

RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY ENGINE.—George W. Morthland, Lead, South Dakota. In the cylinder of this engine is a wheel secured upon the main driving shaft, the wheel having two pairs of oppositely arranged spring-pressed pistons, sliding in radial recesses, while on opposite sides of the cylinder are abutments, with curved sides, to permit the pistons to pass over them, the middle portions of the abutments being in frictional contact with the periphery of the wheel. The abutments are provided with ports for the live and exhaust steam, and the arrangement is such that the steam always acts on two oppositely arranged pistons at the same time, all dead center positions being avoided.

CUPOLA FURNACE.—James Blakeney, Springfield, Ohio. This furnace has radial tyere openings which gradually increase in width from the inside to the outside, and whose bottoms are obtuse angled, whereby the air blast can readily pass to the center of the furnace from all the points of the wall, while the molten metal is prevented from filling up the tyeres. In the bottom plate of the tyere are also formed transverse pockets leading to passages in the bottom of a surrounding air chamber formed by the enlarged part of the shell for the stack, a pipe connected with the air blast discharging into this chamber.

FURNACE.—Augustus L. Engelbach and Sidney E. Bretherton, Leadville, Col. This is an improvement on a former patented invention of the same inventor, designed to prevent the incrusting of the settler by the molten products, and providing for the ready moving of the settler to or from the heater, if incrustation should take place. The settler is formed of a cast iron box lined with fire clay and provided on its outer side at the corners with slotted lugs and a wheeled frame into which the settler fits, there being vertical corner uprights with pivoted bolts to swing into the slots of the lugs.

GRATE.—James W. Smith, Moscow, Ky. This invention consists of a grate head in sections, each section having solid ends and longitudinal bars integral with the ends, each bar having in its top a deep longitudinal groove for the passage of air. The construction is designed to permit also a ready entrance of air between the grates to penetrate the fuel in all its parts, and to heat air which will travel at considerable velocity through the boiler flues.

HYDRAULIC ELEVATOR.—Charles J. Dudley, Mobile, Ala. This is an elevator of simple and durable construction, and is provided with novel arrangements to vary its lifting power according to the load of the cage, the varying device being controlled by the operator in charge of the cage.

Railway Appliances.

ELECTRIC RAILWAY SYSTEM.—Charles D. Tidale, Boston, Mass. According to this system both rails, or one rail and an auxiliary conductor, may be used for conveying the current for driving the cars. The car truck is provided with three or more insulated car wheels, and furnished with one or more auxiliary wheels for taking the current from one of the rails or conductors and returning it to the other rail. It is designed with this improvement to avoid the necessity of using a trolley wire, main conductors being provided on the ground level, and so arranged as to be free from danger by being crossed by vehicles or otherwise.

RAILWAY SIGNAL COMPENSATOR.—William Daves, Jersey City, N. J. This is an improvement in devices for taking up the slack in signal working wires, so as to compensate for the stretching of the wires and their varying lengths under temperature changes. The construction is very simple and inexpensive, and the parts are so arranged that they cannot well get out of order, while, if either of the operating wires breaks, the semaphore arm will swing to the position of danger.

FENDER FOR TRAM CARS.—Frankly S. Hogg, New York City. This fender is concealed entirely beneath the car platform, and has a rear guard which, should the main fender be elevated by an obstruction working beneath it, would be brought down in operative position between the rails, preventing a person or obstruction from passing beneath the wheels. To the fender are connected spring-controlled plungers having limited sliding movement in bearings on the vehicle frame, and the improvement may be applied to any car without any interfering with the usual mechanism on the car bottom. It does not add to the length of the car, enabling the cars to be stored in as small a space as previously.

Miscellaneous.

ROAD WORKER AND SCRAPER.—Otis W. Stearns, Johnson, Vt. This is a machine with which the road may be scraped and rolled at the same time, the scraper being adjustable beneath the body of the machine in such manner as to carry the material removed from the road in direction of the front of the machine, or more or less in direction of either of its sides. The scraper may be raised and lowered quickly and conveniently, and shifted to stand at any desired angle laterally beneath the body of the machine. The machine is designed to be simple, durable, and inexpensive in construction, and equally well adapted for work in summer and winter.

BICYCLE CRANK.—Ferdinand F. Ide, Peoria, Ill. According to this a curved crank of spring material attached to the pedal shaft and under ordinary circumstances acts like the rigid crank commonly used, but it is designed to straighten out under heavy pressure, thus increasing its length and giving additional leverage, so that the rider's foot travels in an ellipse, and the increased leverage enables him to drive a machine easily up hill. The crank is designed to respond quickly to the thrust of the foot, without transmitting jar to the rider.

FIRE BOX AND GRATE.—Augusta R. Isaacs, New York City. This invention provides an auxiliary fire pot to be introduced into the regular fire

pot of a range, stove, or heater. It may rest upon the bottom of the ash pit of the stove, and be entirely removed in a quick and convenient manner. This auxiliary fire pot has two grates, one or both of which may be removed, one of the grates being at the lower portion of the fire pot and constituting its bottom, and the other being between the bottom and the top, thus providing for the use of a greater or less amount of fuel. One or both of the grates has a rake attachment.

VALVE FOR HYDRANTS.—Christopher H. Watson, Riverside, Cal. This invention relates to valves used in connection with a measuring box for irrigating purposes, and provides improvements whereby the flow of the water from the supply to the box can be conveniently regulated according to the amount of water required for a certain purpose.

NUT LOCK.—Fredrick B. Wallace, Orion, Mich. The nut is perforated at one side of its threaded hole, according to this improvement, and channeled transversely on one face, while an independent locking block is perforated and threaded to conform with the bolt hole in the nut and seated in the channel. A tilting pin fast in the block is fitted loosely in the side perforation of the nut and projects beyond its inner face. The nut and bolt are thus locked without injury to the threads of either, permitting reuse an indefinite number of times.

SULKY.—Gilbert J. Loomis, Westfield, Mass. This invention provides means whereby the body of the sulky may be raised and lowered upon the wheel supports, enabling the vehicle to be used with equal facility with a large or small animal. The invention also provides for the employment of pneumatic wheels, and provides an attachment which will effectually prevent the sulky from being upset in a rearwardly direction.

BRIDLE.—James R. McLeod, Calgary, Canada. This is a harness bridle comprising the usual bit and a continuous cord having its free ends arranged to form the reins, the cord extending loosely through the bit rings, crossing beneath the jaws of the horse, crossing again above the top of the head, extending downward to form the cheek pieces of the bridle, connecting with the bit rings, returning upon themselves and merging in a loop adapted to form a noseband and overdraw and connect with the bit rings. This bridle may be used to render a horse easily manageable with any form of bit.

CLEVIS.—S. E. Bricker, Arco, Idaho. This clevis consists of two members having nearly circular hooks curved in opposite directions and lying side by side, the inner end of one member being provided with a keyhole slot, and a pin or bolt pivoted to one member and provided with a radial flange being adapted to enter the key hole slot of the other member. In practical operation the clevis works substantially like an ordinary clevis made of a single piece, while the parts may be easily separated and as easily locked, so that the clevis may be readily connected with any hauling or other device.

HOOK.—David W. Holden, Gardiner, Oregon. This hook is more especially designed for use with chains employed for logging purposes, and is arranged to conveniently unhook the load while under strain, to obviate backing up to "cast off." A shank is provided with a locking link to engage the hook pivoted on the shank, the latter having on the inside at the pivot end a projection to limit the inward swinging motion of the hook and protect the pivot.

LIGHT DEFLECTOR.—Dexter E. Hawkins, North Attleborough, Mass. This is a device to concentrate the light of a lamp or gas flame, and direct the rays upon the page of a book or on any object of work. In vertical members carried by a suitable base is a lens-carrying frame fitted to slide, with means for vertically adjusting the frame, to which is secured an apertured shield in rear of the lens. The lens is given any desired inclination by simply turning it upon its pivot. The device is very simple and inexpensive, and will not interfere with the stand or pedestal of a lamp in connection with which it may be used.

WALL DESK.—Joseph F. Figgins, Washington, D. C. A case or cabinet to be suspended from the wall or supported on legs has been provided by this inventor, the case having notched sides and a rounded lower piece, a vertically folding lid with projecting strips, and rigid strips on the side of the case, while hinges connect the side and lid strips. When the lid is lowered a desk for writing purposes is afforded, the construction being very neat, simple and compact, and the connection between the desk and the lid is such that a rigid support is attained without the use of chains, legs, or supporting arms.

WASTE PAPER BASKET.—Edward L. Weston, Washington, D. C. This basket is composed of upright strips curved at their ends to form feet and headings, rows of connecting strips in pairs encircling the basket, which is designed to be ornamented by running ribbons around and through the strips, to give it a very ornamental appearance.

ANIMAL TRAP.—Frank J. Bragunier, Topeka, Kansas. This is a simple trap adapted to catch small game alive, and when once set and baited will operate many times without resetting. A tripping platform is located in a bait box, at one side of which is a cage, a swinging door being in the passage, while a spring-revolving shaft in the bait box has arms designed to strike the animal and throw him through the opening into the cage.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

WOOLEN SPINNING. By Charles Vickerman. London and New York: Macmillan & Co. 1894. Pp. xii, 352. Price \$1.75.

The advance of technology is well illustrated by the production of such works as the present. It treats of one of England's great industries, its history and progress and

present aspect. It is fully illustrated, but its want of an index is especially to be deplored, as it would have added very greatly to its value and utility.

DIE PHOTOGRAPHIE IN NATURLICHEN FARBEN. Mit besonderer Berücksichtigung des Lippmann'schen Verfahrens. By Eduard Valenta. Halle a. S.: Wilhelm Knapp. 1894. 20 test figures. Pp. 82.

This book forms the second number of the Encyclopedia of Photography, and treats in a very exhaustive manner on photographing in natural colors, with special reference to G. Lippmann's process.

HOW TO THINK IN SPANISH. By Charles F. Kroeh, A. M., Professor of Languages in the Stevens Institute of Technology, Hoboken, N. J. Published by the author.

As in the author's books on French and German, the aim of "How to Think in Spanish" is to teach the language of everyday life by direct association of complete idiomatic sentences with the student's actions, so as to establish the habit of speaking Spanish without first conceiving the thought in English. Then, by a series of instantaneous mental processes, the student is taught to vary these sentences as a native does by substitutions and additions, so that he will acquire a real command of the language and not merely the ability to parrot a few sentences. The author has made an independent study of what he calls the "mechanism" of these languages and has given adequate practice in every grammatical difficulty.

We are in receipt of the thirteenth part of that handsome and lavishly illustrated quarto, "The Book of the Fair," published by the Bancroft Company, of Chicago. The completed work will consist of twenty-five parts, two being issued monthly, at the price of \$1 a part.

READINGS FROM THE BOOK OF NATURE. By Simeon Mills. Chicago: Charles H. Kerr & Company. 1893. Pp. 181.

SCIENTIFIC AMERICAN BUILDING EDITION.

APRIL, 1894.—(No. 102.)

TABLE OF CONTENTS.

- Elegant plate in colors showing a handsome colonial residence just completed at Ashbourne, Pa, for Charles Salmon, Esq. Two perspective views and floor plans. Cost complete \$11,500. Frank R. Watson, Esq., Philadelphia, Pa., architect. An elegant design.
- Plate in colors of a Chicago dwelling designed for an architect's home, and recently completed at Morgan Park, Chicago, Ill. Two perspective views and floor plans. Cost \$4,200 complete. Mr. H. H. Waterman, architect, Chicago, Ill.
- Two perspective views, interior view and floor plans of the elegant residence of Judge Horace Russell recently completed at Southampton, Long Island. Mr. Bruce Price, New York City, architect. An admirable design in the colonial style of architecture.
- An English cottage at Buena Park, Chicago, Ill. Two perspective views and floor plans. Mr. James Gamble Rogers, Chicago, Ill., architect. A unique design in the Gothic style of architecture.
- A residence at Southport, Conn. Two perspective views and floor plans. A picturesque design in the modern colonial style of architecture. Mr. W. W. Kent, New York City, architect.
- A cottage at Freeport, Long Island, erected at a cost of \$2,800 complete. Perspective view and floor plan. A unique design. Mr. W. Raynor, Freeport, L. I., architect.
- A residence at Rogers Park, Ill. Two perspective views and floor plans. Cost \$3,948 complete. An attractive design. Mr. C. W. Mellin, Chicago, Ill., architect.
- Two perspective views and floor plans of a dwelling recently erected at Rogers Park, Ill., at a cost of \$3,780 complete. A unique design. Mr. Robert Rae, Jr., Chicago, Ill., architect.
- A cottage at Morgan Park, Ill., erected at a cost of \$3,968 complete. Two perspective views and floor plans. An attractive design, treated in the English cottage style of architecture. Mr. H. H. Waterman, Chicago, Ill., architect.
- The new St. James M. E. Church at Kingston, N. Y. Perspective and plans. Architects, Messrs. Weary & Kramer, of New York City and Akron, Ohio. Estimated cost, \$70,000. Style of architecture, Romanesque.
- Miscellaneous Contents: Vibrations of tall buildings.—Artificial stone.—A simple and efficient dumb-waiter, illustrated.—An improved woodworking machine, illustrated.—The New Eber electrical gas burner, illustrated.—P. & B. Ruberoid roofing, sheathing papers, and paints.—Improved wood-working machine, illustrated.—Foot power mortising machine, illustrated.—A large sheet metal ceiling, illustrated.

The Scientific American Architects and Builders Edition is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITECTURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

The Fullness, Richness, Cheapness, and Convenience of this work have won for it the LARGEST CIRCULATION of any Architectural Publication in the world. Sold by all newsdealers. MUNN & CO., PUBLISHERS, 361 Broadway, New York.

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 the following week's issue.

"U. S." metal polish. Indianapolis. Samples free. Heating machinery. Trevor Mfg. Co., Lockport, N. Y. Cheapest Water Power.—See top of 1st column, page 170. Also top of 2d column, page 238.

Distance Reading Thermometers.—See illus. advertisement, page 256. Ward & Doron, Rochester, N. Y.

Air compressors for every possible duty. Clayton Air Compressor Works, 26 Cortlandt Street, New York.

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

Nickel-in-slot machines perfected and manufactured Electrical supplies, Waite Mfg. Co., Bridgeport, Conn.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Light and Canal Sts., New York.

Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y.

Emerson, Smith & Co., Ltd., Beaver Falls, Pa., will send Sawyer's Hand Book on Circulars and Band Saws free to any address.

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

The "Olin" Gas and Gasoline Engines, from 1 to 10 horse power, for all power purposes. The Olin Gas Engine Co., 222 Chicago Street, Buffalo, N. Y.

Patent for Sale—Stall for comfort and cleanliness of milk cattle. Agents wanted at 50 per cent commission. M. Schembri, 396 Van Buren St., St. Paul, Minn.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

Wanted—A slide valve engine of about 200 H. P. Must be in first class condition. Address, giving maker's name, date, and full particulars, also location, J. B. J., care this office.

Competent persons who desire agencies for a new popular book of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

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. Enquirers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. 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. Minors sent for examination should be distinctly marked or labeled.

(5989) L. B. asks (1) for directions for putting on shellac or varnish over rosewood stain so as to make it shine and give it a high polish. Would it be preferable to use the best varnish or shellac, and state how I shall proceed to put it on cherry wood so as to give it a glossy and polished like appearance? Also how shall it be rubbed or shined? A. First fill the rosewood, using the following filler: Linseed oil, 1 quart; spirits of turpentine, ½ pint; lime, the size of a base ball, broken fine. Let the mixture simmer on a stove, covered over, for two or three hours, then strain through a coarse cloth. It is to remain on twenty-four hours, then rub off with a woolen cloth and polish. Then varnish with the following:

Sandarc.....	6 oz.
Elemi (genuine).....	4 "
Anime.....	1 "
Camphor.....	½ "
Alcohol.....	1 qt.

Digest the gums in the alcohol in a corked bottle, in a warm place. Have the wood smooth. No rubbing is necessary; several flowing coats of the varnish should be given, sandpapering between each with fine sandpaper. 2. What voltage would a battery of two cells have, each having two zinc plates and three carbon ones, each 3¼ by 2¼, connected in series, and state the amperage? Immersed in electropoolon fluid. A. 3 to 4 volts. The amperage depends on the resistance of the circuit. On short circuit they should give 6 or 8 amperes for a short time.

(5990) O. C. P. says: I have several small pieces of glass which I wish to color. Can you give me formula by which I can give them durable colors? A. The following is due to Mr. Arthur S. Huey, of Minneapolis: 1. Prepare the glass by thoroughly washing in soap and water and drying. Then dip in bath, made by beating up the whites of two eggs in 1½ pounds or pint of water and filtering, and hang up today. Dissolve the aniline color in photographer's common colodion. Red or blue aniline will form clear solutions, while the green solution will require filtering. Yellow aniline forms a handsome color, but the surface of the glass presents a frosted appearance after the application. Violet and purple colors may be obtained by combining red and blue in different quantities. When the solution is ready, dip the prepared glass bulbs therein, hang up to dry, and finally pass a current through the bulb for

half an hour, that the heat thus generated may harden the coating of the collodion, or place in a current of air. The preparation can easily be removed with alcohol or sul huric ether, but is not affected by water. Experience as shown that the best results are obtained by not using too much aniline. Make the color light rather than deep, and apply two or three coats. These preparations may be used for coloring incandescent lamp bulbs. From the SCIENTIFIC AMERICAN Cyclopaedia of Receipts, Notes and Queries.

(5991) F. E. B. writes: 1. In making telephone instruments, would 1/2 an ounce of silk-covered No. 36 do to wind the spool? A. Yes. 2. What size spool should I make to hold that amount? A. Make the diameter of the small part of the spool as small as possible. The space between the flanges of the spools should be about 1/2 inch, and the flanges should be 1/2 inch wide. 3. Should 3/4 round 6 inches long bar magnets be magnetized the whole length or just the end? A. Magnetize the bars as much as possible. The magnetism would show principally at the ends. 4. How can I harden them? They are tool steel. A. Harden only at the ends by heating to a cherry red and plunging in cool water. Draw the temper to a dark straw color. 5. Will 6 small tumbler bichromate batteries sufficiently magnetize them? A. Yes. 6. How many layers of what size wire should I use? A. 10 or 12 layers of No. 18.

(5992) R. P. J. asks: 1. In telephone systems is earth used to complete the circuit or is a return wire necessary? Why? A. In quiet places free from induction, the earth may be used, but where there is induction from adjacent lines, a return wire is desirable, as the induction currents are equal and opposite in the two wires, and therefore neutralize each other. 2. Is there any satisfactory method of placing more than one subscriber on a single line leading from central, without making it possible for all subscribers on that line to overhear conversation carried on by any one on same line? A. There are complicated cut-out devices which will permit of calling up any person on a line without calling up others. You will find descriptions of these in works on the telephone.

(5993) H. K. G. says: What can I put on drawing paper to make it transparent, so I can use it for tracing paper? A. Dissolve a given quantity of castor oil in 1, 2, or 3 volumes of absolute alcohol, according to the thickness of the paper, and apply it by means of a sponge. The alcohol evaporates in a few minutes and the tracing paper is dry and ready for immediate use. The drawing or tracing can be made either with lead pencil or Indian ink, and the oil removed from the paper by immersing it in absolute alcohol, thus restoring its original opacity. The alcohol employed in removing the oil is preserved for diluting the oil used in preparing the next sheet.

(5994) C. F. N. writes: 1. How many ounces of bichromate of potash will saturate a half gallon of water? How many fluid ounces of sulphuric acid should be added? If the plates are 5x6 and close together in a half gallon jar, how much resistance will the battery have? A. The quantity depends on the temperature. For battery add 1 1/2 parts by weight of potassium bichromate in fine powder, 10 parts of water, and add slowly with constant stirring 4 1/2 parts by weight of oil of vitriol. Use after cooling. The battery will have about one-tenth ohm resistance. 2. What horse power (approximately) will simple electric motor develop with 8 cells plunge battery, plates 5x7? How many amperes of current should be sent through it to obtain best results with greatest power? What is the power? A. Possibly one-fifth horse power at 6 or 7 amperes. 3. Could it be run as a dynamo with wrought iron fields? Are they better than cast iron? A. It would not work well as a dynamo. 4. Would a solid copper commutator be better than one described? What diameter should it be? A. A regular copper bar commutator would be better than the one described. There is no special diameter—the smaller the better, if properly constructed.

(5995) G. I. B. T., Peoria, Ill., asks what the weight of a water tower and contents are. The tower is twenty feet across and one hundred and twenty feet tall. The first five sections are of 3/4 inch steel, the second five sections are of 5/8 inch steel, the third five sections are of 1/2 inch steel, and the last nine sections are of 3/4 inch steel, and filled with water within ten feet of top. A. The steel tower weighs 258 tons, including the bottom, if also of 3/4 inch plate; 110 feet of water height weighs 1083 tons; together 1340 net tons, or 4 1/2 tons per square foot of its base.

(5996) C. & T. ask: 1. Are growing flowers and plants in bedroom injurious to health of occupants? A. There is danger of their being so. It depends on the plants. 2. Do coal ashes possess any value as a fertilizer? If not, are same injurious to soil? A. Little or none, except a mechanical value in clay, as loosening and lightening the soil. 3. How are roses propagated? A. They may be propagated by cuttings. We can supply Parson's "On the Rose, a Treatise on the Propagation, Culture and History of the Rose," price \$1 mailed.

(5997) C. N., Ontario, asks information regarding best appliance to use for elevating water in draining some low land. I wish to elevate over am from ditch, average lift about 20 inches, amount of water to be handled about 3 acres, covered to depth of say 10 inches, time for disposing of it, say 3 to 5 days. Would suction pump elevator buckets driven by chains and sprocket wheels, or cylinder with rotatory spiral, be preferable? Please give plan of construction of what you deem best. What amount of power would be required to drive it? Would a gasoline engine answer the purpose? Does a gasoline engine require attention after starting, or would it operate for several hours without attention? A. Assuming that you may have to lift 120,000 cubic feet of water 2 feet for clearance over the dam, you will need to lift 90 cubic feet per minute for 3 days of 24 hours each, or 5 days of 15 hours each day. This is equal to 2,700 foot pounds per minute. Allowing 50 per cent for friction and loss, will require 1/2 of a horsepower. In the application of a gasoline or petroleum engine for this work a much larger power will be required by the commercial rating of such engines. A bucket breast wheel 5 feet diameter, 8 inches wide, with 15 buckets, shrouded on the sides, running in a one-fifth circle trough

at a speed of 12 to 15 revolutions per minute. Shaft extended with a sprocket wheel and chain from the engine shaft. Engine making 100 revolutions per minute. The gasoline and petroleum engines will work many hours without attention.

(5998) A. L., L'Epiphanie, P. Q., asks: Is it possible to boil water, bubbling as much as water in a kettle on a very hot stove, in an open vessel holding about 4 gallons, with steam at 50 pounds pressure? I do not want steam being mixed with said water. If there is any possibility to do so, please inform me how to do it. A. Yes; you can boil the kettle over with steam at less than 50 pounds pressure. Use a flat bottom kettle 14 inches diameter and any convenient height to hold the 4 gallons, say 8 or 10 inches. Make a flat spiral coil of 3/4 inch copper pipe, using 14 feet of pipe, each coil separated so as to allow of water circulation between the pipes; turn the ends up to clear the kettle and connect one end with the steam and the other end to waste, with a valve to keep back the pressure and drip away the water of condensation.

(5999) E. M. G.—Dr. L. O. Howard, Acting Entomologist, Dept. of Agriculture, says: The insect you sent is the common bag worm (Thyridopteryx ephemera formis). It is in the egg state at present, the eggs being laid inside the cocoon from which the female moth may easily be destroyed by spraying with Paris green or London purple in the proportion of one-fourth pound to 50 gallons of water.

(6000) W. E. L. says: Please inform me of the best material to use to prevent the nitric acid from eating fine lines away in photo zinc etching for the greatest depth in quick work. A. Dust with powdered dragon's blood and heat until the etching ink and dragon's blood fuse. For full directions see Schraubstaedter's "Photo-Engraving, with Copy for Photo-engraving," which we mail for \$3.25.

(6001) J. D. W.—The average rise and fall of the tide at New York is 4 1/2 feet. Liverpool, 20 feet 31 inches. London, 31 feet 10 inches.

(6002) A. G. P. asks: 1. How many caustic potash batteries of the large size described in "Experimental Science" will it take to run motor #41, and would they be a good kind of battery to charge storage batteries with, and how many will it take to charge 3 storage batteries like those described in "Experimental Science"? A. Ten or fifteen would run the motor. It would take twelve to charge 3 storage cells. 2. What is the voltage and amperage of battery described in SCIENTIFIC AMERICAN, April 11, 1893, page 230, with tin cell 6 inches by 5 inches? A. We have no exact figures. Allow 0.6 volt and 1/4 ohm internal resistance. 3. Is it a constant battery, and is there any action in the cell when the circuit is open? A. It is constant and unattacked on open circuit. 4. Should the zinc be amalgamated? A. No. 5. How long will it last in constant use? A. It depends on the current taken from it.

(6003) F. H. writes: I want to build a small electric motor of the Froment type, in which armature placed around the circumference of a wheel are successively attracted by an electro-magnet. During the day I want to use the motor. I have a battery (Fuller-Leclanche type) of 6 cells for an incandescent lamp. I think an electro-magnet of high resistance would prevent the battery from being exhausted so soon on the motor; if not, kindly give me the necessary instruction for this kind of motor. A. A high resistance motor would save the battery, but might tend to reduce the power. For electric motor construction we refer you to our SUPPLEMENT, Nos. 641, 759, 761, 767, 783, 844, 865, and to "Electric Motor Construction for Amateurs," by Parkhurst, price \$1; Botone's "Electro Motors," price 75 cents mailed. Your battery and motor should be adapted for each other.

(6004) G. C. W. asks: 1. Can an alternating current of electricity be taken from a sectional commutator? A. Yes; but at a disadvantage. 2. Can a continuous current be taken from a commutator, composed of rings on the armature shaft? A. Yes; under proper conditions, not as dynamos are ordinarily wound. 3. Why in a dynamo is one wire from each of two segments connected with one bar of the commutator? A. As a matter of mechanical convenience and to avoid sparking and to secure electrical balance. 4. Please explain a shunt-wound dynamo. A. The ends of the field wires are connected to the brushes, thus bringing the field and outer circuit in parallel.

(6005) C. C. S. asks: 1. Can small dynamo, say 75 light 16 candlepower, direct current, which refuses to start with no visible reason why it should not, be made to start by momentarily short-circuiting across brushes while at full speed, and why? A. If series wound, this will tend to send a heavy current through the field coils, and thus start the machine. 2. Is it good practice to connect 16 candle power lamps, 10 in series, direct from mains of 1,100 volt alternator circuit, and why? A. This is done for street lighting; it is bad practice in house lighting, as it involves a dangerous potential. 3. Have telephone transmitters been made which operate by the vibrations opening and closing a circuit around induction coil? A. The operation described is not adapted for telephoning, the variations are so sudden. 4. How is Edison carbon telephone made? A. See our SUPPLEMENT, No. 127. 5. Can spools for electro-magnets be made of tin tube with brass or copper heads and be as effective as made of paper or rubber? A. Yes.

(6006) H. D. W. asks: Can sulphate of magnesium (MgSO4) be decomposed into magnesia (MgO) and sulphuric acid (H2SO4) by passing superheated steam over the anhydrous MgSO4? How complete is the reaction and what conditions are most favorable to it? A. At a high enough heat the decomposition spoken of might be produced.

(6007) F. D. H. writes: How may I refill the tube of a barometer from which part of the mercury was lost by the instrument falling? The tube is turned up at lower end, and has stopcock between bend and cistern. A. You will probably have to boil or heat strongly the mercury. The operation is a difficult one and should only be undertaken by an expert, as there is great danger of breaking the tube.

TO INVENTORS. An experience of forty-four years, and the preparation of more than one hundred thousand applications for patents, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices and particulars. We hold the office for the time and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted April 24, 1894, AND EACH BEARING THAT DATE. (See note at end of list about copies of these patents.)

Table listing inventions with patent numbers. Includes items like Alarm, Animal trap, Arm for firing fulminate sticks, Hardesty & Sale, Armature for dynamo-electric machines, etc.

Table listing inventions with patent numbers. Includes items like Fireplace heater, Fire pumps or engines, Water supply system, Fish traps, Floorboards, Machine for matching ends of, etc.