Business and Personal.

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

16 ft. Steam Yacht, very cheap. Box 10, Bridgeton, N.J.

Lathes.—20 inch swing, 8 foot bed, ready June 1. F. C. & A. E. Rowland, New Haven, Conn.

Excelsior Metallic and Steel *Tapes.* The most durable and the handiest made. General depot, Keuffel & Esser, New York.

A novel without a plot in it would be as rare to find as a stationer's stock without Esterbrook's Pens.

Wanted, a Mechanical Draughtsman, acquainted with stationary engine and general machine work. Machinist preferred. Address T. E. J., P. O. Box 773, New York.

THE SINGER M'F'G CO.'S CASE FACTORY, SOUTH BEND, IND.

H. W. Johns Manufacturing Company, New York.

GENTLEMEN: Some of your Asbestos Roofing was used to cover our dry kilns during 1879, and at this date is in good order. The under side of the roof is exposed to steam and acid generated in drying lumber, and a temperature of 250° heat; while the roof rafters and sheathing have cracked by the heat, your roofing shows no sign of damage. Tin roofs, painted both sides, used to last but a few months, while the ordinary gravel roofs are useless on our kilns. Yours very truly, L. PINE, Supt.

A thoroughly competent Foreman in an Organ Factory wanted. Address Lock Box 85, York, Pa.

Drop Forgings. Billings & Spencer Co.

"T. New, 32 John St. New York, has sold and applied over fifty million feet of his Prepared Roofing, the major part being placed upon manufacturing establishments."—SCIENTIFIC AMERICAN.

Agents Wanted.—None but intelligent and energetic need apply. Must furnish good recommendations, or no notice will be taken of applications. Exclusive territory given. Agents are now making from $10 to $15 a day. Address, for terms, The Infallible Coin Scale Co., 267 Broadway, New York city.

Improved Skinner Portable Engines. Erie, Pa.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your *free* book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

Abbe Bolt Forging Machines and Palmer Power Hammers a specialty. S. C. Forsaith & Co., Manchester, N.H.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Combination Roll and Rubber Co., 27 Barclay St., N. Y. Wringer Rolls and Moulded Goods Specialties.

Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N.J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock, 80 to 88 Market St., Chicago, Ill.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Cope & Maxwell M'f'g Co.'s Pump adv., page 263.

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

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

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

List 27.—Description of 3,000 new and second-hand Machines, now ready for distribution. Send stamp for same. S.C. Forsaith & Co., Manchester, N.H., and N.Y. city.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

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

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made. 631 Arch, Phil.

The Sweetland Chuck. See illus. adv., p. 270.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's Parallel Vise, Taylor, Stiles & Co., Riegelsville, N.J.

4 to 40 H. P. Steam Engines. See adv. p. 285.

Supplee Steam Engine. See adv. p. 221.

Saw Mill Machinery. Stearns Mfg. Co. See p. 286.

See Bentel, Margedant & Co.'s adv., page 304.

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

Machine Diamonds, J. Dickinson, 64 Nassau St., N.Y.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 304.

Telegraph, Telephone, Elec. Light Supplies. See p. 316.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Eagle Anvils, 10 cents per pound. Fully warranted

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling see Frisbie's ad. p. 304.

Elevators, Freight and Passenger, Shafting, Pulley, and Hangers. L. S. Graves & Son, Rochester N. Y.

Gould & Eberhardt's Machinists' Tools. See adv., p. 306.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 304.

Centrifugal Pumps, 100 to 35,000 gals. per min. See p. 304.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p. 305.

Lehigh Valley Emery and Corundum Wheels are free cutting, durable, and safe. Can be adapted to all kinds of work. Write for prices, stating sizes of wheels you use. Lehigh Valley Emery Wheel Co., Lehighton, Pa.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 305.

Cutters for Teeth of Gear Wheels formed entirely by machinery. The Pratt & Whitney Co. Hartford, Conn.

Steam Pumps. See adv. Smith, Vaile & Co., p. 306.

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

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 306.

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

NEW BOOKS AND PUBLICATIONS.

CLARK'S NEW SYSTEM OF ELECTRICAL MEDICATION. By A. W. Tipton, M.D., Jacksonville, Illinois: The Author. 8vo, leather. $4.

A revised and enlarged edition of Daniel Clark's treatise, first published in 1866. Since that date Dr. Tipton has brought out several editions at his own cost, thus proving the fervency of his discipleship. He believes that the electric current, applied as Clark's theory directs, in connection with other remedies, is a valuable curative agent. How far the theory bears the test of practical applications at the hands of others does not appear.

NEW YORK WATER SUPPLY. Department of Public Works. 8vo, cloth. pp. 64.

Commissioner Thompson's report on a proposed new aqueduct and storage reservoir for additional supply from Croton River, with detailed report of Isaac Newton, Chief Engineer of the Croton Aqueduct, and opinions of consulting engineers. The latter report contains a large amount of information with regard to the present and possible scope of New York's water supply from the Croton Valley and the Housatonic River. It carries an excellent map.

HOW TO MAKE PICTURES: EASY LESSONS FOR THE AMATEUR PHOTOGRAPHER. By Henry Clay Price. New York: Scovill Manufacturing Company. Cloth, pp. 92.

The simplicity, cheapness, and portability of the apparatus employed in dry plate photography has enabled the camera to more than supersede the sketch book for travelers, students, and others, who wish to keep permanent memorials of scenery, buildings, or other objects of nature and art which may seem worthy of remembrance. This little handbook sufficiently describes the apparatus used by such amateur photographers, and so much of the art of photography as they may need to know to make a good beginning.

ANNUAL REPORT OF THE FRUIT GROWERS' ASSOCIATION OF THE PROVINCE OF ONTARIO FOR THE YEAR 1881. 8vo, pp. 136.

ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY OF THE PROVINCE OF ONTARIO FOR THE YEAR 1881. 8vo, pp. 85. Toronto: printed by order of the Legislative Assembly.

These two reports bound together make a creditable volume. The first indicates a promising interest and progress in Canadian fruit growing, forestry, and kindred subjects. The second contains much useful information relative to Canadian insects.

A SYSTEMATIC HANDBOOK OF VOLUMETRIC ANALYSIS. By Francis Sutton, F.C.S., F.I.C. Philadelphia: Presley Blakiston. Cloth, pp. 471. $5.

Working chemists need no introduction to this standard treatise. For this fourth edition the work has been carefully revised, and so far as the progress of chemistry has made necessary, rewritten.

AMERICAN CHEMICAL JOURNAL. Edited, with the aid of chemists at home and abroad, by Ira Remsen, Professor of Chemistry in the Johns Hopkins University. Baltimore: Published by the editor, 6 parts a year. pp. 400 to 500. Price $3. Single number, 50 cents.

The third year and volume of this valuable periodical have just been completed. As a record of original research in chemistry its standing is unsurpassed in English. The frequent reviews of recent progress in the several departments of applied chemistry constitute a feature of wide practical value and interest.

YENSIE WALTON'S WOMANHOOD. By Mrs. S. R. Graham Clark. Boston: D. Lothrop & Co. $1.50.

The author tells us that this is not a book for critics, but for the sorrowing, burdened toilers of her own sex, which bars an opinion here. It is a high tension, Sunday-school library love story.

INTERIORS AND INTERIOR DETAILS. INTRODUCTION, DESCRIPTION OF PLATES AND NOTES ON WOOD FINISH. By William B. Tuthill. New York: W. T. Comstock. Quarto, cloth. 52 plates. $7.50.

A comprehensive and valuable series of suggestions for architects and architectural designers, reproduced from original drawings by prominent architects in New York, Boston, Chicago, and other cities.

REPORT OF THE STATE BOARD OF HEALTH ON THE EPIDEMIC OF DIPHTHERIA IN FREDERICK CITY, MARYLAND. By C. W. Chancellor, M.D., Secretary. Baltimore.

The aim of the inquiry here reported upon was not merely the abatement of the epidemic, but also such a study of the conditions which invited and made it possible or might contribute to the general sanitation of the State. There is reason to fear that many towns, naturally as favorably situated for health as Frederick City is, are more or less rapidly preparing for a similar scourge by a general neglect of sanitary precautions.

WHITEHEAD'S AMERICAN PASTRY COOK. By Jessup Whitehead. Chicago: National Hotel Reporter. Cloth. $2.

Contains 814 tried receipts, plainly worded and given so fully and explicitly that there should be no failure or even uncertainty in following directions. It is more comprehensive than the title indicates, covering, in addition to fine pastries, ices, creams, and dessert dishes in general, puddings, souffles, and meringues; breads and cakes, and salads and cold dishes.

A FAMILY FLIGHT THROUGH FRANCE, GERMANY, NORWAY, AND SWITZERLAND. By Rev. E. E. Hale and Miss Susan Hale.

ALL ABOARD FOR SUNRISE LANDS. By Edward A. Rand. Boston: D. Lothrop & Co.

Two books of juvenile travel, profusely illustrated, and likely to be attractive to young readers, who will not suspect that the travels were invented to furnish a thread for stringing a multitude of pictures unless they happen to get both books at once and see the same cuts doing service in opposite parts of the world.

WHAT IS BRIGHT'S DISEASE? ITS CURABILITY. By Seth Pancoast, M.D. Philadelphia: The Author. $1.

According to Dr. Pancoast's view Bright's disease involves not the kidneys alone but the heart, lungs, and liver also, and the disease may exist for months before albumen can be detected in the urine. The "disease is due to an ennervation of the nervo-vital energy." The first step toward cure is to correct or replace by normal action "the ennervation of the vital energy centered in the organic nervous system." The curability of the disease under timely and proper treatment is strongly insisted upon.

THE CENTURY MAGAZINE. New York, 1882. The Century Company. Publishers, Union Square. Price $3.50.

The first bound volume of this splendid periodical (formerly Scribner's Magazine) presents a most attractive appearance so far as typography is concerned, while the contents are in the highest degree valuable. The volume contains over one thousand pages of fresh and interesting matter, adorned by hundreds of original engravings, embracing novels, short stories, poetry, essays, biography, travels, literary reviews, scientific notes, etc. Several excellent improvements in the typography of the magazine have been added and the pages have been enlarged. The circulation of the magazine has risen from 120,000 to 134,000, which shows that the public recognizes the value of the work.

Notes & Queries

HINTS TO CORRESPONDENTS.

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

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

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

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

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

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

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

(1) L. K. B. writes: I send you to-day by mail a piece of lead pipe, laid about ten years ago some three feet underground; the soil from which this piece came being "made ground" principally, as the pipe was laid under railroad tracks. Will you kindly inform me through the columns of the SCIENTIFIC AMERICAN (to which I am a subscriber), to what causes the holes in the pipe are to be attributed? A. The corrosion of the lead pipe was probably due to the action of water charged with carbonic acid.

(2) P. H. writes: I have seen the colors in woolen goods tested by soaking a small piece in a solution or acid of some kind, the test showing what the colors would fade to if exposed to the sun. Can you tell me what the acid or solution is? A. It is probably a solution of an alkaline sulphite slightly acetified with oxalic acid. It could be ascertained definitely by a simple chemical analysis.

(3) T. W. says: I have a piece of carving in Babbitt metal, a family relic. I want to fill up the lines with red and black composition, the same as zinc name plates are filled in with. The article must stand the heat of summer sun. A. For red filling: Mix with thick copal varnish enough vermilion to produce a thin paste. For black: use ordinary black japan mixed with a little ivory black. Apply with a small spatula, moistened with oil of turpentine, and let the composition dry thoroughly before dressing.

(4) F. W. asks: Will you please describe the method of taking copies by the blue process? I notice in your issue of April 15, how to prepare the paper, but am at a loss to know how to use it. A. Expose the prepared paper under a clear ink tracing (on tracing cloth) or a glass negative, to sunlight for from five minutes to half an hour, according to the strength of the light. Then remove to a dark room, and wash the paper in plenty of running water, and dry in the air.

(5) C. F. B. asks (1) for a simple and good way to soften steel hammers for drilling the handle holes. A. Heat them uniformly to a cherry red heat, and bury them in dry wood ashes, or better, pulverized charcoal, and let them remain till cold. 2. What is the best way to clean a vertical tubular steam boiler, about 9 feet high, 4 feet diameter, with 61 tubes inside? A. If you wish to clean the fire side of the tubes, use a wire brush or scraper; if the water side, it will depend upon the deposit. If you could empty the boiler of water, close it tight, and admit steam from another boiler; after a few hours the scale will rot and fall off. You must then use suitable means or tools to draw the scale from the boiler.

(6) A. S. asks: 1. What constitutes the strength of the electro magnet? A. It is not definitely known. 2. Does more wire on the spool make it stronger, or does the size of the iron core make the strength, the electric power being the same? A. The magnetic strength of an electro magnet depends upon the size of the iron core, the number of turns of wire surrounding it, and the strength of current charging the wire of this helix. In practice these helices are seldom wound to a diameter exceeding three times the diameter of the core, as what is thereby gained in magnetic moment is more than lost in increased resistance of helix circuit. 3. Would two electro-magnets with a wire spool in each of the four helices equal in thickness to the diameter of the iron core, attract each other with greater force than one of them would attract an armature? A. Yes, if unlike poles were opposed. 4. Would one electro-magnet, as per question three, be as strong or stronger than both if the wire in the first instance on the two were placed on only one? A. If the same current were employed, no. 5. Would the strength of the magnet be enhanced by enlarging the ends of the wire core? A. As we understand you, no. 6. Would an electro-magnet be made stronger by using several soft inner magnets in one? A. The advantage of this arrangement would not be great.

(7) S. P. G. writes: I want to make carbons for a Bunsen battery. I have tried gas coke pounded fine and mixed with treacle, then pressed in an iron mould and burnt, but when cooled and removed from mould, are lighter in weight, and crumble away if pressed in the hand, compared to those one buys. Please inform me what are the ingredients of such carbons, how are the ingredients mixed, and after mixture what process do they undergo? Are they pressed and heated (burned)? If so, to what extent? A. In the preparation of ordinary battery carbons it has lately been the practice to use gas tar as the cementing substance instead of saccharine matters, etc. The gas carbon is reduced to a powder, and this is uniformly mixed together with just enough of the tar to make a stiff smooth paste. The paste (or dough) is forced into the moulds under considerable pressure, then heated slowly at first, and finally at very bright redness. When cooled the plates are put to soak in a gas tar liquid and afterwards rebaked. They can by these means be made very dense and hard.

(8) B. B. asks: Is there any process by which rather thick paper can be rendered transparent? A. It can be rendered quite translucent by saturating it (while warm) with Canada balsam or castor oil, but we know of no process of treatment whereby it can be made transparent.

(9) L. G. C. writes: I have tried to make a plain gold ring out of an old watch case and broken jewelry, using a mould made of black lead crucible, in two pieces, counter bored in each half to form a cavity the shape I want for a ring, but I can't get the gold to flow so as to fill the mould. I have tried the gold at different degrees of heat, and tried the mould hot and cold. Is there anything I can melt with the gold to make it more of a liquid? A. Your gate is too small and not high enough to give pressure to the flowing metal. If the two parts of the mould are rubbed together very close, the air cannot get out. Clamp them very lightly or cut air vents from the outside of the ring toward the top of the mould. A few drops of oil will make the casting run clean. Put a little flux of soda or borax in the crucible to clear the metal. Heat is all that is required to make the metal liquid. Moulds of soapstone are in common use among jewelers for plain work, and fine sand moulds for pattern work.

(10) J. H. G. says, in answer D. McF. (page 251, No. 12): If he will keep the cloth well dampened with a sponge ahead of his colors all the difficulties will be removed no matter how the color is mixed.

(11) B. H., Jr., of Texas, asks how or where he can find a description of the process of extracting oil from lemon peel. A. Consult U. S. and German Pharmacopœias; also Spons' "Cyclopedia of Arts" (last edition).

(12) W. P. H. writes: I am using Venetian red paint on wood bowls designed for and covered with rustic work such as hanging baskets, etc. The paint is usually mixed with water for cheapness, but what is better is stale beer. I use it, but neither of above satisfies me, as it does not adhere, but comes off when the bowl is struck, dust fashion. We varnish afterwards, and that aids some in holding in place. Also, how can I get something cheap to varnish the goods with? Cheap varnish is all the goods can stand, in cost say about a dollar a gallon is what is used, but it never dries. I have thought polish of some kind could be produced cheaper. A. Try water glass as a vehicle for your colors (see page 16, vol. xlv.). A cheap shellac varnish is prepared by dissolving six parts of shellac and one of borax in a small quantity of boiling water. Shellac dissolved in wood naphtha also constitutes a good cheap varnish.

(13) J. M. J. asks if a ¾ inch nut is large enough to hold a 50 inch saw on the arbor; the arbor is 2 inches where the saw goes on. A. The thread on the arbor should be as large as possible, 8 or 10 threads to the inch, 1½ inches thick, with a heavy washer between it and the saw. Both collar and washer should be as large as possible without interfering with the requirements of work to be done. The thread in nut and on arbor should be either right or left, so that any tendency of the saw to slip would screw the nut tighter, according to the way in which you wish the saw to run. Two other ways are used in fastening the washer and saw so as not to turn: key the washer, or put two pins through washer, saw, and collar.

(14) H. F. F. asks: Can you tell me of any solution that will change cast iron in appearance so it will look like brass or green bronze? A. See "Electro-brassing and Bronzing," in SUPPLEMENT, No. 316.

(15) E. McL. asks: 1. Is there anything cheaper than alcohol which is suitable for chemical manipulations—for burning in lamp? A. Methylic alcohol or crude wood naphtha is much cheaper and quite as useful.

(16) A. F. asks: Will you please inform me through your paper what preparation is used by map makers to cover the brass plate before immersing same in battery in order to produce lines in relief? A. The varnish used is a solution of purified asphaltum in naphtha. Ordinary black japan is also employed.

(17) E. K. asks: 1. What could I mix with spelter for castings so as to make it less brittle? A. Use about five per cent of tin and two per cent of copper as alloy. 2. Referring to description of telescope, SUPPLEMENT, No. 252, what is understood by achromatic object glass? A. The form of the ordinary convex lens is such as to cause a slight decomposition of the rays passing through it, making the outlines of objects when viewed through it more or less indistinct or colored. These lenses, when *corrected for color* by the superposition of properly ground concavo-convex glasses, are called achromatic or color free.

(18) O. L. C. asks: 1. What proportion in bulk should the quantity of black oxide of manganese bear to the finely pounded carbon, as used in manganese batteries, to procure the best results? A. About one of carbon to one and three-fifths of manganese oxide. 2. How long should a good manganese battery last, allowing the sal-ammoniac solution is renewed as its strength weakens, if the bell the battery rings is rung, say, 100 times per day for two or three seconds each time—the battery to consist of two cells of the battery? A. At least four months, if the connections are perfect.

(19) F. S. W. asks: 1. Could you give me a good receipt for stove polish, either liquid or solid? A. The best stove polish we know of is pure graphite (blacklead) reduced to an impalpable powder by grinding and sifting. 2. Also a receipt for a starch gloss. I have seen a gloss, and think it is made of borax and starch. Will that give a good gloss? A. See answer to other correspondents, this page. 3. Do you know any good remedy for bedbugs? A. Genuine Persian (Dalmatian) insect powder is effective when properly used. Kerosene oil is also quite serviceable.

(20) C. L. W. asks: Please give me directions for making a paste for fastening photographic prints to cards, one that will not stain the print. A. Use a clear, well boiled, rather stiff starch paste to which has been added a few drops of clove oil. 2. Can the gelatine film be removed from a dry plate negative (after having used it to print with) and the glass recoated and used again? A. Yes. Use strong solution of bichromate of potash acidified with sulphuric acid.

(21) E. T. G. writes: I have dissolved some quicksilver in strong commercial nitric acid, and on standing a day, a quantity of crystals appear in the bottom of the flask. According to U. S. P., nitrate of mercury does not crystallize. Now what have I in the flask? It is not soluble in water, but in strong HNO_3. Please reply in the columns of your paper. A. The crystals are doubtless mercuric and mercurous nitrate and nitrate with probably traces of mercuric chloride. The nitrate is not very soluble.

(22) J. H. Z. asks: Can you tell me how to starch collars, cuffs, etc., so that they will be stiff and glossy, as those you buy at furnishing stores? A. Add to one quart of the well boiled (corn) starch three ounces of water glass, one ounce of gum arabic, and two ounces of loaf sugar. Use a polishing iron.

(23) C. H. W. writes: In using knitting machines I find some yarn breaks, which, if well oiled, works all right; but the oil soils the paper boxes and bands in which the goods are put for sale. Can you tell me of any other method of softening the yarn that will not soil the paper? I have tried soap, but do not succeed with it. A. Have you tried glycerine?

(24) M. I. writes: In order to oxidize the scale in which our castings are packed, we use a solution of NH_4Cl (salammoniac) in water. What chemical action takes place, and where does the oxygen come from? A. Chlorides in aqueous liquids oxidize by virtue of the inclination of their positive element to form hydrates or double salts. In these cases the oxygen is obtained from the water. 2. Can Georgia iron be used for malleable purposes? A. Yes.

(25) D. P. S. asks: 1. Could you tell me of a good grease for greasing cartridges? Have been using beef tallow, but it melts too easy. A. Try pure stearic acid or stearine. 2. Why does an ice boat sail faster than the wind that propels it? A. See pp. 388, 340, and 381, SCIENTIFIC AMERICAN, vol. xlii., and pp. 3402-3, No. 214, and 3496, No. 220, SCIENTIFIC AMERICAN SUPPLEMENT.

(26) E. D. S. asks: Will you please inform me, through the SCIENTIFIC AMERICAN (1), how I can stain a glass lamp chimney green? I have a great deal of writing to do evenings, and it hurts my eyes. A. Try painting the glass with a solution of waterglass (sirupy) stained with chrome green. Let it dry thoroughly before using on the lamp. 2. Would a stained globe do any good? A. Probably.

(27) A. G., Jr., asks: Can you inform me of the composition of the hektograph or gelatin pad? A. Use one ounce best gelatin (softened by soaking over night in a little water) dissolved, by aid of heat over a water bath in about six ounces of purest glycerine. Pour into the pan or mould while hot and let cool before using. It should be heated for an hour or more in the water bath before pouring.

(28) A. H. C. asks: Can you inform me of any process by which I can harden plaster of Paris—that is, to make it hard enough for a mould for metal? A. Use ten per cent of alum in the water used for mixing the plaster. Let the cast set slowly, and when properly set dry it in an oven.

(29) Referring to our answer to D. McF. (page 251, No. 12), S. W. says: Your way of sizing cloth with glue is very good, but I have found that it is easier and better in many cases to mix the colors with shellac varnish (shellac and alcohol) and not size the cloth at all. It makes a clean and better job.

(30) N. E. F. asks: Will distilled water in a boiler foam? If the distilled water is not exposed to the atmosphere at all will it foam sooner than rain water? A. If the distilled water has not been allowed long enough in contact with the air to become properly aerated it will thump and foam on first heating. Ordinarily this will not occur where rain water is used.

(31) W. C. M. asks: Is there any rule laid down for working gears on all kinds of lathe, that is, for cutting (threads?) There is generally an index on all lathes, but I want to be able to understand it without referring to the index. Is there any book on lathe work? A. In a three train gear, where A is the first driver running at the same speed as the spindle, B the carrier or accommodation gear, and C the screw gear, the formula is $\frac{C}{A}$ (number of teeth) × pitch of screw= number of threads to the inch—or reverse if convenient, and multiply the number of teeth in the screw gear by the pitch of the screw, and divide the product by the number of teeth in the driving gear, which will give the number of threads required to the inch. In a four train gear, where A is the first driver running at the same speed as the spindle, B the first receiver, C the second driver (B and C being on the movable stud), D the second receiver running on the leading screw; the formula is $\left.\frac{B \times D}{A \times C}\right\}$ × by the pitch of the screw= the number of threads the lathe will cut to the inch. If (as in some lathes) the first driver runs at one half the speed of the spindle, the last product in both the above trains must be multiplied by 2. The books on lathe work are generally deficient in this essential part. Consult "Designs and Construction in Machine Gearing," by Joynson; also "Screw Cutting Tables," by W. A. Martin, London.

(32) E. F. B. writes: It is said that putting glass jars into cold water will prevent them from cracking when any hot fluid is poured into them, as in canning fruit. Is this correct? A. No. Glass expands when heated, and if heated unequally is liable to break. In a jar of this description it is better to have the outside of the jar quite dry and warm or hot.

(33) A. L. H. asks: What are the rules for proportioning the lenses of a terrestrial eyepiece for a telescope, having given the power required, diameter and focus of the object glass? In the eyepiece described in No. 1 of the SCIENTIFIC AMERICAN SUPPLEMENT (Fig. 3), is the second image, a' b', a magnified image of a b, or are the lenses, r, r', and s, used only to invert the image, a b? I wish to increase a little the power of such an eyepiece. Is it necessary to change all four of the lenses, or only the one nearest the eye? A. The best proportions for focal length of the lenses are 3, 4, 4, 3. The power is about the same as if the outer lenses were used alone, separated half their focal distance. Plano-convex lenses are generally used, although variations from these forms are used by different makers for special reasons, arising from different formulas for correcting both aberrations. The power can be varied slightly by changing the distance of r' and s in Fig. 3, No. 1, SUPPLEMENT. The image, a' b', Fig. 3, as above, may be varied also by varying the distance of 3 and t, but ought not to interfere with the general adjustment for achromatism. The lenses, r and r', are the inverting system.

(34) R. W. asks: Is there a chemical process for distinguishing between the different vegetable fibers? A. Yes; dyes are occasionally advantageously employed for this purpose. See articles on "Fibers," in Wagner's "Chemical Technology."

(35) F. A. L. asks: Can you tell me how to remove rust from tools, such as saws, chisels, etc.? A. If very rusty scour first with emery moistened with sulphuric acid diluted with six volumes of water, rinse, dry, and finish with oil and emery flour.

(36) A. L. W. asks: Can you tell me if there is anything (not costly) in which I can soak silk to remove the color (brown) so that it can be recolored red, or so that it will remain light? A. You can try a strong solution of sulphurous acid in water.

(37) T. H. S. asks if as strong a weld in iron can be made by hydraulic pressure as by hammering. A. Wrought iron can be welded by hydraulic pressure as perfectly as by hammering, provided you make the time of contact as short as it is with the hammer. It is the quick stroke that keeps up the heat on the surface and makes what is called a smooth weld. The slow hydraulic pressure would, no doubt, make the interior contact perfect.

(38) E. H. writes: Having a well protected covered one-inch steam pipe connected at boiler dome (boiler supplying 70 horse power engine, pressure 65 pounds), the pipe is carried about 400 feet; steam is not used constantly; condensation of steam takes place too rapidly at terminus. Would you advise for the steam passing through a worm (12 inches diameter, eight or ten rings) incased in an oven or heater to superheat the steam before utilizing; or do you think it will in any way interfere or endanger working of boiler? A. Steam passing through such a heater would not in any way endanger or interfere with the operation of the boiler.

(39) H. A. B. asks: What is the fastest regular time made by the passenger trains in this country, and also in England? A. From Jersey City to Philadelphia, 90 miles, in 1 hour 50 minutes, and about 54 miles per hour on English fast express. 2. What is the diameter of the driving wheels used upon the passenger engines in England? A. In this country 5½ feet to 6½ feet, and in England 6½ feet to 8 feet. It is claimed that on the West Jersey road 70 miles per hour has been accomplished.

(40) W. G. S. writes: My engine is an upright, and has two cylinders 6½ inches each diameter. The steam supply pipe is only 1¼ inches diameter. I am working with only one cylinder. When both are connected they fill with water from the boiler. Is the steam pipe too small? Would that cause the cylinders to take water? A. The steam pipe would not cause the engine to take water. Probably the steam chamber or capacity of your boiler is too small when using both engines.

(41) H. H. asks: What has been the fastest time made on railroads in Europe, and where? A. London and North Western, 73 miles per hour, and on London and South Eastern, 64 miles per hour.

(42) J. A. writes: In compressing a cubic foot of air at 60° into the space of half a cubic foot, will not its temperature be raised to 120° and its pressure to 15 pounds per square inch, provided there be no loss by radiation or otherwise? In short, what is the law of increase of temperature of air by compression, and in contrary its decrease by expansion? Wind power here is cheap, though unsteady, but might it not be utilized by raising heavy weights, and from the slow descent of which, by proper gearing, small but constant power be derived; or might not stout coiled springs be used instead of weights, if there are any makers of such machinery or any known records of attempts in that line? A. Air compressed at 60°, two vols. into one, takes a theoretical temperature of 192° and a pressure of 20 pounds per square inch; falling upon cooling to its normal temperature to 15 pounds pressure where provision is made for cooling the air in the pump and discharge pipe, the pressure will be 4 volumes to 1=30 pounds, 8 volumes to 1=60 pounds, and so on. The contrary effect takes place when compressed air is expanded from some normal temperature (say 60°), with variations in practice resulting from the absorption of heat by the surrounding material at the instant of expansion.

The decrease of heat from 60° when one vol. is expanded to	1½	vols.,	64°
" "	2	"	104°
" "	3	"	155°
" "	5	"	210°
" "	10	"	279°

or as above, to discharge a constant stream of air from a tank at a temperature of 60°, and under a pressure of 15 pounds, will lower the thermometer at the point of discharge to 40° below zero, outward influences modifying this result somewhat in practice. A constant small power may be utilized from the irregular action of a windmill, by pumping water into a reservoir, or compressing air into cylinders for the purpose of driving a water or air engine; or by the winding up of heavy weights and distributing the power through a train of gearing or pulleys; or by converting the power into electricity and storing it in storage batteries.

(43) W. L. G. asks: Referring to the article on tinning, in SUPPLEMENT, No. 310, is protochloride of tin and muriate of tin crystal or solution, the same article? A. Protochloride of tin or tin salt (stannous chloride) refer to the same salt. It is also occasionally called tin crystal. Tin liquor is stannic chloride, or a mixture of the stannous and stannic chlorides (lower and higher chlorides of tin). 2. What preparation does brass need before dipping? A. Brass may be most readily cleansed for this purpose by first passing it through the hot potash dip, and after rinsing in plenty of cold water, dipping it momentarily in a cold mixture of equal parts of sulphuric and nitric acids and quickly rinsing again.

(44) E. E. O. asks: What circumferential speed will it take to burst a disk of uniform thickness of cast iron? of steel? Is the following formula for finding the speed correct? $32\frac{1}{6}\sqrt{\frac{L}{16\frac{1}{12}}}$ in which L equals the length in feet of a bar of uniform size, which will support itself by its tensile strength? A. For cast iron 6,000 feet per minute; for steel, 35,000 feet per minute. The formula that you give is a safe one, as it is about two-thirds the limit given above.

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

C. B. C.—It is a fragment of fluorspar.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

April 25, 1882,

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 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Adjustable chair, J. Pursell 257,065
Alarm. See Knob alarm. Telephone alarm.
Album clasp, P. Hufeland 257,012
Axle box, car, G. F. Godley 256,997
Axle box, car, Troup & Germer 257,109
Bag fastener, W. B. Purvis 256,856
Bag or satchel, R. Harris 257,063
Baking powder, manufacture of, A. Giesecke 256,832
Bathing tub, cabinet, E. F. Collins 256,886
Bed, H. Buckingham 256,969, 256,970
Bedstead, folding, C. F. Youngberg 256,942
Bedstead, sofa, T. Soden 256,925
Bedsteads, clothes rack attachment for, J. Monzel 257,044
Bee hive, F. D. Torre 256,932
Belt guide and tightener, J. Mills 256,913
Belt tightener, F. Snyder 257,098
Bicycle stand, C. Wicksteed 256,936
Bit and washer cutter, extension, J. W. Cooper 256,979
Blanket fastener, O. Sweet 256,865
Bleaching woven fabrics, etc., apparatus for, W. Birch 256,95
Blinds, support for inside window, C. M. Young 257,125
Block. See Pictorial story block. Saw mill head block.
Bluing package, E. W. Gillett 256,935
Board. See Wash board.
Boiler furnace, steam, C. I. Hall 257,060
Bolt. See Door bolt.
Boot or shoe heel, E. S. Moulton 256,848
Bottle stopper, P. Miles 257,042
Bottle stopper, S. S. Newton 257,053
Bottles, combined label, guide slip, and wrapper for, J. Livor 257,136
Box. See Axle box. Mailing box. Miter box.
Box fastener, G. E. Crane 256,823
Bracket. See Lamp bracket.
Braid trimming, device for and method of forming, D. Henius 256,895
Brake. See Car brake.
Brick machine, hammer, E. F. Andrews 257,126
Buckle, J. H. Wood 257,122
Buckwheat hulling machine, G. S. Cranson (r) 10,091
Cable way, underground, H. Casebolt 256,881
Cake and confectionery machine, J. H. Mitchell 257,043
Camera attachment, W. L. Brown 256,906
Can. See Oil can.
Can nozzle, shipping, Wilson & Bools 257,120
Candles, shade or globe holder for, D. Leary 257,027
Capsules, manufacture of metallic, A. Sichel 257,090
Car brake, J. H. Burks 256,876
Car coupling, C. G. A. Alexander 256,943
Car coupling, M. Bergan 256,953
Car coupling, C. K. Cordrey 256,822
Car coupling, N. J. Glover 256,996
Car coupling, D. T. Hubbell 257,011
Car coupling, A. Rice 256,859
Car coupling, C. P. Wilson 257,119
Car, stock, J. B. Calkins 256,887
Car wheel, T. E. Knauss 256,841
Car windows, dust guard for railway, J. H. Reynolds 257,068
Cars, grain door for freight, J. R. Sprague 257,099
Cars, lever for starting and moving, R. K. Evans 256,829
Carpet fastener, J. A. Cole 256,978
Carpet stretcher, W. E. Henderson 256,838, 256,839
Carriage wrench, E. A. Robbins 257,072
Carrier. See Hay carrier.
Case. See Needle case.
Case for preserving food, J. J. Hoyt 257,010
Chair. See Adjustable chair. Railway chair.
Chandelier, S. S. Newton 257,055
Chimney, J. M. Patterson 256,919
Churn, Bruner & Lewis 256,967
Churn, J. Cochran, Jr 256,975
Churn, B. H. Overhiser 256,851
Churn cover, E. C. Richardson 257,071
Clasp. See Album clasp. Corset clasp.
Clevis, whiffletree, J. E. Smith 257,096
Clock movement, F. A. Lane 257,025
Clock pendulums, mechanism for regulating, J. W. Williams 256,988
Clothes line fastener, W. H. Josselyn 257,015
Coal and iron unloader, A. Beckert 257,128
Coal screen, Dodge & Righter 256,987
Coat, waterproof, Landstreet & Towner 257,024
Collar, horse, G. P. Cole 256,977
Collar, horse, W. H. Hall 257,002
Colter, wheel, W. B. Young 256,941
Comb. See Folding comb.
Cooler. See Milk cooler.
Copying press, L. Bailey 256,815
Corkscrew, H. L. Perryman 257,062
Corn off the cob, machine for cutting green, W. Sprague 256,926
Corset and abdominal and skirt supporter, combined, F. A. Dietrich 256,888
Corset clasp, D. H. Tierney 257,106
Cot and bedstead, folding, C. T. Segar 257,085
Cotton press, M. M. Scherer 257,079
Coupling. See Car coupling.
Crusher. See Stone crusher.
Cultivator, T. Meikle 257,039
Cultivator, cotton, J. R. Howard 257,009
Cultivator, sulky, J. W. Rockafellow 257,074
Cup. See Dental impression cup.
Cuspidor, C. F. Markland 257,137
Dental flask, M. H. Carpenter 256,879
Dental impression cup, J. V. McMann 257,038
Dental mallet, J. B. Odell 256,850
Detachable handle for tea cups, etc., J. W. Davis 256,983
Detecter. See Time detecter.
Digger. See Potato digger.
Door bolt, W. B. Purves 257,141
Door hanger, L. Terry 256,929
Doubling and winding silk, etc., machine for, J. E. Atwood 256,948
Drier. See Fruit drier.
Drilling machine, multiple, C. T. Parry 257,061
Drum, heating, C. H. Chapman 256,832
Electric communication, device for underground, B. F. Teal 256,866
Electric machine, dynamo, W. Hochhausen 257,007
Electric meter, C. V. Boys 256,965
Electrical generation and distribution, system of, H. S. Maxim 256,910
Electro-magnetic escapement mechanism, J. M. Gardiner 256,994
Elevator. See Platform elevator.
Elevator gate, automatic, J. Cushing 256,981
Elliptic springs, die for making, C. T. Schoen 257,080
Engine. See Steam engine. Steam and compressed air engine. Traction engine.
Eyeglass frame, F. A. Schorr 256,861
Fan, J. North 257,058
Fanning mill, J. D. Bush 256,972
Faucet, U. Bohren 256,873
Faucet and automatic toy, combined, F. C. Zanetti 256,868
Fence, H. E. Johnson 257,013
Fence, portable, E. Stahl 257,101
Fence post, W. Cline 256,884
Fence wire barbed, G. Case 256,880
File, paper, A. R. Weiss 257,115
Filter, W. A. Pitt 256,853
Finger, scarf, and other jewelry rings, R. J. La Grange 257,023
Fire alarm registering apparatus, Randall & Byington 257,067
Firearm, breech-loading, C. W. Sneider 257,097
Fire escape, N. H. Borgfeldt 256,874
Fire escape, F. P. Fish 256,990
Fishing, spoon bait for, W. T. J. Lowe 256,843
Flask. See Dental flask.
Flue register, air, H. A. Tobey 257,107
Fodder holder, W. S. Tilghman 256,931
Folding comb, J. Lowe 257,083
Frame. See Eyeglass frame. Picture frame. Pump frame.
Fruit drier, J. M. Teasdale 256,927
Fruit picker, E. Case 256,818
Fumigating, disinfecting, and ventilating vessels, buildings, etc., apparatus for, B. J. Tayman 257,104
Furnace. See Boiler furnace. Smoke consuming furnace. Smoke purifying furnace.