

## ENGINEERING INVENTIONS.

A car-axle-box brass has been patented by Messrs. Daniel Reynolds and Joseph S. Murray, of Allegheny, Pa. It covers only about one-fifth of the surface of the axle journal, instead of almost one-half, as the common broad brasses do, and is intended to reduce friction and wear, make the lubrication more effective, and economize the hauling and driving power.

A car coupling has been patented by Mr. George H. Lipe, of China Grove, N. C. This invention has for its special object to provide for easily uncoupling cars jammed or crowded together when they stop, the coupling pin being supported by an apertured sliding plate which is forced back by the approaching car to allow the coupling pin to fall to coupling position.

A cable traction for street cars has been patented by Mr. Orlando H. Jadwin, of New York city. This invention relates to the gripping attachments and covers improvements on former patented inventions of the same inventor, relative to relieving the cable of the weight of the gripping attachment by a counterbalance and the means of attaching the grip to the car by links, so the gripping attachment was made to lift with the cable away from its supporting pulleys.

## AGRICULTURAL INVENTIONS.

A cultivator has been patented by Mr. Norris H. Shepardson, of West Halifax, Vt. It is so made that it can be readily extended or contracted in width, and can be conveniently turned around and moved from place to place, the invention covering a novel construction and combination of the various parts.

A plow has been patented by Mr. Wellington Shaver, of Medusa, N. Y. The construction is such that the plow can turn a furrow up hill more effectively than an ordinary plow, while it is also designed to prevent sods, clods, lumps, or other rubbish from passing over the mould-board into the central part of the plow, and thus clogging or choking it.

A plow has been patented by Mr. Andrew McLean McGregor, of Moss Point, Miss. This invention provides for such a construction of plows that they can be readily adjusted for use as a right or a left plow, or a right and left plow, as may be required, which will be strong and simply made, while the various parts can be made small and the implement used as a hand plow.

A self-clearing breaking plow colter has been patented by Mr. Benjamin C. Brownell, of Center Junction, Iowa. A spindle-like roller with an outwardly flaring top extends upward and backward from the point of the colter, and operates so that when the plow catches obstructions they are forced up and catch the roller, which revolves and discharges itself.

A rotary colter has been patented by Mr. John Feger, of Lenzburg, Ill. The object of this invention is to make a colter for plows in which the cutting plates will be held securely in position, and the parts subject to wear can be readily taken out and replaced by new ones.

## MISCELLANEOUS INVENTIONS.

A latch has been patented by Mr. Francis Keil, of New York city. The invention consists of novel locking devices in connection with the dog by which the bolt is retracted by a key from the outside, and in a peculiar form of key for the outside locking mechanism, with other special details.

A chimney support for telegraph wires has been patented by Mr. Albert Potts, of Philadelphia, Pa. It consists of a frame clamped to the chimney top and supporting a short telegraph pole suitably braced, the frame and the pole carrying insulators for supporting the electrical conductors in the usual way.

A wrench has been patented by Mr. Michael S. Weller, of Charlestown, W. Va. It has a novel construction by means of which a face section is removably held to one of the jaws of the wrench, being an improvement in that class of wrenches known in the trade as "alligator wrenches."

A washing machine has been patented by Mr. Elmer E. Allison, of Hillside, Pa. It consists of a tub with a rubber to be operated to rub and squeeze the clothes on the bottom of the tub, the rocking of the rubber rubbing and squeezing the clothes between rubber disks and cleats in the tub.

A folding music stand has been patented by Mr. Oswald S. Vaughan, of Glasgow, Mo. It is an arrangement of tubes and rods so pivoted and joined together that the stand can be folded very compactly for carrying conveniently by a handle, and can be quickly set up as a strong and durable stand.

A sash fastener has been patented by Mr. Robert Kemper, of Foster, Ky. This invention consists in a special design of a lever, to which is pivoted a brace lever, making a simple device for locking sashes so they cannot be raised from the outside, and for holding the sash at any desired elevation.

An extension table has been patented by Mr. George Schmitt, of New York city. This invention covers improvements on a class of extension tables formerly patented by the same inventor, and consists in a novel construction and combination of the various parts of the table.

A saw mill dog has been patented by Mr. Nathaniel J. Cushman, of North Paris, Me. This invention covers a special construction and arrangement of parts to provide for the carriages of saw mills a dog for clamping green frozen logs upon the saw mill carriage while being sawed into boards, planks, or joist.

A riving machine has been patented by Mr. Israel A. Davis, of Englewood, Cal. Combined with a series of frows or knives is a rotary shaft passed loosely through their upper ends, with arms mounted on the shaft between the frows and constructed to remove the split material, with other novel features, making an improved machine for splitting boards, shingles, etc.

A flood gate has been patented by Mr. John Dailey, of Van Wert, O. It is intended to prevent animals from passing up or down a stream, but is so arranged that when struck by any heavy debris it will swing and be automatically raised to allow its passage, the gate being so mounted that it may be raised quite a distance above the bed of the stream if desired.

A shipping tag has been patented by Mr. John A. Pegg, of Jonestown, Miss. It is a metal tag or label through which the shipping marks are to be punched, the metal plate having serrated edges on two opposite sides, and flanges, the tag to be secured to a tie by springing the flanges with a pair of pliers with wide jaws.

A lead for setting stained glass has been patented by Mr. Jacob Pfleging, of New York city. It is a lead having grooves formed in it in combination with stiffening strips made of plates of tin or other metal, both edges of the strips being grooved, such plates rendering the panels sufficiently firm and rigid without separate braces or rods.

A coffee roaster has been patented by Mr. Mathias A. Laska, of New Orleans, La. The stirring arms or blades are placed loosely on the revolving shaft, and held in contact on the bottom of the roasting pan by aspiral spring, preventing the coffee beans from clogging up the arms, and roasting them equally and effectually.

A stove pipe damper has been patented by Mr. George C. Fraser, of Port Sanilac, Mich. The pipe has semicircular partitions and pivoted semicircular damper valves arranged therein, so the smoke and draught must pass through the pipe on a zigzag line, and the partitions stop the sparks, permitting the easy government and regulation of the fire.

A churn has been patented by Mr. Peter Hauerperger, of Urbana, Ill. The cream box is rectangular in horizontal cross section, and is formed with a wedge-shaped bottom, which permits a small quantity of cream to be churned with as much care as a larger amount, the churn being an oscillating device which may be constructed of either wood or metal.

A wood carrier has been patented by Mr. Charles G. Fransson, of Norway, Mich. It consists of a strip of canvas so folded as, with gores, to form a pocket, the ends being provided with bars, the canvas having hand holds to grasp the bars, and the bars also having hooks and eyes by which the canvas can be fastened around the bundle of wood.

A sheep protector has been patented by Mr. William L. Lewis, of Sweet Springs, W. Va. It has about the shape of a horse coat or covering, and is made of oiled sail cloth or rubber fabric or other similar material, and is specially cut and fitted so it will not hold snow and moisture, and will thus be an effective protector for animals against the weather.

A velocipede has been patented by Mr. Samuel Martin, of Mill Rock, O. It has two driving wheels actuated by hand and foot levers, a swinging frame and seat, a guide wheel in turning bearings, and a specially devised brake, and it is to be propelled by one, two, or more persons, being adapted to attain a great rate speed, and to carry passengers and freight.

A windmill has been patented by Mr. Jules R. Desjardins, of Burlington, Vt. It has a novel mechanism for adjusting the stops that regulate the position of the hinged fans or sails, to provide for checking the speed of the wheel automatically when the wind pressure is excessive, and when the wheel is not in use it can be arranged so that the fans offer no resistance to the wind.

A book clasp has been patented by Mr. Jacob Monch, of Offenbach, Germany. It consists in a hollow slotted pintle containing a threaded spindle, one-half of which is threaded with a right handed thread and the other half with a left handed thread, by which specially devised arms can be spread or contracted, so a book, album, or file fitted therewith will be adapted to contents of variable quantity.

A vehicle brake has been patented by Mr. James L. T. Linson, of Johnson County, Mo. This invention covers certain novel features of construction and combination of parts, so that when the draught is applied the brakes will be taken off the wheels, and so held, and when the vehicle moves suddenly forward on a down grade, the brakes will be automatically applied to the wheels.

A chain bolt for doors has been patented by Mr. James B. Hawes, of North Tarrytown, N. Y. Combined with a sliding bolt and its chain applied to a door and casing or a double door is a supplementary chain with one end connected to the other chain or its support, and the other end detachably connected to the bolt or its chain, the device being also for use as a door fastening when the doors are fully closed.

A whale shaped museum building has been patented by Mr. Anthony Ward, of Brooklyn, N. Y. It has a movable lower jaw, with movable teeth, to admit spectators, and gravity cars to carry them out, while there are ventilating openings in the back, and above the back are placed perforated pipes, whereby a fine spray of water can be showered upon the back of the whale to keep the main chamber cool.

A shingle has been patented by Mr. Robert C. Snowden, of Elizabeth, Pa. It is formed of sheet metal, having interlocking portions and provided with a lateral horizontal flange terminating short of the end of the shingle, whereby to form a stop for the adjacent shingle, with other novel features, to combine ornamentation with strength and ease of application and removal.

A tension mechanism for spindles of metal working machines has been patented by Mr. James Hartness, of Torrington, Conn. Combined is a cross pin or key, a spring acting on the key, and a cam plate on which the key is turned, with other novel features in an improved spindle, intended to allow the tool to yield as the strain approaches the breaking point, but not to yield until this point is almost reached.

A safety attachment for watches, etc., has been patented by Mr. Otto G. Faber, of Washington,

D. C. Combined with a chain swivel having a supplemental hook and a latch for closing the same is a back plate with perforations, supporting bail, and other novel features, to prevent watches from being dropped out or stolen from the pocket, while the attachment is one which can be conveniently applied to a garment.

A stove has been patented by Mr. Frank Brielmair, of Nashville, Tenn. It has a partition on one side of the firebox, between which and the outer wall is a compartment having slides, and a perforated outer casing through which a lug on the slide passes, the partition having apertures at its top and bottom, with other novel features, for the more perfect regulating of the draught.

A machine for making lead pipe has been patented by Mr. Christopher C. Tracy, of Brooklyn, N. Y. This invention consists principally in a movable receiving reservoir, which can be moved to and from the point of alignment with the die holder, thus facilitating the removal of the mandrel as desired for replacing it with others for different sizes, and also the pouring of the molten metal.

A beer and water cooler has been patented by Mr. Joseph F. Shomate, of El Dorado, Ill. There is a refrigerating box for receiving the barrel or keg, and another box with a cylinder, the liquid being conducted from the barrel through this cylinder, which is surrounded by broken ice, and the whole being mounted on castors for ready moving from place to place.

A gas regulating burner has been patented by Messrs. Joseph J. Butcher and Johann H. Wuster, of Newcastle-upon-Tyne, England. A small permanent flame is used, beside the larger burner which has to be lighted, and the working part of the apparatus consists of a valve actuated by the pressure of the gas, the edges of the valve being sealed by mercury, there being a pressure governor, which may or may not be used with the apparatus.

## NEW BOOKS AND PUBLICATIONS.

THE AMATEUR PHOTOGRAPHER. By Ellerslie Wallace, M.D. Philadelphia: Porter & Coates.

The art of photography has, of late, attracted so many enthusiastic amateurs, that a large and increasing literature has sprung up to meet the inquiries of the beginner. Of the host of writers who have thus endeavored to throw some light on dark places, probably none has succeeded better than Dr. Wallace. His convenient little manual presents a clear and concise description of the different apparatus and processes. An ardent amateur himself, at a time when the mysteries of the art were little known outside of the professional studio, the author has had an excellent opportunity to study the development and merits of recent methods. So well has he availed himself of this opportunity, that he is now a recognized authority on the subject. While the size of the book prevents it from being at all exhaustive, it covers as much ground as the ordinary amateur will have time to master, and can be recommended to him as a trusty guide.

ASSIGNMENTS OF PATENT RIGHTS. Compiled and arranged by Schuyler Duryee, Chief Clerk of the U. S. Patent Office. Washington: Schuyler Duryee, 1886. Price \$3.

Numerous questions respecting the assignment of patent rights are constantly arising. To answer them intelligently, it has heretofore been necessary to search through an almost equal number of works of reference. Mr. Duryee's experience, as Chief of the Assignment Division of the United States Patent Office, gave him an opportunity to feel the urgent need of a classified digest of decisions relating to the transfer of patent rights. It is the purpose of his work to supply this want, and as far as we have been able to examine it, he has succeeded admirably. An alphabetical list of cases cited precedes the index. A digest of decisions and the statutes relating to assignments are then given. The proper forms for all deeds respecting the whole or partial transfer of patent property, or its use under specified conditions, are exhibited in full. The work will be found a valuable addition to the literature of patent law.

Education (Wm. A. Mowry, publisher, Boston) for April contains a number of interesting papers on educational subjects. "The Relation of the Secondary School to the College," by Mr. Willard, offers several valuable suggestions regarding the adoption of a uniform standard for admission of students to colleges and the establishment of some degree of co-operation between these institutions and the preparatory schools. The development of the Amherst idea, as described in Mrs. Houghton's "Evolution of a College Republic," is of particular ethical interest. Dr. Lowrey also continues his discussion of the "Philosophical Phase of a System of Education." Current events are well presented in the editorial columns.

The Lidgerwood Manufacturing Company, whose works are in Brooklyn, N. Y., and who have salesrooms in both New York and Boston, have just issued a handsome illustrated catalogue of their hoisting engines, of which they make a great variety, and of their stationary and marine boilers and general steam fittings.

Messrs. Jones & Laughlins, of Pittsburgh, Pa., present a new illustrated catalogue of their cold rolled steel and iron shafting, couplings, pulleys, pulley stands, binder frames, jib frames, etc. In this connection are appropriately added Professor Thurston's conclusions as to the advantages of cold rolled iron and steel, with a list of shapes and sizes of iron and steel supplied cold rolled by the firm.

Messrs. Guild & Garrison, of Brooklyn, N. Y., describe some of the most important of their steam pumping machinery in a recently issued catalogue. Besides making pumps for almost every known industrial use, the firm also make air and gas blowers, high speed air compressors, etc.

## Special.

## ANOTHER HOUSEHOLD NECESSITY.

Mr. Wild, the Inventor of Linoleum, notes a Discovery as Valuable as his Own.

Fifteen or twenty years ago it was found that a floor-covering could be made, looking like oilcloth and lasting as long or longer, and yet without that coldness to the tread which is one of the peculiar characteristics of oilcloth. The new article was made of very finely ground particles of cork, mixed with linseed oil and other substances in mysterious ways which need not here and now be described. "Linoleum" was the name selected for it. At first it was put before the public on a very small scale. But its merits created a great demand for it, and it is now a household institution, both in this country and in England. At the head of the Linoleum business, in this country, is the well known house of Joseph Wild & Co., of 84 Worth St., New York.

The senior partner of this firm is Joseph Wild, Esq., a resident of South Brooklyn, and one of the most hearty looking gentlemen of his age anywhere to be seen. He is considerably over seventy, with snow white hair, erect form, and a very cheerful countenance. To look at him one would suppose he never had suffered a day's illness in his life. Yet there was a time when Mr. Wild was an invalid, worn by active attention to business, and seeming to be on the verge of total nervous prostration. Concerning his invalidity and his restoration to health, one of our correspondents recently had a little conversation with him at his store.

"They tell me you were considerably run down in health, Mr. Wild?"

"It is very true, sir. I was not bed-ridden, nor was I entirely laid aside from business, but I had given myself very closely to my business affairs, and my duties in connection with the church and some of the Baptist benevolent societies had weighed heavily upon me. A younger man than I might not have felt these burdens as I did, but at my time of life they began to make their mark on my constitution. I felt a lack of vitality, and realized that my nerve power was about to fail me. My appetite was not as it formerly had been, and my digestion was somewhat disordered. I needed, in fact, revitalization. About this time I heard of Compound Oxygen, and I made inquiry of Dr. Turner, in charge of the New York office of this remedy, to see if it could be applicable to me. Learning from him that others who had been run down as I was had been benefited by the Compound Oxygen, I procured a 'Home Treatment,' with considerable doubt as to whether or not it would do me any good. This was about two years ago. Since that time I have been taking Compound Oxygen, not all the time, but frequently at intervals, when I have felt the need of it."

"Then you received decided benefit from it at the outset?"

"Very soon after I began to inhale I found that I was receiving new strength. And I was glad to note that it was real strength, and not a mere stimulus. I noted also the steadiness of my improvement. There was no falling back, but a constant and reliable advance. Daily I could feel an increase of vitality. My spirits were better and my power of action was greater. I was able to attend to my business and to all my other duties with far less strain on me than I had for sometime previously experienced."

"And so you now find yourself as well as ever, and beyond the necessity of medicine?"

"For a man of my years I am as hearty and vigorous as I can expect. I am free from disease and pain, and am attending to as much detail of business as if I were only fifty years old. As to medicine, I have no use for it, drug medicine I mean. I do not call this Oxygen exactly a medicine; certainly not in the sense that drugs are medicinal. I regard it as a wonderful vitalizer and invigorator. And it is as such that I even now occasionally resort to it when I feel the need. I keep it in the house and intend to continue doing so."

To the many gentlemen of advancing years who are overworked and weary, and who feel themselves in need of revitalization, Compound Oxygen is, as in Mr. Wild's case, a valuable helper. Thelate T. S. Arthur, of Philadelphia, was brought almost from the grave by this means when he was quite an old man, and by it his life was prolonged for a number of years. The Hon. Wm. D. Kelley, of Philadelphia, who is beyond seventy, attributes to Compound Oxygen his recovery from what had been pronounced a fatal disease. He still uses the Oxygen as a vitalizer, and is in vigorous condition, attending to his legal and congressional duties as actively as if of old.

For a valuable treatise on what Compound Oxygen is and what it does, write to Drs. STARKEY & PALEN, 1523 Arch Street, Philadelphia. The treatise will be mailed free of charge.

## 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.

Carbon Plates. Bowe, 26 Harmon St., Jersey City, N. J.

For Sale—2d hand Daniels Planer (24 in. wide, with 15 ft. carriage), just put in thorough repair. Price \$150 (a bargain). Address Witherby, Rugg & Richardson, Worcester, Mass.

For Sale—Patent for Keyless Combination Alarm Door or Drawer Lock.—T. Mabbett, Jr., 130 Dock Street, Philadelphia, Pa.

Wanted—A mechanical engineer of experience to take charge of the mechanical department of our shops. Address, with references, U. S. Cotton Harvester Co., Room 68, Cotton Ex. Building, New York City.

Wanted—An experienced foreman for a machine shop in the West, employing an average of 50 hands; must be thoroughly conversant with engine practice and general machine work, with experience in the economical management of men. Give reference and salary expected. Address "J. M. H.," P. O. Box 773, New York.

Send to the Railroad Gazette, 73 Broadway, New York, for a catalogue of Locomotive, Track, and other railroad books.

Emery Wheels of unusually superior quality for wet grinding. The Tanite Co., Stroudsburg, Monroe Co., Pa. Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Pumps for liquids, air, and gases. New catalogue now ready.

Wanted—To correspond with a practical door, sash, and blind maker; one who would be fully competent to take full charge of a factory and could give correct estimate of machinery needed, cost of manufacture, probable demand and margin. One that could take an interest would be preferred. Address Mr. H. H. Durkee, 43 Broad St., New York.

A competent steam engineer and mechanic wanted. Address box 5183, Boston, stating wages.

See Burnham Automatic Engine adv. last and next week.

Curtis Return Steam Trap returns all condensations into the boiler without waste. Curtis Regulator Works, Boston, Mass.

**Wanted.**—A Mechanical Draughtsman wanted to go West. One acquainted with wood working machinery preferred. Steady employment to a sober and industrious man. Address, with full particulars, stating wages expected, etc., "Western," P. O. Box 773, New York city.

**Wanted.**—Patented articles of merit to manufacture on royalty. Electric Mfg. Co., 311 River St., Troy, N. Y. Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. \$100 "Little Wonder." A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty St., New York.

**Grimeshaw.**—Steam Engine Catechism.—A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimeshaw. 18mo, cloth, \$1.00. For sale by Munn & Co., 361 Broadway, N. Y.

Wm. Frech, Sensitive Drill Presses, Turret and Speed Lathes combined, Power Punching Presses, 68 W. Monroe Street, Chicago.

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

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

**Haswell's Engineer's Pocket-Book.** By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form, \$4.00. For sale by Munn & Co., 361 Broadway, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 130 Center St., N. Y.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

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

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

**Nystrom's Mechanics.**—A pocket book of mechanics and engineering, containing a memorandum of facts and connection of practice and theory, by J. W. Nystrom, C.E., 18th edition, revised and greatly enlarged, plates, 12mo, roan tuck. Price, \$3.50. For sale by Munn & Co., 361 Broadway, New York city.

Tools, Hardware, and other specialties made under contract. American Machine Co., Philadelphia.

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

Cyclone Steam Flue Cleaners are the best. Crescent Mfg. Co., Cleveland, O.

Curtis Pressure Regulator and Steam Trap. See p. 142.

Cushman's Chucks can be found in stock in all large cities. Send for catalogue. Cushman Chuck Co., Hartford, Conn.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Friction Clutch Pulleys. D. Frisbie & Co., Phila.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv., p. 158.

"Wrinkles in Electric Lighting," by V. Stephen; with illustrations. Price, \$1.00. E. & F. N. Spon, New York.

Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Astronomical Telescopes, from 9" to largest size. Observatory Domes, all sizes. Warner & Swasey, Cleveland, O.

"Affliction sore long time he bore  
Physicians were in vain."

But had he used Dr. Pierce's "Golden Medical Discovery," the greatest blood purifier known, he might still be living. For all scrofulous diseases this preparation is a sovereign and never-failing remedy. All humors, from a pimple to an ulcer, yield to it. It will cure consumption (which is a scrofulous disease of the lungs) if taken in time. All druggists have it.

Catarrh, Catarrhal Deafness, and Hay Fever permanently cured by a new treatment, in from one to three simple applications, made at home. Send stamp for descriptive pamphlet to  
Dixon & Son, 308 West King St.,  
Toronto, Canada.

## Notes & Queries

### HINTS TO CORRESPONDENTS.

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

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

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

**Special Written Information** on matters of personal rather than general interest cannot be expected without remuneration.

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

**Books** referred to promptly supplied on receipt of price.

**Minerals** sent for examination should be distinctly marked or labeled.

(1) J. A. K. writes: I have a telephone wire running from my house to the store; how can I attach a ground wire to prevent lightning from following the telephone wire into the house or store?

A. Carry a wire from your gas fixtures or water pipes to the vicinity of your telephone. Let it terminate in a metal comb about two inches long, with forty or fifty sharp teeth like a saw. Screw this to a board. Opposite, and with its teeth facing those of the first comb, place a second one connected to the line wire near the telephone, between it and the line. Have the teeth of the two combs as close as possible without absolute contact existing. Use one of these attachments at each end of the line.

(2) E. R. W. asks: 1. Does it take a current of higher tension to run an incandescent lamp than an arc lamp? A. In general terms, it is the other way; more intensity is needed for the arc light. 2. Will a ten inch Grenet cell run a 6 candle power incandescent light? A. No. 3. Suppose I wish to light a private residence with incandescent lamps; would it be economical and profitable to use a Shipman automatic engine to run a dynamo of sufficient size? A. Electric lighting on the small scale with special plant is not economical as a rule. 4. What is the best battery for telegraphic purposes? A. For closed circuit, gravity (sulphate of copper) batteries are largely used. For open circuit work, Leclanche cells.

(3) J. T. D.—A solution of orange shellac in alcohol is generally used on the plates of electrostatic machines.

(4) C. P. K. asks: Will a solution of bichromate of potash and sulphuric acid corrode or eat its way through a wooden tank lined on the inside with lead? Can the same fluid mixture be contained in a wooden tank coated outside and in with asphaltum varnish? If so, how long would such a tank last? A. Either tank will answer for battery fluid for an indefinite period. If oil of vitriol and bichromate of potash, undiluted by water, were used, then a lead lining would be requisite. Exact durability cannot be given.

(5) H. W. B. asks: 1. What difference does it make in the strength of an electro magnet whether the coils are wound in regular layers or put on roughly? A. The power of an electro magnet depends on the proximity of the exciting wire to the core and on the number of convolutions. To secure these ends, the wire should be smoothly laid. 2. Which would work best on a short telephone line of 200 feet in length—telephones wound with No. 34 cotton-covered wire or those wound with No. 36 wire? A. The No. 34 wire telephone. 3. What is the penalty for making, selling, or using a telephone? A. This is determined in the courts; there is of course no statutory penalty. 4. What could be done to a person for connecting a telephone to a line wire if it did not interfere with the working of the line, and he could not use it for conversing, but only for listening? A. This might give rise to a suit for infringement or for trespass, or possibly something much more serious than either of these. 5. Where is the best place to take a course in electrical engineering, and also in mechanical engineering, with length of courses? A. The Stevens Institute of Technology, Hoboken, N. J.; the Boston Institute of Technology, Boston, Mass.; or the Sibley Mechanical College of Cornell University, Ithaca, N. Y. The course is generally four years.

(6) O. W. asks how to make a cheap and also a very good battery. I have three glass jars, each about 8 inches high and 6 inches wide. A. Use flat carbon plates, about 8 inches by 4 inches by  $\frac{1}{4}$  inch, and zincs to match, but thinner. Amalgamate the zincs by rubbing with mercury, keeping the surface moist with dilute sulphuric acid. One zinc may be used as a rubber for the other. For exciting fluid, mix five fluid ounces of oil of vitriol with three pints of cold water, and after it has cooled add six ounces finely powdered bichromate of potash. A little nitric acid will improve the constancy. Each cup contains one plate of zinc and one of carbon; connect zinc of one to carbon of next; do not let the plates touch each other under the fluid.

(7) W. J. McC. asks how to take the sound off an acoustic telephone into a receiver, and also how to make the receiver? A. Acoustic telephones, so called, consist of two similar instruments, one at each end of the line. Each instrument is substantially a tense drumhead, generally somewhat funnel shaped. To its center is attached one end of the line wire, which may be of steel, and which strains the membrane by its pull. The line wire is directed in its course by loops of leather or muslin. Sharp bends are prejudicial. The wire must be tightly strained from drumhead to drumhead. On speaking into one instrument, the sound is repeated in the other. We refer you to advertisements in our columns.

(8) F. D. H. asks: 1. What gears are required to cut a thread of  $\frac{9}{16}$  per inch on a single geared lathe, whose lead screw is 6 per inch?

A. Spindle	12	24	36	48
	—	—	—	—
On screw	19	38	57	76

2. What cement will resist the action of alcohol (for an unlimited time), and will attach smooth metal to glass? A. Glue and whiting if the alcohol is anhydrous.

(9) A. H. H.—The independent cut-off in a steam engine is more perfect in its action and considered more economical than cutting off and exhausting by one valve. Engines with independent cut-offs are more expensive than the plain ones. Good clean tin cans are worked up into stamped goods, such as toys, etc., but will not pay freight charges.

(10) C. C. S.—In both the Bessemer and Clapp-Griffiths process, the silicon is first oxidized and combines with the ferrous and manganous oxides to form a siliceous slag. The carbon then burns, the disappearance of the carbon flame indicating the end of the reaction. We believe that a basic lining has never been used in the Clapp-Griffiths converter, but there is no reason why it should not be. The mixture of fire clay and magnesia which you suggest would not work, as any excess of silica in the slag would set free the phosphorus anhydride from any oxide of iron with which it had combined, and the phosphorus would be again reduced by the carbon, or, at such an elevated temperature, even by the iron itself. You would thus defeat the very purpose for which the magnesia and lime are employed.

(11) K. E. E. M.—The furnace referred to in our article on the Clapp-Griffiths steel process as having produced 325 tons of pig iron in 24 hours is located at the Edgar Thomson Steel Works, Bessemer, Pa. We believe that it is designated as "Furnace D," and that the diameter of the bosh is 21 feet, the height of the shaft being over 100 feet. As far back as the spring of 1883, it had produced 305 tons of pig metal in 24 hours, and we were informed, at the time of our last visit to the works, in February, that the record since then had reached 325 tons.

(12) W. R. P. asks the highest temperature (C. scale) yet produced by combustion, also by electric arc? A. 1,600° C. in steel furnaces. About 2,500° C. by hydro-oxygen blowpipe. Probably 500° higher by electric arc.

(13) N. T. G. asks: What will darken the color of a mustache without using common dyes? A. There is nothing more satisfactory than the common silver hair dyes. An excellent brown dye is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 356, under title of "A Bismuthic Hair Dye." The expressed juice of the bark or shell of green black-walnuts is the simplest form of hair dye.

(14) M. H. S. writes for a recipe for the glaze known as salt glaze, such as is used on cheap yellow and Rockingham pottery. A. Common salt is placed in the oven with green wood for fuel to form an irritable smoke. This salt, heated to redness, receives, and is decomposed into hydrochloric acid and soda, the vapors of which fill the oven. The inside and outside of the vessel submitted to this process are thus simultaneously glazed. See Wagner's Chemical Technology, under "Pottery."

(15) F. G. B. desires a receipt for coloring the skin to a dark complexion and a preparation to take it off. The color to be that of a Cuban or Spaniard. A. The general principle in making such preparations consists in mixing the dry powder, a little darker than the desired tint, with some fat, such as petrolatum or lard. A formula for a brown face paint is as follows. Take of:

Burnt umber.....1 part.  
Cacao butter.....6 parts.  
Oil of neroli.....5 drops.  
Melt the cacao butter, add the umber, and while cooling make an intimate mixture, adding the perfume toward the last. Wash it off with vaseline.

(16) W. M. B. asks: How are silver flowers worked into iron for ornamentation? A. The design is etched out of the iron by means of acids, and the silver is then brazed in and polished down.

(17) D. H. N.—The largest driving wheel on a locomotive in the world is said to be that of one built for the Bristol and Exeter Railroad, England, in 1859. It was originally 9 feet in diameter, but its size was reduced, and is now 8 feet 10 inches.

(18) M. F. D. asks (1) a method for effectually deodorizing carbon bisulphide. A. Distill the carbon disulphide with quicklime, the two substances having been in contact for 24 hours. The distillate to be received in a flask partially filled with clean copper turnings. 2. In a mixture of rubber cement, with a given quantity of ultramarine blue added, does the ultramarine blue add to the unpleasant odor of the carbon bisulphide? A. We should think not; but you can obviate any difficulty of that character by using chloroform or ether as a solvent for the rubber.

(19) R. H. R. asks if cast zinc plates will do in a Grove's battery. A. They will answer, but rolled plates are preferable on account of lightness and uniformity of composition and structure.

(20) C. B. H. asks for black ink for use on the hektograph. A. Use a strong aqueous solution of nigrosine (aniline black) in the proportion of about 1 of the coloring material to 5 or 7 of water. It must be a saturated solution, rather thick.

(21) F. R. W. writes: What can be put in melted sulphur to toughen it, so that articles cast from it will not crack when cold? Sulphur alone is apt to crack if heated unevenly. A. When sulphur heated to 230° is suddenly poured into cold water, it remains soft, and so plastic that it may be advantageously employed for obtaining impressions of woodcuts and engraved plates; these impressions, as the sulphur again hardens after a few days, are used as moulds. We know of nothing that can be added to sulphur to lessen its brittleness, but it is used as above described for casts.

(22) E. Y. E. desires a sure way to detect sewer gas in a house, and the remedy. A. There is no direct way of always certainly detecting the presence of sewer gas. It can be inferentially determined where defective plumbing exists. The only remedy is to be sure that your plumbing is perfect.

(23) G. A. D. desires a formula which when applied to highly polished brass will keep it absolutely bright, and free from tarnishing. A. Thinly coat with a varnish of bleached shellac and alcohol.

(24) H. H. says: If I have a tank containing compressed air, 10 pounds to the inch, and the temperature of air in the tank is 80°, what will be the increased space the air would occupy with same pressure, the temperature being raised to 160° Fah.? What is the law or rule governing air under such conditions? A. For approximate calculations allow one-fifth of 1 per cent expands on per degree Fah. The true rule is that air under constant pressure expands one forty-ninth of its volume at 32° F. for each degree F. This would give for your case the following result: 1,000 parts of air at 80° would expand at 160° to 1,148 parts.

(25) W. M. S. writes: I have bought a one barrel breech loading shot gun, Spanish make, very light, and it gives a very strong rebound or kick in firing. A. This is a common fault of light guns. They recoil less with light charges of both shot and powder, but the difficulty cannot be entirely overcome without permanent weight added to barrel and stock.

(26) R. A. H. writes: I saw a man selling what he called a magic glass, a piece of plain window glass, which by breathing on would display figures. How was this done? A. The drawing is made on the glass by means of soapstone or stearite; when breathed on it appears, and disappears as the moisture from the breath dries away.

(27) A. H. G. asks how to color white-wash brown—a cheap color, that will not wash off easily. A. Add brown sienna to the whitewash in order to produce the desired color, and mix with alum or glut water.

(28) J. M. L.—Sugar, glycerine, and gum arabic are the articles used to produce the glossy appearance of ink. Not enough of either must be used to impede the flow.

(29) W. H. asks (1) if there is any fluid compound (not volatile under a temperature of 300° Fah.) more expansive than mercury. A. No. 2. What is the most expansive metal or other solid known not destructible under a temperature of 300° Fah.? A. Zinc.

(30) "4man."—There is no necessary relation of resistances between the secondary coil of the induction coil and the telephone. The primary of the induction should leave about  $\frac{1}{4}$  ohm resistance; for the secondary and the telephone, 80 ohms is good.

(31) C. H. S. asks about tempering mill picks. A. There is no special art in tempering mill picks different from the operation with other cutting tools for hard substances. Water at ordinary temperature with a little salt in it. Do not draw the pick thin, and use great care not to overheat the corners, which is the cause of all the trouble. A slow, dull fire for hammer heating as well as for hardening. "Temper thick and grind thin" is an old maxim.

(32) H. & S. write: We recently bought a keg of poster printing ink (black), which is so thick that it will not distribute on the rollers. How shall we thin it? A. With boiled oil. You have probably been using your ink in a cold room, and it would, most likely, work well in warm weather.

(33) W. L. R. asks: Why is the center of connecting rods of stationary engines made heavier and larger than at the ends? A. To prevent vibration.

(34) C. Q. H. asks the strongest wood, in proportion to its weight, that would be suitable for making framework for a flying machine? A. Lance wood.

(35) G. G. McC. asks how to get a black dye or stain for cast iron that can be varnished. Dip in a solution of gallic acid and water, or make by boiling gall nuts in water, in a glass or earthen jar.

(36) J. H. (of California) writes: I dry quite a good deal of fruit, apricots, peaches, apples, etc., by artificial heat. Fruit is placed on trays made of iron. Have used galvanized iron, but the coating does not last more than one season. I then coat with shellac varnish. Can you suggest anything better and more lasting? A. We know of nothing better than cheese cloth on wood gratings, often renewed, for health and cleanliness.

(37) G. R. asks the acids and any component parts of fluids that make a mantel piece ornament in a bottle, I think zinc and acetic acid. The ornament is inside the glass bottle. A. Dissolve 1 ounce lead acetate (sugar of lead) in  $1\frac{1}{4}$  pints distilled water, add a few drops of acetic acid, place the liquid in a clear white glass bottle, and suspend a piece of zinc in it by means of a fine thread suspended from the cork.

(38) F. E. asks whether water in range boilers heated by water back is suitable for cooking purposes. A. It is objectionable, although the hot water from the range boilers is a great deal used by cooks, for boiling vegetables and meats. If the boiler is tin lined and much water used through it, there is less objection. Water that has remained hot in the boiler a short time gives an unpleasant odor, and if in a galvanized iron boiler, is poisonous.

(39) W. H. R.—Lead 6 parts by weight, bismuth 7 parts by weight, cadmium 1 part by weight, make an alloy that melts at 180° Fah.

(40) G. A. S. writes: I have seen the statement that the greatest number of revolutions ever recorded of a shaft making was 57,000 per minute in a very fine machine built in France to test the speed of light. Is this correct? A. The highest velocity in Wheatstone's apparatus was 48,000 per minute. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 165, for full description. Also SUPPLEMENT, No. 168, for experiments on the duration of the electric spark with speed of 20,000 per minute. Have no doubt that 57,000 is feasible.

(41) W. P. T. says: Please give me the greatest speed of any boat you know of. A. A new torpedo boat by Yarrow & Co.—2766 miles per hour.

(42) C. F. C. asks how to stop the crack in a plated coffee pot, which got cracked by a fall. A. It will be necessary to coat with solder, and possibly the following simple process will answer: Cut a piece of tin foil the size of the surfaces to be soldered, dip a feather in a solution of sal ammoniac, and paint over the surfaces of the metal; then place them in their proper position, with the tin foil between; keep it so arranged on a piece of iron hot enough to melt the foil. When cold they will be found firmly fastened together.

(43) C. S. asks for an ink or similar preparation, which may be printed upon brass or zinc plates, and that will resist muriatic and nitric acids. A. Take of chloride of potassium  $\frac{1}{4}$  ounce, soft water 1 pint. to be kept in glass and used with a quill pen. 2. An ink that may be printed with upon glass to resist hydrofluoric acid. A. You will find that it is the glass that is attacked by the hydrofluoric acid and not the ink. Any carbon ink, such as printer's ink or asphalt ink, should resist the action of this acid.