S PATENT FURNACE GRATE BAR. Best and cheapest in the world. CHS. TOOPE, Manufacturing Agent, 353 East 78th Street, New York.



MUSTACHE AND WHISKERS.

Pond's Tools,

DAVID W. POND, Worcester, Mass.

WESTON DYNAMO-ELECTRIC MACHINE CO

Machines for Electro-plating, Electric Light, etc. In addition to testimonials in our Catalogue of Jan. 1, we beg to refer to the following houses: Meridisk Britannia Co.; Riveskel & Erwin M. Fg Co.; Rich & Barton; Hall. Elion & Co.; Richardson, Boynton & Co.; WM. H. JACKSON & Co.; Stanley Works; Rogers Cuttery Co.; Chas. Rogers Bross. Ebward Miller Co.; Mitchell, Vance & Co.; Norwalk Lock Co.; Hayden, Grew & Co.; Domestic Stwing Machine Co.; Buyden, Grew & Co.; Domestic Co.; Mumford & Hanson; Faan & Son, and over 700 others. Outlits for Nickel, Silver, Bronze, Plating, etc. The two high est Contennal Awards, and the Chntennal Cold Medalof American Institute, and Paris, 1878. Prices, \$130 to \$500.

CONDIT, HANSON & VAN WINKLE Sole Agents NEWARK, N.J.

New York Office, 92 and 94 Liberty St. English Agency, 18 Caroline St., Birmingham, England

MECHANIC WANTED. A skilled mechanic, capable of constructing and operating a works for the manufacture of wrought iron pipe and tubing. Address DUNMOYLE, Lock Box 1459, Pittsburg, Pa.



1880 MODEL WORKING 1880 TOY ENGINES AND FIGURES. We send Engine, Figures, Pulleys, Belt, etc. all omplete as percut, and in working order, by mail or \$1.50. Our complete Catalogue, 192 pages, 700 lustrations, by mail, 10c. Catalogue No. 15, for 80-81, 376 illustrations, by mail, 5c.

PECK & SNY DER,

124 and 126 Nassau St., New York.

THE AMERICAN ELECTRIC COMPANY.

PROPRIETORS & MANUFACTURERS OF THE THOMSON—HOUSTON

SYSTEM OF ELECTRIC LIGHTING. OF THE ARC TYPE



DUC'S ELEVATOR BUCKET.

For use in Grain Elevators, Flour Mills, Sugar Refineries, and Mills of every kind. They are made of Charcoal Stamping Iron, extra strong and durable. Have no corners to catch. 300,000 in use. THOS. F. ROWLAND, Sole Manufacturer, Brooklyn, N. Y.

BLAKE'S CHALLENGE" ROCK BREAKER,



Patented November 18, 1879.

For Macadam Road making, Ballasting of Railroads, Crushing Ores, use of Iron Furnaces, etc. Rapidly superseding our older styles of Blake Crushro on account of its superior strength, efficiency, and simplicity. Adopted by important Railway and Mining Corporations, Cities, and Towns. First Class Medal of Superiority awarded by American Institute.

BLAKE CRUSHER CO., Sole Makers, New Haven, Conn.

NEW YORK BELTING AND PACKING COMP'Y. SOLID VULCANITE WHEELS EMERY

All other kinds Imitations and Inferior. Our name is stamped in full upon all our standard BELTING, PACKING, and HOSE. Address NEW YORK BELTING AND PACKING CO., Emery Wheel. JOHN H. CHEEVER, Treas.

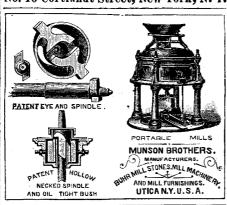
THE WALLACE DIAMOND CARBONS FOR ELECTRIC LIGHTS MAN'F'D. FOR THE ELECTRICAL SUPPLY CO., 109 LIBERTY STREET, NEW YORK.

ERICSSON'S NEW MOTOR. **ERICSSON'S**

New Caloric Pumping Engine FOR

DWELLINGS AND COUNTRY SEATS.
Simplest cheapest, and most economical pumping enging for domestic purposes. Any servant girl can operate Absolutely safe. Send for circulars and price lists.

DELAMATER IRON WORKS C. H. DELAMATER & CO., Proprietor No. 10 Cortlandt Street, New York, N. Y.



The BELMONTYLE OIL

Prevents Rust, Tarnish. etc., on Firearms, Machinery, Tools, Cutlery, Safes, Saws, Skates, Stoves Hardware, etc., without injury to the polish. In use over 10 years. Highest Testimonials. Samples 50 cents three for \$1.00, sent free of expressage. Send for circular BELMONTYILE OIL CO., SOLE MANUFACTURERS, 150 Front Street, New York.

NO FAILURE IN SIXTEEN YEARS HEALD & SISCO, CENTRIFUGAL PUMPS 100 TO 35.000 GALL'S PER MINUTE CAPACITY J-Ceald Sisco & Go, Bald winsville N.Y.

UNIVERSAL GRINDER.

These Grinders consist of a series of disks with beveled edges locked together on a shaft. They revolve towards each other at different rates of speed. They com bine strength and durability. No friction; hence no heat. They will grind all kinds of Grain, also Quartz Rocks, Ores, Gypsum, Brimstone. Shavings. Shells, Brick Clay, Cork, Rubber, Bone, Oil Cake, Flax Seed, Cotton Seed, and any number of articles in use by manufacturers and farmers. These Grinders are disposed of on reasonable terms. Send for Illustrated Catalogue with terms. NEWELL & CHAPIN, foot of West 19th Street, New York.



SEND FOR THE BEST BAND SAW BLADE

in the market to LONDON, BERRY & ORTON, Phila., Pa. \$66 a week in your own town. Terms and \$5 outfit free. Address H. HALLETT & Co., Portland, Me.



Bookwalter Engine. Compact, Substantial. Economical, and easily managed; guaranteed to work well and give full power claimed. Engine and Boiler complete, including Governor, Pump, etc., at the low price of

SURFACE FILE HOLDERS. By their use a crooked file may be utilized as well as a straight one, and both are made to do better execution in filing broad surfaces than has hitherto been possible.

No. 4 holds files 12 to 14 in. long. Price 75c. each. No. 5 " 14 to 16 in. " Price \$1.00 each. For sale by the trade generally. Manufactured only by the NICHOLSON FILE CO., Providence, R. I.



PONY PLANER will plane 6 inches thick, and as thin as ¼ inch, and in quantity from 8,000 to 18,000 feet in ten hours. We build four sizes, 16, 20, 24, and 30 inch, either with one or two roller feed; also, Eureka Band Saw, Upright Shaping and Variety Moulding Machines.

nines. r particulars, address FRANIA & CO., Bufialo, N. Y.

THE BIGGEST THING OUT. Illustrated book sent free. Address E. NASON & CO., 111 Nassau St., New York.

ORGANS \$30 to \$1,000; 2 to 32 Stops. Paper free. Address Daniel F. Beatty, Washington, N. J.

TELEPHONE Works 1 mile.
Price \$4. Pat'd.
Circulars free. HOLCOMB & Co., Mallet Creek, Ohio.



Special Machines for Car Work, and the latest improved Wood Working Machinery of all kinds.

JOHN R.WHITLEY & CO. European Representatives of American Houses, with First-class Agents in the principal industrial and agricultural centers and cities in Europe. London, 7 Poultry, E.C. Paris, 8 Piace Vendôme. Terms on application, J. R. W. & Co. purchase Paris goods on commission at shippers' discounts.



The George Place Machinery Agency
Nachinery of Every Description
121 Chambers and 108 Reads Streets, New York.

\$5 to \$20 per day at home. Samples worth \$5 free. Address STINSON & Co., Portland, Me.



ROOTS' NEW IRON BLOWER.





POSITIVE BLAST. IRON REVOLVERS, PERFECTLY BALANCED IS SIMPLER, AND HAS FEWER PARTS THAN ANY OTHER BLOWER.

P. H. & F. M. ROOTS, Manuf'rs, CONNERSVILLE, IND.

S. S. TOWNSEND, Gen. Agt., \ 6 Cortlandt St., \ 8 Dey Street, \ WM. COOKE, Selling Agt., 6 Cortlandt Street, \ 18 PEGGS 8 CO. CO. JAS. BEGGS & CO., Selling Agts., 8 Dey Street, SEND FOR PRICED CATALOGUE.

FIRE BRICK TILE AND CLAY RETORTS ALL SHAPES. BORGNER & O'BRIE 1 4

MACHINISTS' TOOLS. NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

Lathes, Planers, Drills, &c.
NEW HAVEN MANUFACTURING CO.,
New Haven, Conn.

50 All Gold, Chromo, and Lit'g Cards (No 2 alike). Name on, 10c. Clinton Bros., Clintonville, Conn.



SHEPARD'S CELEBRATED \$50 Screw Cutting Foot Lathe. Foot and Power Lathes, Drill Presses, Scrolls, Circular and Band Saws, Saw Attachments, Chucks, Mandrels, Twist Drills, Dogs, Calipers, etc. Send for catalogue of outits for amateurs or artisans.

H. L. SHEPARD & CO...
331, 333, 335: & 337 West Front Street,
Cincinnati, Ohio.

Wheeler's Patent Wood Filler

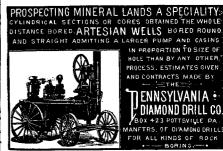
lls the pores of wood perfectly, so that a smooth finish obtained with one coat of varnish. Send for circular. is obtained with one care

Mention this paper.

BRIDGEPORT WOOD FINISHING CO.,

40 Bleecker Street, New York.

50 Landscape, Chromo Cards, etc., name on, 10c. 20 Gilt-Edge Cards, 10c. CLINTON & Co., North Haven, Ct.

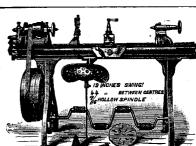


PERKINS'

High Pressure Engine and Boiler, Etc.

On returning to England. I have arranged with Mr. James L. Howard, of Hartford, Conn., to represent the interests of The Perkins' Engine Company, Limited, of London, in this country. All communications addressed to him on this subject will receive attention.

GEO. DEANE, Secretary, The Perkins' Engine Co., Limited.



BARNES' PATENT FOOT POWER MACHINERY. Complete outfits for actual Workshop business. Lathes, Saws, Formers, Mortisers, Tenoners, etc. Machines on Trial if desired. Mention this paper and send for Descriptive Catalogue and Frice List.

W. F. & JOHN BARNES, Rockford, Ill.

HUB MACHINFRY.—HUB TURNING, HUB MORTIS-ing, and Hub Boring Machines. Send for price list and circulars. DAVID JENKINS, Sheboygan, Wis.



50 Gold, Figured, and Actress Chromos, 10c. Agent's Sample Book, 25c. SEAVY BROS., Northford, Ct.

BIG PAY to sell our Rubber Printing Stamps. Samples free. Taylor Bros. & Co., Cleveland, O. FOR SALE-LARGE MACHINE SHOP, WITH Machinery, Tools, Engine, etc., ready for running. Inquire of A. MONNETT & CO., Bucyrus, Ohio.





THE NEW OTTO SILENT GAS ENGINE. Useful for all work of small stationary steam engine. Built in sizes of 2, 4, and 7 H. P. by SCH LEICHER, SCH U.M & CO., 3045 Chestnut Street, Phila., Pa. H. S. Manning & Co., 111 Liberty St., N. Y., Agents.







Advertisements.

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

Enravings may head advertisements at the same rate per tree, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

SOLID EMERY WHEELS.

We have 290 Solid Emery Wheels, varying in diameter from 6 to 16 inches, which we will sell at one-half the usual price. We are using them in our own factory, and find them the best wheels that we have ever tried, and we so warrant them to all purchasers. They have Babbitt metal centers, so as to be easily fitted to any size shaft. We shall have no more to sell. Those who order first can probably get what they want. At any rate, we will answer and give the exact price.

> MILLERS FALLS CO., 74 Chambers St., New York.

ECONOMY CLUB FURNISHES Periodicals and Books at club rates. Send for Catalogue Tribune Building, New York. C. C. WHI'INEY.

COVERING

For Steam Pipes, Boilers, and Water Pipes Applied, Removed, and Replaced without injury by any one. No dust-no cirt. Send for circular. J. A. LOCKE & SON, 40 Cortlandt Street, N. Y.

UPRIGHT DRILLS SEND FOR .BICKFORD Cincinnalia.

THE NEWSPAPER

ABLE, NEWSY, GOOD and CHEAP.

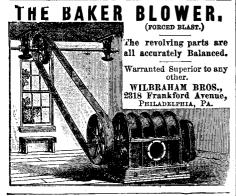
WEEKLY COURIER-JOURNAL.

The publishers of the COURIER-JOURNAL (Hon. Henry Watterson, editor) claim that as a reliable and valuable newspaper it has no superior in this country or in the world. It is able, bright and newsy, contains the strongest editorials, the most complete summary of the news of the world, the best correspondence, full turf and stock reports, market reports, fashion reports, sermons, splendid original stories and novelettes, poetry, department for children, answers to correspondents, etc., etc.; in a word, everything to make it a delight to the family drele, and invaluable to the man of business, the farmer, the mechanic, and the laborer.

Rare inducements in the way of cash commissions and valuable premiums are offered agents, postmasters, and club-raisers who send subscriptions to the Weekely. Countrals of the day, a handsome book, or some other valuable premium for a very small amount of money. Our list of premiums to all subscribers who send us Two Dollars will be found to be worthy of especial attention. Specinen copies and full descriptive circular sent free on application.

Subscription terms, postage free, are—for Daily. \$12; Sunday, \$2; Weekly, with premium, \$2; without premium, \$1.50.

Any one sending four yearly subscribers and six dollars will be entitled to an extra copy of the Weekly Courier-Journal one year, free to any address. Address W. N. HALDEMAN, President Courier-Journal Co., Louisville,



SAFETY HOISTING Machinery OTIS BROS. & CO., No. 348 Broadway, New York.

NEW YORK BELTING AND PACKING THE BEST IS THE CHEAPEST. 1 lowest cost.

37 & 38 PARK ROW, NEW YORK.

ROCK DRILLS COMPRESSORS, FUSE, BATTERIES, POWDER.

Mill Stones and Corn Mills

We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing specially adapted to Flour Mills. Send for

J. T. NOYE & SONS, Buffalo, N. Y.

THE MANUFACTURER AND BUILDER,

EDITED BY DR. WM. H. WAHL,

18
THE BEST AND CHEAPEST MICHANICAL AND SCIENTIFIC JOURNAL PUBLISHED. A PRACTICAL PUBLICACATION FOR PRACTICAL MEN. ENTERS JANUARY, 1881,
UPON ITS 18TH YEAR. PUBLISHED MONTHLY.
Subscription price, \$2 per year; \$1 for 6 months. Send
for specimen copy. Address
H.N. BLACK, Publisher, 37 Park Row, New York.

EMERY WHEELS and GRINDING MACHINES.



THE TANITE CO.,

Stroudsburg, Monroe County, Pa. Orders may be directed to us at any of the following addresses, at each of

New York, 14 Dey Street.
Chicago, 152 and 154 Lake St.
St. Louis, 299 North Third St.
St. Louis, 311 to 319 North Second St.
Cincinnati, 212 West Second St.
Louisville, 427 West Main St.
Indianapolis, Corner Maryland and
Delaware Sts.
New Orleans, 28 Union St.

San Francisco, 2 and 4 California St.
Philadelphia, 11 North Sixth Street.
Boston, 21 Doane St.
Portland, Oregon, 43 Front St.
Louisville, 427 West Main St.
Holborn Vladuct, E. C.
Liverpool, Eng., 42 The Temple,
Dale St.
Sydney, N. S. W., 11 Pitt St.

CAMERON STEAM PUMP, DESIGNED FOR USE IN

GOLD, SILVER, COAL, AND IRON MINES,

ALSO FOR GENERAL MANUFACTURING AND FIRE PUMPS.

Pumps furnished with Movable Linings in Iron, Composition, or Phosphor-Bronze Address THE A.S. CAMERON STEAM PUMP WORKS, FOOT EAST 23d STREET, NEW YORK CITY.

vill save over Fifty per cent. in Fuel with greater duty the any other Steam Pump in the market; also. more Simple, Durable, and Compact. Specially adapted to Mining, Railroads, Steamboats, Paper Mills, Chemical and Gas Works, Tanneries, Breweries, Sugar Refineries, and other Manufactures. For Draining Quarries, Cellars, Plantations, and various other purposes. For Contractors' use it has NO EQUAL.

Send for book giving full description, reduced prices, and many letters of umendation from leading manufacturers and others throughout the country who

PULSOMETER STEAM PUMP CO.,

Office, No. 83 John St., New York City.

HARTFORD STEAM BOILER

Inspection & Insurance COMPANY.

W.B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.



WANTED—A POSITION IN THE OFFICE of some reliable manufacturing concern, by a well edu-cated, practical machinist, the owner of valuable real estate. Can furnish first-class references as to character and ability. Address JAMES LONG, care Carrier No. 34, Cincinnati, O.



Address

The Bloycle has proved itself to be a permanent, practical road vehicle, and the number in daily use is rapidly increasing. Professional and business men, seekers atter health or pleasure, all join in bearing witness to its merits. Send 3 cent stamp for catalogue with price list and full information.

THE POPE NIT'C CO.,

89 Summer Street, Boston, Mass.

** A G E N T S \$5,000.00

BY SECURING MANUFACTURERS' CABINET.

By employing Agents for 500 Manufacturers. By manufacturing rapid selling articles. By getting, through means of the Cabinet, the best agencies in the world.

J. B. CHAPMAN, 72 WEST ST., MADISON, IND.

Patent "AIR SPACE" Method.

ASBESTOS MATERIALS,

Made from pure Italian Asbestos in fiber, mill board, and round packing. THE CHALMERS—PENCE CO., 40 John Street, and Foot of E. 2th Street, New York.

TATAL AVALA

LIQUID PAINTS, ROOFING, Boiler Coverings, Steam Packing, eathing, Fire Proof Coatings, &c. Steam Pipe & Mill Board, Sh H. W. JOHNS M'F'C CO. 87 MAIDEN LANE, N. Y.

Superior Wood Working Machinery, principally for Cabinet, Piano, and Piano Action Makers. Shafting, Pulleys, and Hangers. P. Pryibil, 461 to 467 W. 40th St., New York.

TELEPHONE and Electrical Supplies.
C. E. JONES & BRO., CINCINNATI, O.





PREVENT SLIPPING. The handsomest, as well as the safest CarriageStepmade. Forgedfrom best iron, and formed with a sunken panel, in which is secured a plating of richly moulded rubber. Durability warranted. Send for illustrated circular. ranted. Send for illustrated circular. Rubber Step M'f'g Co., Boston, Mass.

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil stills, etc. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

WM. A. HARRIS,
PROVIDENCE, R. I. (PARK STREET),
Six minutes walk West from station.
Original and Only builder of the HARRIS-CORLISS ENGINE With Harris' Patented Improvements, from 10 to 1,000 H. P.

Pictet Artificial Ice Co., Limited, P. O. Box 3083. 142 Greenwich St., New York. Guaranteed to be the most efficient and economical of all existing Ice and Cold Air Machines.



STEREOPTICON. — DOUBLE OXY-HYarogen dissolving view Lanterns, for public or private exhibitions, with accessories, in perfect order. Cost \$250. Price \$110. J. E. S., P. O. Box 2052, Philadelphia, Pa.

The Oldest NANKEE NOTION HOUSE In the World. HOWARD BROTHERS & READ, Successors to Howard, Sanger & Co., THE HOWARD MANUFACTURING CO., MANUFACTURE AND INTRODUCE

PATENTED NOVELTIES.



Can be carried in the Vest Pocket. Each one warranted abso lutely accurate.

Weighs up to 8 lbs. PRICE 25 CENTS

Sample by mail on receipt of price. A liberal discount to the trade.

No.1-"Post Office," weighs to 8 ozs.

" 2—"Pocket," weighs to 8 lbs.

Howard Manufacturing Co., Box 2295, New York.

THE

New York Ice Machine Company,

21 Courtland St., New York, Rooms 54, 55.

LOW PRESSURE BINARY ABSORPTION SYSTEM. Machines Making

ICE AND COLD AIR.

Low Pressure when running. No pressure at rest. Machines guaranteed by C. H. Delamater & Co.

Our new Stylographie Pen (just patented), having the luplex interchangeable point section, is the very latest improvement. THE STYLOGRAPHIC PEN CO., Room 13, 169 Broadway, New York. Send for circular.

TONE.

TOUCH,

WORKMANSHIP, & DURABILITY.

WAREROOMS: { 112 Fifth Avenue. New York. 204 & 206 W. Baltimore St., Baltimore.

ADJUSTABLE INCLINE PRESSES.
STILES & PARKER PRESS CO., Middletown, Conn.



The Asbestos Packing Co.,

Miners and Manufacturers of Asbestos, BOSTON, MASS.,

OFFER FOR SALE:
PATENTED ASSESTOS ROPE PACKING,

LOOSE "
JOURNAL " 66

WICK "
MILL BOARD,
SHEATHING PAPER, FLOORING FELT.



Scientific American

The Most Popular Scientific Paper in the World. VOLUME XLIV. NEW SERIES.

COMMENCES JAN. 1st. Only \$3.20 a Year, including postage. Weekly.

52 Numbers a Year. This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages or useful information, and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechan cs, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Archiecture, Agriculture, Horticulture, Natural History, etc.

All Classes of Readers find in The Scientific American a popular resume of the best scient fic information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms. To every intelligent mind, this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

Terms of Subscription.—One copy of The Scientific American will be sent for one year-52 numbers—postage prepaid, to any subscriber in the United States or Canada, on receipt of three dollars and twenty cents by the months, \$1.00. the publishers; six months, \$1.60; thres

Clubs.-One extra copy of The Scientific Ameri-CAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate.

One copy of THE SCIENTIFIC AMERICAN and one copy of THE SCIENTIFIC AMERICAN SUPPLEMENT will be sent for one year, postage prepaid, to any subscriber in the United States or Canada, on receipt of seven dollars by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes and make all orders, drafts, etc., payable to

MUNN & CO., 37 Park Row, New York.

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 subscriberz 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, 1 year; \$0, gold, for both Scientific American and Supplement for 1 year. This includes postage, which we pay. Remit by postal order or draft to order of Munn & Co., 37 Park Row, New York.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Philadelphia, and 50 Gold St. New York.