

dissolving, in distilled water, equal weights of sulphocyanide of ammonium and bisulphite of ammonia. When this is added to a liquid containing copper, it immediately precipitates white sub-sulphocyanide of copper, as an insoluble powder readily washed; while scarcely any other metal is affected by it. It appears to us that this combination of a sulphocyanide with a sulphite is capable of application in photography and ought to be tried. Its value in separating copper from other metals appears to be well ascertained.

GASES ABSORBED BY COAL.

Ernst von Meyer finds that the gases absorbed by coal are chiefly the following: Carbonic acid, marsh gas, nitrogen, oxygen, and hydrocarbons. He publishes a table with the interesting statement that more nitrogen is retained by coal than any other gas. If it be true that anthracite coal absorbs more nitrogen than oxygen, we have the germ of an important application, as this method could be employed to effect the separation of the nitrogen from the oxygen in the atmosphere, and lead to a cheap way of making oxygen. It may be worth while for some one to repeat the experiments with a view to attaining this desirable result. We give below the table of gases found by Meyer inclosed in coal:

Carbonic acid.....	16.9.....	22.4
Marsh gas.....	20.4.....	22.3
Nitrogen.....	53.3.....	48.0
Oxygen.....	1.7.....	4.1
Heavy hydrocarbons.....	7.7.....	3.2
	100.0	100.0

[Special Correspondence of the Scientific American.

HOLLY'S SYSTEM OF FIRE PROTECTION AND WATER SUPPLY.

WASHINGTON, D. C., Nov. 11, 1871.

The most severe conflagration that ever occurred in New York city was that of 1835, and \$20,000,000 of property were destroyed. The late fire in Chicago destroyed, it is estimated, \$200,000,000. Lake Michigan and Chicago river encircled the city, but were as impotent to save it as were the exhausted firemen and broken engines. They only environed the awful scene or steamed under the falling cinders.

The property of the Chicago Fire Department cost about \$700,000, of which sum the fire engines and auxiliary apparatus cost about one half. The annual cost of maintaining the department was nearly \$500,000. The water works were admirable of their kind, and cost considerably over \$3,000,000. They embraced the famous tunnel extending far out into the lake, and a large and handsome building within which powerful machinery lifts the abundant waters to the top of a stand pipe 136 feet high. The gravitating pressure of this column of water was relied upon as the power for supplying the ordinary demands of the city through more than 200 miles of street mains, and also to furnish, in case of fire, twenty steam fire engines through a thousand hydrants. Was this the best system of fire suppression Chicago could have had? Might she not have been spared this terrible affliction? Cannot water be concentrated on a burning building so promptly, and in such measure, as to insure the rapid extinguishment of the devouring element, even under the adverse circumstances of high wind and severe cold? These are questions now very anxiously asked.

On a recent visit at Saratoga, I took occasion to examine the new water works of that place, and found the apparatus and general arrangement to be the same as was introduced into Lockport, N. Y., in 1863, Auburn in 1865, and still more recently into thirty cities in ten different states: Buffalo, Binghamton, Dayton, Covington, Minneapolis, Cumberland, Atlanta, etc.

The reservoir at Saratoga is about a mile from the village, and is formed by damming a small but abundant stream; and I learned, to my surprise, that it is several feet below the average level of the main streets. Just below the outlet of the reservoir, and situated on a still lower plane, is the well built and tasteful structure containing the machinery; and a glance at its nature, large proportions, and superior workmanship is sufficient to answer some of the questions of an interested visitor. The whole is known as "Holly's System of Fire Protection and Water Supply," and consists of a series of powerful rotary forcing pumps, worked by turbine wheels below, driven by water from the reservoir, or by a massive steam engine, according as circumstances require. In this case the water power is sufficient during more than half the year. The simplicity of the system is apparent to any observer, and experience has shown its economy and efficiency.

Its leading feature consists in this, that, independently of what is called a "gravitation supply," whether from an elevated reservoir, or a stand pipe constantly filled from a source on a lower plane, the mains of a city can be supplied with water in exact proportion to the demand; and in case of a conflagration, a power of propulsion can be given far exceeding in steadiness and degree that attained by any other means. By combining, with pumps so admirably constructed and arranged, a hydrostatic pressure regulator, the whole is placed under such perfect control that in twenty seconds the pressure can be increased from the ordinary measure, say sixty pounds to the square inch, to double that amount, or even triple, if required.

A telegraph line connects the works with the headquarters of the fire department in the town; but aside from this communication, a most delicate and automatic one exists in the apparatus itself, for the opening of a single hydrant in the most remote street is instantaneously indicated by the regulator, causing, at the same time, a bell to ring for the information of the engineer. Just after the works were completed in July last, a fire broke out in a hotel situated between the Union and the Clarendon, seriously threatening both;

and about the same time another fire started, several blocks distant, among very combustible buildings and material. The village itself was in great danger, and, when both fires were speedily brought under control, the citizens were of the opinion that the works had, on that one occasion, saved the entire cost, and that the three steam fire engines heretofore depended on could not have been equal to such an emergency.

The following are the more evident advantages of the Holly system:

1. Dispensing with all locomotive fire engines.
2. A gravitation supply not needed, nor even an artificial reservoir, where a lake or river is at hand. At Binghamton the water is drawn directly from the Susquehanna, and at Cumberland, Md., from the Potomac.
3. The water is applied to a fire much more speedily than in any other way, or as soon as a hose can be attached to a hydrant.
4. The water is thrown more rapidly, and from one fourth to one third greater distance than by a steam fire engine; and the stream is steady and not exposed to irregularities and failures from the effect of extreme cold or defective machines.
5. Every building can have within it an effective extinguisher, and every private hydrant and water cock becomes a fire engine, effective in proportion to its size.
6. The propulsion is so great that long hose can be used, even half a mile, with entire success.
7. The great reduction of insurance rates—twenty-five and even fifty per cent in some cases.

Mr. Holly has devoted himself for years to devising improvements in the construction of pumps and their application to fire prevention. The records of the Patent Office show at least ten patents issued to him, one as early as 1849. Wherever adopted, the system has proved valuable and effective.

Replaceable Pivots for Watches.

When, heretofore, watch pivots have broken from their stems or spikes, it has been customary to bore into the remaining end of the spindle and insert a new pivot into the socket thus prepared. The boring of the very small spindles is a matter of difficulty, requiring delicate handling. It often happens that the spindles or axles break out while being bored, or that the boring tools break off during the operation and remain in the spindles, thus making the latter useless. When this occurs, it is necessary first to soften the spindles for boring, and then reharden them, thus adding still more to the cost and difficulty of repair.

The invention of Mr. Simon B. Simon, of New York, consists in the production of repair pivots, having tubular sockets, so that they may be slipped upon the ends of the spindles or stems when required, thus dispensing with the necessity of boring the spindles.

Electric Pyrometer.

A most ingenious and valuable application of the known fact that the resistance of metals, to the galvanic current, increases directly as the temperature, has lately been devised in Germany. The resistance of a platinum wire having been determined, a cylinder of clay is surrounded with such wire, and covered with a tube of the same earth. The coil is connected with a two cell Daniell's battery, and also with an indicator for the determination of the resistance, and subjected to the heat of which a test is required. Such an instrument would be valuable in temperatures at which mercury would evaporate and glass melt.

HOW TO ACQUIRE A GOOD MEMORY.—We read too much and think about what we read too little; the consequence is that most of the people we meet know something, in a superficial way, about almost everything. Not a tenth part of what is read is remembered for a month after the book or newspaper is laid aside. Daniel Webster, who had a rich store of information on almost every subject of general interest, said that it had been his habit for years to reflect for a short time on whatever he read, and so fix the thoughts and ideas worth remembering in his mind. Any one who does this will be surprised to find how retentive his memory will become, or how long after reading an interesting article, the best portions of it will remain with him.

As daylight can be seen through very small holes, so little things will illustrate a person's character.

Inventions Patented in England by Americans.

- From October 19 to October 30, 1871, inclusive.
 [Compiled from the Commissioners of Patents' Journal.]
 ANIMAL TRAP.—W. H. Chase (of New York city), London, England.
 HARVESTER.—W. F. Goodwin, Metuchen, N. J.
 ORDNANCE.—N. Thompson, Brooklyn, N. Y.
 PAPER BOX MACHINERY.—H. R. Heyl, Philadelphia, Pa.
 PHOTOGRAPHIC PICTURES.—F. A. Wenderoth, Philadelphia, Pa.
 PISTON, ETC.—S. L. Wiegand, Philadelphia, Pa.
 PRESERVING WOOD.—N. H. Thomas, New Orleans, La.
 ROVING FRAME.—E. P. Morgan, J. H. McMullen, York, Me.
 SEWING MACHINE.—D. Mills (of Brooklyn, N. Y.), Aston, England.
 STEAM PACKING.—G. M. Cruickshank, W. R. Smith, Providence, R. I.
 TRANSMITTING POWER.—W. F. Goodwin, Metuchen, N. J.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished free.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Lubricating Oils of Chard & Howe, 134 Maiden Lane, neither gum nor chill.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, \$1 00 a year. Advertisements 17c. a line.

Vertical Engines—Simple, Durable, Compact. Excel in economy of fuel and repair. All sizes made by the Greenleaf Machine Works Indianapolis, Ind. Send for cuts and price list.

Metallic Molding Letters, for Pattern Makers to put on patterns of Castings, all sizes, etc. H. W. Knight, Seneca Falls, N. Y.

Wanted—A competent man to take charge of a Screw Department as Foreman. A good steady man can have constant employment. Address Bles Sewing Machine Co., 89 John St., Brooklyn, N. Y.

The Pew Hat Rack. State and County Rights. E. S. Blake, Pittsburgh, Pa.

The best wood filler in use, 25 cents per lb. Made, used, and sent (in packages of not less than 16 lbs.) all over the country, C. O. D., by L. W. Jones, Unionville, Conn.

The best and cheapest Self Oilers are manufactured by Holland & Cody, 8 Gold Street, New York. Send for price list.

Hafner's Patent Eureka Coil Spring for Mill Spindles, is the only Spring constructed on scientific and the rotary principle. Mill-furnishers, millwrights, and millers, send for circulars and satisfy yourselves. Sample spring sent on trial to reliable parties. John A. Hafner, Santa Fe, Ill.

Land sufficient for the purposes of any good manufacturing business, and most admirably located on the Poughkeepsie & Eastern R. R., with plenty of water for steam purposes at hand, and only fifteen minutes' walk from the center of the city, will be given to any parties who meet the views of the owner. Address P. O. Box 534, Poughkeepsie, N. Y.

Tested Machinery Oils—Kelley's Patent Sperm Oil, \$1 gallon; Engine Oil, 75 cts.; Filtered Rock Lubricating Oil, 75 cts. Send for certificates. 116 Maiden Lane, N. Y.

Use Soluble Glass for fireproofing Wooden Pavements, Shanties, R. R. Bridges—also as common hardening Mortar and Cements, makes most durable Stove and Foundry Putty, Iron Cement. Apply to L. & J. W. Feuchtwanger, Chemists, 55 Cedar street, New York.

Francis Schleicher, Consulting, Analytical and Manufacturing Chemist. Laboratory, Newark St., between Jackson and Harrison St. P. O. Box 172, Hoboken, N. J.

One "Scott's Wheel Moulding Machine," saves \$5,000 yearly in patterns—wheels absolutely perfect. Engraving sent free. Hamilton E. Towle, 176 Broadway, New York.

Portable Farm Engines, new and beautiful design, mounted on Springs. Compact, light, and efficient. Send for descriptive circular, Mansfield Machine Works, Mansfield, Ohio.

For the best 15 inch Eng. Lathes, Bench Lathes, or Friction Pulleys, address John R. Abbe, P. O. Box. 345, Providence, R. I.

Kelley's Chemical Metallic Paints, \$1, \$1.50, \$2 per gallon mixed ready for use. Send for cards of colors, &c., 116 Maiden Lane, N. Y.

I want the address of every cabinet maker and every painter in the world. J. Henry Symonds, P. O. Box 57, Boston, Mass.

Stencil Tools & Steel Letters. J. C. Hilton, 66 W. Lake st. Chicago.

To Boiler Makers—Water Gauges sold cheaper by us than any other House in the Country. Holland & Cody, No. 8 Gold st., N. Y.

Baxter's Adjustable Wrenches fit peculiar corners where no other will work. All first class mechanics need one. Baxter Wrench Co., 18 Park Place, New York.

Taft's Portable Hot Air Vapor and Shower Bathing Apparatus. Address Portable Bath Co., Sag Harbor, N. Y. Send for Circular.

Shoe Peg Machinery. Address A. Gauntt, Chagrin Fall, Ohio.

We will remove and prevent Scale in any Steam Boiler, or make no charge. Geo. W. Lord, 107 Girard ave., Philadelphia, Pa.

Builder's Scaffold—Patent for Sale—For further particulars, address Redick & Kunkle, Butler, O.

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

Walrus Leather, for Polishing Steel, Brass, and Plated Ware. Greene, Tweed & Co., 18 Park Place, New York.

Kelley's Pat. Petroleum Linseed Oil, 50c. gal., 116 Maiden Lane

Turkey Boxwood pieces for Sale, suitable for engravers and fancy turners' use. Address Stephens & Co., Riverton, Conn.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours F. Sage, Cromwell, Conn.

Best Oak Tanned Leather and Vulcanized Rubber Belting. Greene, Tweed & Co., 18 Park Place, New York.

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 oates an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

Brown's Coal-yard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro., 414 Water st., N. Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada Europe, etc. Catalogue free. N. R. Baldwin, Laconia, N. H.

Blake's Belt Studs. The cheapest and best fastening for Rubber and Leather Belting. Greene, Tweed & Co., 18 Park Place, N. Y.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

15 horse power Engine and Boiler, complete, for sale cheap. R. H. Norris, near West Street Bridge, Paterson, N. J.

To Ascertain where there will be a demand for new Machinery, mechanics, or manufacturers' supplies, see Manufacturing News of United States in Boston Commercial Bulletin. Terms \$4.00 a year

Examples for the Ladies.

A. Cady, of Cambridge, Mass., has used her Wheeler & Wilson Machine constantly in all kinds of dress-making, since the spring of 1858, without repairs, and it is now as good as new.

Burnett's Cocaine for the hair takes precedence all over the United States.

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at 100 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

D. F. C., of N. J.—There have been no less than eleven patents taken on nickel plating.

J. M., of —.—Inquire of your bookseller, or write to Baird, Philadelphia, for Box's "Practical Hydraulics." It contains all necessary tables and formulæ for the solution of most practical problems in hydraulics.

W. W. M., of —.—Your query is not sufficiently intelligible.

E. C. B., of Wis.—To increase the capacity of an engine, beyond the capacity of the boiler, gives rise to loss through increased radiation and friction, owing to increased surface and weight of parts.

A. B. B., of Thames, N. Z.—We have no information relative to the use of rubber springs, for storing power, for the propulsion of street cars, etc., that we have not already published.

G. S. A., of Ind.—A fly wheel is an accumulator and distributor of power and a regulator of expenditure, not a creator, of power.

E. K. J., of Mich.—The only way to positively determine the initial pressure in the cylinder of your engine is to use the steam engine indicator. It is useless for us to guess at it for you, with only one element of information, namely, distance of cylinder from boiler.

J. W. G., of —.—To restore horseshoe magnets that have lost their power from disuse, proceed as with new ones. Place the poles of the magnet to be charged, against the poles of another, making opposite poles meet. Then draw a piece of soft iron, placed at right angles upon the magnet to be charged, from the poles to the bend. Do this a number of times on each side of the magnet. If the magnet is of good steel, this produces a maximum power. It is the method of Jacobi, and is considered one of the best.

W. G., of Pa.—We do not think tannate of soda is an article of general commerce as yet, though if it is as effectual in sealing boilers as stated by a former correspondent, it must inevitably become in great demand. It may be formed by slowly adding a solution of tannin to a solution of caustic soda.

A. P., of Cal.—Ewbank puts his steam current outside of the vacuum nozzle, which requires steam in large quantity to get the exhaust. Professor Draper puts the steam nozzle inside of the vacuum tube, which requires far less steam.

DAMAGED MIRROR.—Pour upon a sheet of tinfoil about three drams of quicksilver to the square foot of foil. Rub smartly with a piece of buckskin until the foil becomes brilliant. Lay the glass upon a flat table, face downwards; place the foil upon the damaged portion of the glass; lay a sheet of paper over the foil, and place upon it a block of wood or a piece of marble with a perfectly flat surface; place upon it sufficient weight to press it down tight; let it remain in this position a few hours. The foil will adhere to the glass.—C. T., of Vt.

H. B., of Pa., writes, in regard to an answer on hydraulic and steam pressure, Vol. XXV., page 281, that they are equal in effect on boilers. "I have always thought from what I have seen in testing boilers that water had greater effect than steam; as I have seen them leak under test, and have steam to same number of pounds, and no perceptible leak. I supposed it was because water was denser and the boiler was tight from not having the iron warm. I have two more subjects which have caused me some thought: Is not the bottom of the boiler more strained than the top, in proportion of the weight of water over steam?" To the first we reply that the effects described as occurring with boilers under water pressure do not indicate greater strain, and are accounted for by our correspondent correctly. To the second query we answer in the affirmative. The third query is not intelligible.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—**TINNING SHEET IRON.**—I wish to know how tinning upon sheet iron is done, and how much it costs per pound.—G. H.

2.—**WATER WHEEL POWER.**—Will you please inform me how large a pipe it will require to supply a 20 feet overshot water wheel with sufficient water to run one run of three feet six inches and one run of two feet six inches burrs, with bolt, smutter, and two elevators. I can run the whole thing now with forty pound's steam, (boiler 18 feet by 3 feet 6 inches; engine 10 by 18 inches.)—W. G. D.

3.—**BALLOONS.**—What is the lightest and toughest material or small balloons?—J. H. B.

4.—**INCORUSTATION IN BOILERS.**—I noticed in a recent number of your paper that the tannate of soda has been successfully used to prevent incrustation in boilers. Please inform me how much is required for a locomotive boiler 18 feet long, 40 inches diameter, with 120 two inch flues and how often it should be used.—J. H. W.

5.—**SPRING IN SHAFTING.**—Will shafting that has been heated and bent, and afterwards straightened and turned up, be likely to spring at the place where it was bent?—J. M. G.

6.—**WORMS IN HICKORY.**—I am engaged in a business in which a good deal of green hickory wood is used, and would feel obliged if any one can tell me of a simple preventive of worms, which often render it useless.—S. F.

7.—**CUTTING BEVELS.**—Can any of your readers give me a rule for cutting miter corners on beveled work? I am working in a wagon shop, and often want to cut a miter corner on a seat or body, where the corners are square, but the sides and ends, or some of them, are beveled. I have to go by the old cut and try rule, and a rule for cutting them would be of great service to me.—C. H. S.

8.—**FACING FOR SAND MOLDS.**—What can I use to dust over the surface or green sand molds to prevent the sand from burning, so as to produce clean bright castings? Should I use a flux in the process of melting?—W. Z. M.

9.—**CEMENT FOR LEATHER.**—How can I make a cement or glue, for joining leather, that shall be waterproof, strong, and not expensive?—G.

10.—**PULVERIZATION OF GELATINE.**—Can any of your readers tell me how to pulverize French gelatine to the fineness of flour?—H. M. C.

11.—**PAINT FOR OUTSIDE WORK.**—Will some of your correspondents give a recipe for an economical and durable wash or paint for outside work? Neutral color desired.—C. H. M.

12.—**PRESSURE ON SLIDE VALVES.**—In a steam engine, with flat slide valve, what proportion of the steam pressure, unbalanced and tending to produce friction, is there on the solid ends of the valve when sliding on the seat and not over the ports? How much is the pressure on the back counterbalanced by the steam between the valve face and the seat, without regard to ports or openings? What proportion of the weight of a steam engine, with flat slide valve, including steam pressure on its back, is required to move it, weight being applied direct?—F. A.

13.—**PROPORTION OF KEY WAYS.**—Please inform me if there is any rule laid down for the different sizes of key ways in shafts and wheels; and, if so, where I can procure it.—T. H. B.

14.—**SPEED OF STEAM ENGINE.**—Suppose that a steam engine has a cylinder 12x18 inches, with ports 1x10 inches, and is making 120 revolutions per minute, being very heavily loaded. Would it be better to give the engine more speed and enlarge the pulley driven by the engine, running the machinery as before? Would there be as much strain on the engine, and would there be much more friction on the slides, wristpin, and main journals, the work done by the engine being the same in both cases? The boiler that furnishes this engine with steam is a locomotive boiler with 357 square feet of heating surface.—E. F.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

ARE ALL PLANETS INHABITED?—C. M.

CHEMICAL FIRE ENGINE.—H.

PSYCHIC FORCE.—C. E. S.—J. S.—H. G.

WOOLEN MANUFACTURE.—S. S.

ANSWERS TO CORRESPONDENTS.—R. F. H.—S. C.—S. P.—

T. A. R.—T. W.—W. G. E. H.

QUERIES.—E. N. S.—H. M.—J. W.—P. B.—R. F. H.—W.—W. W. M.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SCREWING BOLTS INTO BOILERS.—Allan Talbot, Richmond, Va.—The object in this case is to prevent leakage of water or steam from boilers by reason of the rusting of the plate bolts or from their becoming loose in consequence of strains put upon them in various ways. The desired end is attained by means of bushings or thimbles which have solid bottoms and are inserted in the bolt holes to receive the bolts.

PROCESS OF WELDING COPPER.—Christian L. Schurr and William G. Rehbein, Baltimore, Md.—This invention relates to a process whereby copper may be welded so as to produce as perfect a union between the surfaces in contact as can be produced in iron, a thing which has heretofore been deemed impossible.

ORE CRUSHING MACHINE.—Samuel Hughes, Charleston, S. C.—This invention relates to a metal shell lined with crushing ribs, and combined with an inclosed cone bearing similar crushing ribs on its exterior, the object of the machine being to reduce phosphatic rock to a size suitable for a thorough washing of the same.

ANIMAL TRAP.—Oscar S. Eiving, Rome, Tenn.—This invention relates to a trap in which the animal entering steps upon a hinged floor that yields beneath it, which yielding, by means of intermediate mechanism, springs the trap; or, if the floor does not yield, the same result is accomplished by the pulling of the animal on the bait, the trap being provided with teeth which impale the animal, and also cast it out of the trap, so as to leave it in readiness for another.

STEAM GENERATOR.—William Byers, Philadelphia, Pa.—This invention relates to boilers made in separate compartments with fire spaces between them, and it consists in such compartments when constructed with bulged or swelled surfaces between the transverse retaining bolts.

HARVESTER.—John S. Truxell, Greenburgh, Pa.—This invention consists in an arrangement which enables the draft of the team upon a harvester to be regulated in such a manner as to counteract the resistance, offered to the sickle bar by the crop, whether the same be little or much.

DESK AND CHAIR COMBINED.—Archibald A. Porter, of Griffin, Ga.—This is an improved school desk or office chair, provided with a desk or writing board, so constructed that the said desk or writing board may be conveniently turned back out of the way.

BLASTING PLUG.—Julius H. Holsey, of Butler, Ga.—This is a new implement, to be inserted, previous to blasting, in the holes drilled into wood or rock, and is to receive the explosive charge, with the object of insuring greater safety in the preparation of the charge and more perfect results of blasting, without danger to the attendants. The invention consists in the use of a hollow pin, of wood, metal, or other material, made in two sections, to receive the charge and control its force.

BELL PIANO.—Carl G. G. Buttkeleit, of Toledo, Iowa.—This invention consists in actuating bell hammers for musical instruments. To effect the desired result a combination of keys, dampers, toggles, and springs is employed, the details not being susceptible of verbal description, but involving only well tested and efficient elements of mechanism.

SELF HEATING SADDLE IRON.—Joseph Melzer, of Munchen, Bavaria.—This is a self heating saddle iron, so constructed that it will consume all the products of combustion before the same can escape, thereby avoiding inconvenience from smoke and gas. The invention consists in the application to the heater of plates and wire gauzes, which, when heated by the fire, will serve to consume the products of combustion. The invention consists also in the arrangement of receptacles for heating crimping and curling irons, the said irons being either removable or adjustable.

CLOTHES DRYER.—Hiram Knight, of Westminister, Mass.—This is a new construction of clothes frame, so made as to be self supporting in every position without requiring hasps or locks, and which can be folded together into a narrow space.

PROPULSION OF VESSELS.—John P. Bruce, of Brooklyn, N. Y.—This invention relates to a new mode of propelling marine vessels, and consists in driving the screw or propelling wheel by means of water wheels revolved or driven by water elevated by pumps, the latter being driven by a steam engine, the whole arranged in the specification with reference to accompanying drawings, without which the details cannot well be explained.

FORGE.—Joseph R. Morris, Houston, Harris Co., Texas.—This invention relates to an apparatus in which the gases from one or more forges, instead of passing off unconsumed, into the atmosphere, enter a furnace and are burnt therein, thereby furnishing heat for the generation of steam in a boiler connected with said furnace, which steam is used to drive a fan, that impels a blast into each forge, and is also used to propel an engine that operates a hammer; the exhaust from the engine being conducted to the tweers of the forges through pipes, in which are placed red hot iron plates, which decompose the steam, taking up the oxygen and liberating the hydrogen that is burnt in the forges.

MACHINE FOR MAKING PAVING BLOCKS.—Samuel Wallace Brooks, of Brownsville, Texas.—The cutting knife of this machine is hexagonal, or of any other form desired, and, being actuated by suitable mechanism, the wood, which has been previously sawn into proper lengths, is forced, by a weight, down, endwise upon the grain, upon the knife, which thus shapes the blocks. It is claimed that wood paving blocks may thus be rapidly and perfectly prepared.

MACHINE FOR SAWING SPOKES.—Thomas J. Tolan, of Deiphos, Ohio.—This is a combination of a rotary saw, with two disks and a spring, together with other peculiarities in the machine, whereby spokes may be sawn from bolts, which is claimed to possess advantages over other machines hitherto used for this purpose.

IMPROVEMENT IN PLANING MACHINES.—Charles E. McBeth, Frederick Bentel and William C. Margeant, of Hamilton, Ohio, and Henry Climer, of Muscatine, Iowa. The reader is referred to page 235, current volume of the SCIENTIFIC AMERICAN, for a full description, with engravings, of this machine.

CORN PLANTER.—Abraham H. Stark and John C. Mitchell, of Nevada Iowa.—This is an improved self dropping, check row corn planter, consisting of a combination of a hopper having a single hole in its bottom; a measure of the quantity of grain to be planted; a case, arranged thereunder, having two holes and a slot in the top, and having one central discharge hole in bottom; with plates, rigidly connected, movable together, and having two holes apiece therein; and the tubes extending not quite to bottom of case. Also, a combination with an adjustable shoe, clasp and arm to fasten the said shoe detachably to the frame of the planter and the runner thereof.

PIPE WRENCH ATTACHMENT FOR MONKEY WRENCH.—A. H. Woodruff, of Lansing, Iowa.—This invention consists in a wedge shaped block of steel with teeth upon its inclined face, which is placed upon the movable jaw of a monkey wrench, and which has on each side a spring catch, which engages with the shank of the wrench when the block is in position. The teeth of the block will, when thus adjusted, engage with a pipe or rod so that the latter can be turned as desired.

SULKY CULTIVATOR.—Philip Hewitt, of Farmland, Ind.—The nature of this improvement precludes an explanation of details. The object sought is to render this class of cultivators more effectual and convenient in use, and to this end the inventor, while using many well known devices, adds fenders formed of spiral wire cords attached to plates on the inside of the cultivator plows, to protect the plants, and a peculiar construction of frame with its seat and levers, to render all parts of the machine easily adjustable and controllable by the operator.

HARVESTER.—George S. Grier, of Milford, Del.—This is an attachment to a studded carrier to the self raking apparatus of harvesters, with a gear shifting bar, so constructed that the carrier may be automatically thrown out of gear with its actuating mechanism, and thrown into gear by the driver, the design being to so improve the self raking attachment that its action may correspond to the varying quantity of grain in different parts of a field, and that the gavels may be made of nearly uniform size.

HORSE HAY FORK.—Charles A. Howard, Pontiac, Mich.—One part of the fork has two curved tines, the other part has only one curved tine. These parts are pivoted together and are further connected by bars, which are crossed and pivoted to the shanks of the two divisions of the fork. To these bars or links is attached a tripping device, which by pulling a cord releases the parts so that they open and discharge their load. We judge this to be a convenient improvement, and it certainly is simple, strong, and durable.

HAND SUPPORT AND ADVERTISING MEDIUM FOR STREET CARS.—Mahlon Warne, of Philadelphia, Pa. has invented an improved support and advertising medium for railway cars. A circular frame is composed of two similarly constructed parts, each provided with a groove, so that, when put together, they form a hollow ring for the reception of an endless cord on which is placed a round wooden bar or handle. The cord is tightly clamped between the circular sections by means of screws, but the handle slides freely thereon. The upper ear is slotted to admit of the attachment of a strap, whereby the device is secured to the roof rails of a car. Each of the sections of the frame is cast with an inner flange or rabbeted edge, whereby, when put together, a recess or annular groove is formed, suitable for the reception of circular plates of glass. Between these plates it is designed to place advertising cards, prints, or pictures. Thus, the prints while protected will be legible through the glass, and similar or different advertisements may be placed in the same frame, which, from the position of the frame in the car, it is manifest cannot fail of quickly attracting the notice of passengers. The support is free from a tendency or liability to cramp the hand of the person grasping it, adapted to conceal the junction of the ends of the cord, as well as tightly clamp the same, and is also a device calculated to adorn the car in which it is suspended, while incidentally constituting a most efficient means of displaying advertisements.

COMBINED DINNER PAIL AND LANTERN.—This invention relates to a new dinner pail which is provided with a lamp whereby its contents can be heated, and with a transparent side or door through which the rays of light from the lamp can be projected. Horace C. Ketcham and Willie W. Ketcham, of Newark, N. J., are the inventors.

HARNESS BUCKLE.—Othnel Brown, of Albia, Iowa.—This invention relates generally to harness buckles, but particularly to that patented December 21, 1858, by O. B. Smith. The cross bar of the frame of the buckle has a stud pin rising vertically from it to enter the hole of the strap to be buckled, which is passed under one cross bar and over another. A clamping bar or lever is pivoted in cars rising from the side bars of the frame, and bearing at the short end on the strap around the pin, a hole being made in the short end for the pin. The long arm is bent inward, so as to bear against the strap inside of the main frame and close to one of the cross bars in such a manner that the straightening of the strap by the tension of the draft will force the long arm of the lever out and the short one in, in a way to hold the strap more firmly, according to the strain.

TWINE CUTTER.—Charles Carrington Lewis, of Gainesville, Ala.—This is a new, simple implement to be used in stores, warehouses, etc., for the purpose of cutting twine and cords used for the tying of packages. The invention consists chiefly in applying the cutter to a pivoted balance weight, which is connected with a sliding bed on which the twine is cut. The bed is drawn in during the cutting process and moved out subsequently to bring the end of the twine or cord within convenient reach for future use. A spring holds the twine in contact with the movable bed.

LIGHTNING ROD COUPLINGS.—David W. Demorest, of Newark, N. J.—This is an arrangement of a lap and lock splice on the sections of rod, whereby the same are not only jointed but actually locked together. The invention consists, also, in the application of a screw to the coupling or bearing for locking one of the sections to the coupling, and thereby furnishing an absolute support.

CIGAR LIGHTER.—Joel B. Miller, of Rondout, N. Y.—This is a new pendant cigar lighter, similar to those now used in cigar stores, but so arranged that it will produce the flame by the consumption of kerosene or other burning fluid, instead of gas. The invention consists chiefly in so hanging the pendant burner and reservoir to a frame or arm that, by vibrating the former on its pivot, the wick will be shifted to give a greater or less flame as may be required.

WATER WHEEL.—Samuel D. Taylor, of Hazleton, Pa.—An improved mode of applying gates to turbine wheels; the effects of which are, first, to enable the gate to work close to the wheel, and thereby to bring the unchecked velocity of the water to bear upon the buckets as soon as it passes the throats; secondly, to admit of adjustment without changing the course of the water to the wheel. These effects are produced by means of a series of movable arc plates, and arc extensions of stationary chutes, combined concentrically and closely with the wheel and each other, so that the course of the water will not be changed (as where the chutes move) nor the velocity impeded, after passing the throats, by an adjustment of the gates.

BARK MILL.—Owen Coogan, of Pittsfield, Mass.—This is an improved machine for reducing or breaking up bark for tanners' use, whether the same be in a dry, damp, or green state. This invention consists in the arrangement of a hinged adjustable leaf with the feeding table and roll, and in the method or means of mounting the feeding roll, by which means the machine can be used for reducing all kinds of bark to a suitable degree of fineness, to best serve the purpose for which it may be intended. The manner of reducing or cutting, will, it is claimed, be quite uniform, and therefore most satisfactory. The feed roller, besides slowly supplying the cutters, serves also to hold the bark, so that it cannot slip or move out of the way when acted upon by the cutters. The cut bark is by the cutters carried off the back end of the table. The cutting-points of the saws or cutters may be of hard metal and removable on their blades, to be replaced when worn.