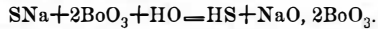


SCIENTIFIC AND PRACTICAL INFORMATION.

NEW METHOD OF MAKING BORAX.

When an alkaline sulphuret is added to an aqueous solution of boracic acid, the water is decomposed; the hydrogen, replacing the metal, forms sulphuretted hydrogen, while the oxygen goes to the metal to form a base, which then combines with the boracic acid thus:



This property may be used in the manufacture of borax from boracic acid. The carbonate of soda heretofore used for this purpose is much more expensive than the sulphuret, since in the manufacture of soda the sulphate is first reduced to the sulphuret which is afterwards converted into the carbonate. By making use of the sulphuret instead of the carbonate, this last and difficult step of the operation is dispensed with. The sulphuretted hydrogen given off may be either employed in the manufacture of sulphuric acid, it being converted into sulphurous acid by burning, or the sulphur itself may be obtained from it by bringing it into contact with sulphurous acid.

LIQUID LENSES.

A new and beautiful lecture experiment has been adopted by Professor Henry Morton, which illustrates very forcibly the action of refraction. A magic lantern is arranged vertically in connection with suitable mirrors to throw the image upon the screen. An empty watch glass is substituted for the usual objective lens. If now we introduce an object, as for example a photograph on glass of course no image will be produced on the screen, but only a nebulous patch of light. On pouring water into the watch glass, however, a well defined image is produced. On replacing the water by alcohol, muriate of tin, or other more highly refracting liquid, a lens of higher power is obtained.

HOUSE BUILDING.

A paper on this subject, read by Edward Roberts, F.S.A., before the Royal Institute of British Architects, closes as follows:

1. Never allow pervious drains in pervious soil.
2. Never allow a cesspool or drain near a well.
3. Never select gravel as a building site if well drained clay can be obtained.
4. Never allow drinking water to be drawn from a cistern supplying a water closet.
5. Never allow waste pipes to be inserted into water closet traps.
6. Never allow rain water to run to the ground, if it is required above.
7. Never allow water to stand in pipes exposed to frost.
8. Never allow pipes to be fixed so that they cannot empty themselves.
9. Never ventilate except by pipes or tubes, inlets and outlets being of equal size.
10. Never use glazed earthenware pipes for upward flues.
11. Never allow chandeliers to be the exclusive light, merely because it has been customary.

INDUSTRIAL EXHIBITION AT NEWARK, N. J.

Arrangements are now being completed for holding an exhibition at Newark, N. J., in August next. The specimens exhibited will be classified as follows: (1) Fine Arts and Education, (2) Dwellings, (3) Dress and Handicrafts, (4) Chemistry and Mineralogy, (5) Engines and Machinery, (6) Inter-communication, (7) Agriculture and Horticulture, (8) Tools and Hardware. No premiums or anything in lieu thereof are to be awarded to exhibitors, and the merits of their productions will thus be pronounced upon by the public solely and wholly. Messrs. Marcus L. Ward, A. M. Holbrook, and Isaac Gaston are respectively the President, Secretary, and Treasurer of the exhibition.

A farmer in Connecticut is said to have contrived an infernal machine for the destruction of crows, in the shape of a kernel of corn which explodes on being picked up by the unsuspecting bird, and blows his "darned eternal head off" without the slightest warning.

Facts for the Ladies.—Louisa Kelley, Ackworth, Ga., has, with the general use of a Wheeler & Wilson Lock-Stitch Sewing Machine, for three years supported a family of four adults and two children, built and paid for a house, and has \$100 cash on hand. See the new improvements and Woods Lock-Stitch Ripper.

Burnett's Cocoa gives luxuriance to the hair.

The People's Friend.—It is susceptible of easy proof that the Sewing Machine has been a greater blessing to the masses of American people than any invention of the present century. Nothing else has done so much to save the lives and health of the wives and mothers, the patient, overworked women of the land, who, as a class, most needed relief from the burthens of everyday life. Every father and husband fails in his duty if he neglects to endow his home with such a triumph of science as the Wilson Under-Feed Sewing Machine. It is the cheapest and best sewing machine ever offered. Salesroom, 707 Broadway, N. Y.; also for sale in all other cities in the U. S.

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.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, \$4 00 a year. Advertisements 17c. a line.

Wanted—Situation as Book-keeper in some good manufacturing business. Can invest means, if satisfactory. C. S. B., Box 929, Cincinnati, Ohio.

Drying Glue—Wanted an artificial, economical, rapid process, in all weather. Address Glue, P. O. Box 6763, New York.

Rapid Evaporator—Simple, 6 ft. sq., no pumps, no attendance, evaporates 4 gals. a min. at temp. under 175°. Address P. O. Box 6763, N. Y.

Wanted—A first class Sewing Machine Repairer. T. Shanks, Baltimore, Md.

Galvanized Slating Nails, Stove Reservoirs, and Hollow Ware. Address Cleveland Galvanizing Works, Cleveland, Ohio.

Machinery Paint, all shades. Will dry with a fine gloss as soon as put on. \$1 to \$1.50 per gal. New York City Oil Company, Sole Agents, 116 Maiden Lane.

Second hand Iron Planer, to plane 9 feet long, 3 3/4 inches wide—good as new and cheap. Chas. Place & Co., 60 Vesey St., New York.

Wanted—A party to make a wood workers' cast iron vise on royalty for the N. E., Middle and Southern States. No expensive machine work necessary. Crawley & Baylies, Edgartown, Mass.

Moulds for Casting Soft Metals made to order. Die sinking the same. We will take a few small articles to manufacture. Send models and patterns. Guns reamed to order. Waterman & Co., West Meriden, Ct.

A steady mechanic, having some knowledge of pattern-making, wishes to perfect himself in that branch at some good shop in or near this city. Plenty of tools. Wages not an object. Address G. McNamara, 142 Nassau Street, New York.

Wanted—A Good Brass Moulder. A "steady" man can find constant employment by applying to Jas. Flower & Brothers, Detroit, Mich.

Wants to Buy one 4 foot Plane and one 4 foot Screw Cutting Lathe. Defiance Machine Works, Defiance, Ohio.

For Sale—Goodyears' Patent Hub Machine. Will turn 100 Sets Wagon Hubs per day. Defiance Machine Works, Defiance, Ohio.

Wanted—A partner in the Machinist and Foundry business, well established at Minneapolis, Minn. Address Chas. M. Hardenbergh.

Portable Baths. Address Portable Bath Co., Sag Harbor, N. Y.

Verdi Water Mills for Sale, with 400 acres of Land. Address J. A. Beam, Verdi, Kans.

Nickel Plating with or without Battery. Instructions of plating with new and unsurpassed solutions given on moderate terms by a practical plater. Address John Nagel, 83 East 7th Street, New York.

Standard Twist Drills, every size, in lots from one drill to 10,000, at 1/2 manufacturer's price. Sample and circular mailed for 25c. Hamilton E. Towle, 176 Broadway, New York.

The Shive Steam Engine Governor—Guaranteed to be the best in the world. Circulars sent free. Shive Governor Company, 12th and Buttonwood Streets, Philadelphia, Pa.

For the best Foot Power Jig Saw, address Goodnow & Wightman, 28 Cornhill, Boston, Mass.

Dry Steam, dries green lumber in 2 days; tobacco, in 3 hours; and is the best House Furnace. H. G. Bulkley, Patentee, Cleveland, Ohio.

Hexagon Iron—superior quality for screws, &c., 9-16 in. 09 1/2, 3/4 in. 09, 11-16 in. 09, 1/2 in. 08 1/2, 1/2 in. 08, 1 in. 08, per lb. The above is price per bundle; single bars 2 cts. higher. Goodnow & Wightman, 28 Cornhill, Boston, Mass.

For hand fire engines, address Rumsey & Co., Seneca Falls, N. Y.

T. Shaw's Steam Gauges, Ridge av. & Wood st., Phila., Pa.

If you want a perfect motor, buy the Baxter Steam Engine.

Brown's Coal Yard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro., 314 Water st., N. Y.

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

For Tri-nitroglycerin, insulated wire, exploders, with pamphlet, as used in the Hoosac Tunnel, send to Geo. M. Mowbray, North Adams, Mass.

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

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

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

In the Wakefield Earth Closet are combined Health, Cleanliness and Comfort. Send to 36 Dey St., New York, for descriptive pamphlet. Best and Cheapest—The Jones Scale Works, Binghamton, N. Y.

If you want to know all about the Baxter Engine, address Wm. D. Russell, office of the Baxter Steam Engine Co., 18 Park Place, N. Y.

T. Shaw's Blast Gauges, Ridge av. & Wood st., Phila., Pa.

Seeds and Fertilizers. R. H. Allen & Co., New York.

Callow's New Patent Mode of Graining Wood, Makes Painters grain all woods first class who never grained before; Likewise makes Grainers lightning fast who thumbed it out before. Address, with stamp, J. J. Callow, Cleveland, Ohio.

Wanted—A Purchasing Agent in every city and county, to supply Nye's fine Sperm Sewing Machine Oil. Put up in Bottles, Cans, and Barrels, by W. F. Nye, New Bedford, Mass.

Presses, Dies & all can tools. Ferracute Mch Wks, Bridgeton, N. J. Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, &c.

The Patna Brand of Page's Patent Lacing is the best. Orders promptly filled by the Page Belting Co., No. 1 Federal St., Boston.

Absolutely the best protection against Fire—Babcock Extinguisher. F. W. Farwell, Secretary, 407 Broadway, New York.

Boiler and Pipe Covering manufactured by the Chalmers Spence Non-Conductor Co. In use in the principal mills and factories. Claims—Economy, Safety, and Durability. Offices and Manufacturing, foot E. 9th street, New York, and 1202 N. 2d street, St. Louis, Mo.

Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck & Co., New Haven, Ct.

"Anti Lamina" will clean and keep clean Steam Boilers. No injury to iron. Five years' use. J. J. Allen, Philadelphia, Pa.

Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.

For the best Recording Steam and Indicating Gauges, address The Recording Steam Gauge Co., 91 Liberty Street, New York.

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

Belting as is Belting—Best Philadelphia Oak Tanned. C. W. Army, 301 and 303 Cherry Street, Philadelphia, Pa.

Boynton's Lightning Saws. The genuine \$500 challenge. Will cut five times as fast as an ax. A 6 foot cross cut and buck saw, \$6. E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

Hydraulic Jacks and Presses, New or Second Hand, Bought and sold, send for circular to E. Lyon, 470 Grand Street, New York.

T. Shaw's Hydraulic Gauges, Ridge av. & Wood st., Phila., Pa. Better than the Best—Davis' Patent Recording Steam Gauge Simple and Cheap. New York Steam Gauge Co., 46 Cortlandt St., N. Y.

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.

Rights for Sale—Of the only Patent out on Stove Pipe Fitters. Address Wm. Volk, 82 Staats Street, Buffalo, N. Y.

What I know about Machinery, especially Engines, Pumps, and Machinists' Tools, which I sell at 93 Liberty Street, New York. S. N. Hartwell, late agent for L. W. Pond.

The most economical Engine, from 2 to 10 H.P., is the Baxter

Over 800 different style Pumps for Tanners, Paper Makers, Fire Purposes, etc. Send for Catalogue. Rumsey & Co., Seneca Falls, N. Y.

The Baxter Steam Engine is safe, and pays no extra Insurance.

Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau St., New York.

Self acting Screen makes 6 grades Coal, ores, &c. A State right at a bargain. Geo. Lord, 232 Arch Street, Philadelphia, Pa.

Important.—Scale in Steam Boilers—We will Remove and prevent Scale in any Steam Boiler or make no charge. Geo. W. Lord, 232 Arch Street, Philadelphia, Pa.

Notes & 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.—MORTARS.—What is the size of the largest mortars used in modern warfare?—W. B.
- 2.—VARNISH FOR RUBBER.—Can any one inform me how to make a flexible varnish for rubber, so as to give it a gloss?—W. W. W.
- 3.—POWER OF SCREW DRIVERS.—Can more power be obtained by the use of a long screw driver than of a short one, both having the same sized handles?—W. H.
- 4.—PROPORTIONS OF SAFETY VALVE GEAR.—Can any one give me a clear and concise method of computing the position of weight on the arm of a safety valve, all things being proportional?—M. I. C.
- 5.—ELECTRO-SILVERING GERMAN SILVER.—Can some one inform me if silver can be deposited on German silver by electricity, so as to stand annealing at a low red heat without blistering? I have tried it in many ways, but failed, as small blisters almost invariably show themselves.—J. H.
- 6.—PROTECTING COPPER FROM THE ACTION OF MERCURY.—Can any of your readers tell me of any solution that will prevent mercury from adhering to or eating copper? I have tried shellac and copal varnishes, but find them only temporary in their effect.—G. S. D.

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 book numbers must be by volume and page.

AQUARIUM CEMENT.—D. C. will find a recipe for a good one on page 267, Vol. XXV. of the SCIENTIFIC AMERICAN.

VELOCITY OF LIGHT.—G. M. V. points out an error in an article entitled "Celestial Space" on page 820 of the current volume. Light moves at 192,000 miles a second.

SUEZ CANAL.—To W. B.—The Suez canal is the property of a joint stock company, which the French Government helped to float by large concessions, "subventions," and guarantees.

F. W. G., of La.—You can make microscopic slides, showing the beautiful crystals of nitrate of silver, by placing a drop of the salt dissolved in water upon a slide and letting it dry. Then cover with glass in the usual manner. Use benzole, not benzine, in preparing objects. For many things Canada balsam is the best substance to use.

SUPPLY OF WATER.—To H. G., of Vt.—Your question, as we understand it, is this: Can the quantity of water supplied by a pipe be increased by using a larger pipe without any additional head? It can, up to the delivery of all the water in the spring. The head of water makes a pressure of so much per square inch on the area of cross section of your pipe, and the supply will increase with the size of your pipe, so long as there is enough water at the head. The pipe to the tub will not affect your supply at the mill, unless both are open at once, in which case the water conveyed from the spring will be divided between the two.

THIRTY TUN MAGNETS.—I have a bet with a gentleman. I stated that there had been a magnet built that lifted thirty tuns; he disputed it, and I agreed to leave it to you. Am I right? If not, what was the strength of the largest magnet? Answer: There was a paragraph published in the SCIENTIFIC AMERICAN some time ago describing the then new magnet built by Wallace & Sons, of Ansonia, Conn., for the Stevens Institute, in which it was stated that the estimated lifting force of that magnet was between thirty and fifty tuns. But President Morton, writing to us recently, states that its actual lift is probably only from four to five tuns. This is the largest magnet that we remember. Its poles are each three feet three inches long and six inches in diameter. The next in size is one lately constructed by Lord Lindsay in London, and is four inches in diameter of poles. There was one of some similar size at the College of Pharmacy, London, and that used by Faraday and Tyndall was in oblong section about three inches by four inches, and two feet long. If the power of electromagnets increased with their size, these large magnets might lift thirty tuns, but as a fact, they do not by any means. The largest magnet made prior to that of the Stevens Institute lifted about 2 1/2 tuns.

SUPERHEATING STEAM.—Query 1, page 354.—Let R. H. E. take a perfectly tight vessel, fill it completely with water, and he will be able to heat it (the water) to 400° Fah. without boiling, but the moment air is admitted, it instantly sinks to 212°. Now a little warning: If he heat it to 419°, the pressure would be 14,700 pounds per square inch, and at 500° it would equal 19,459 pounds to the square inch. The latter would support a column of mercury 3,243 feet in height. (He will need a strong vessel.) The average latent heat of steam, as determined by the philosophers Watt, Southern, Lavoisier, Rumford, and Depretz, is 978° Fah., but Thompson says he does not think it can fall below 1,000°.—G. L. F.

PROPORTIONS OF ENGINE.—Query 8, page 354.—The small engine will do about 94 1/2 per cent of the work that the larger engine is doing now.—P. R.

PROPORTIONS OF ENGINE.—Query 8, May 25.—An engine with a cylinder of 11 inch bore, 3 feet stroke, making 40 revolutions, will, with steam at 50 pounds pressure, be equal to 34 1/2 horse power. An engine with 7 inch bore, 14 inches stroke, 150 revolutions per minute, with 80 pounds of steam, will be equal to 32 1/2 horsepower. Friction is not taken in account in either case. Deduct two horse power for friction, and you will have about the actual power of the engines.—A. H. G.