

TO INVENTORS.

An experience of more than thirty years, and the preparation of not less than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office, or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

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.

Magic Lanterns and Stereopticons of all prices. Views illustrating every subject for public exhibitions. Profitable business for a man with a small capital. Also lanterns for college and home amusement. 74 page catalogue free. McAllister, Mf. Optician, 49 Nassau St., N. Y.

Chapman Valves and Hydrants received the highest award at Mass. Mechanics Fair. Chapman Valve Manuf. Co., Boston, Mass.

Wanted, cheap.—2d hand Lathe Chuck to swing 17 in. Iron sheave. Penfield Block Works, Lookport, N. Y.

To Manufacturers.—Messrs. Bignall & Ostrander, 806-808 N. 2d St., St. Louis, Mo., have added to their present establishment a Machinery Department, from whence the wants of the Western machine-using public will be supplied. Manufacturers will do well to correspond with them.

On actual test the Eaton Sulky Plow is ahead. Manufacturers wanted to build them. Territory for sale. Address E. C. Eaton, Pinckneyville, Ill.

Sir Henry Halford says Vanity Fair Smoking Tobacco has no equal. Received highest award at Paris, 1878.

Wanted.—Tools for the manufacture of Wagon Axles and Springs. Address Box 66, Lambertville, N. J.

For Sale.—Norwalk Engine, 16 x 42; little used; excellent order; very cheap. Address Box 106, Meriden, Ct.

H. W. Johns' Asbestos Liquid Paints contain no water. They are the best and most economical paints in the world for general purposes, and for wood and iron structures exposed to severe tests of climatic changes, salt water atmosphere, etc. They are 50 per cent more durable than the best white lead and linseed oil.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsyth & Co., Manchester, N. H.

Florey & Smith, San Francisco, make a specialty of introducing useful inventions in the Pacific States.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

Nickel Plating.—Wenzel's Patent Perforated Carbon Box Anode for holding Grain Nickel. A. C. Wenzel, 114 Center St., New York City.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsyth & Co., Manchester, N. H.

For Sale.—A 6 x 6 Upright Yacht Engine, 6 H. P. Wm. F. Codd, Nantucket, Mass.

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

The Lawrence Engine is the best. See ad. page 381.

Sheet Metal Presses, Ferracite Co., Bridgeton, N. J. The only Engine in the market attached to boiler having cold bearings. F.F. & A.B. Landis, Lancaster, Pa.

Brush Electric Light.—20 lights from one machine. Latest & best light. Telegraph Supply Co., Cleveland, O.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are to be sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

For the best advertising at lowest prices in Scientific, Mechanical, and other Newspapers, write to E. N. Freshman & Bros., Advertising Agents, 180 W. 4th St., Cin., O.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsyth & Co., Manchester, N. H.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

Brick Presses for Fire and Red Brick. Factory, 309 S. 5th St., Philadelphia, Pa. S. P. Miller & Son.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J. English Agency, 18 Caroline St., Birmingham.

H. Prentiss & Co., 14 Dey St., N. Y., Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Diamond Engineer, J. Dickinson, 64 Nassau St., N. Y. Solid Emery Vulcanite Wheels.—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement.

Wheel Press, Cotton Press, Pipe Line, and Test Mercury Gauges. T. Shaw, 915 Ridge Ave., Philadelphia, Pa.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

Special Planers for Jointing and Surfacing, Band and Scroll Saws, Universal Wood-workers, etc., manufactured by Bentel, Margedant & Co., Hamilton, Ohio.

Boston Blower Co., Boston, Mass. Blowers, Exhaust Fans, Hot Blast Apparatus. All parts interchangeable; material and workmanship warranted the best. Write for particulars.

We make steel castings from $\frac{1}{4}$ to 10,000 lbs. weight, 3 times as strong as cast iron. 12,000 Crank Shafts of this steel now running and proved superior to wrought iron. Circulars and price list free. Address Chester Steel Castings Co., Evelina St., Philadelphia, Pa.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D. Gilbert & Son, 212 Chester St., Phila., Pa.

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

Holly System of Water Supply and Fire Protection for Cities and Villages, is fully described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 140.

Howard Patent Safety Elevators. Howard Iron Works, Buffalo, N. Y.

Mellen, Williams & Co., 57 Kilby St., Boston, Mass. Wierand Sectional Steam Boiler. Etna Rocking Grate Bar.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Self-feeding upright Drilling Machine of superior construction. Drills holes from $\frac{1}{8}$ to $\frac{1}{2}$ in. diameter. Pratt & Whitney Co., Manufs., Hartford, Conn.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St. Wm. Sellers & Co.

The Turbine Wheel made by Risdon & Co., Mt. Holly, N. J., gave the best results at Centennial test.

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Pittsburgh Steel Casting Company, Pittsburgh, Pa.

Notes & Queries

(1) Detroit asks whether a boat propelled with a force of 3 miles an hour on still water will with the same propelling force run 6 miles an hour in a current running 3 miles an hour? A. We think so.

(2) J. C. R. asks: Which was the first railroad built in the United States? That is, a regular, incorporated road, connecting two points, and conveying passengers, freight, etc. A. We believe that the road now known as the Baltimore and Ohio Railroad was the first in the United States chartered for carrying on a general transportation business.

(3) J. R. E. asks how to make an ordinary sunshade for a telescope when placed, and what kind of glass it is composed of. A. Any very dark glass will answer, providing it is perfectly plane. It should be placed between the eye and eyepiece.

(4) W. H. G. S. writes: I wish to give a blue color to screw heads, wire and steel. What shall I use? A. Heat them in a sand bath, or apply shellac or copal varnish, to which a little Prussian blue has been added.

(5) T. McW. asks (1) for a good recipe for making Babbitt metal. A. By weight, 4 parts copper, 8 parts antimony, 96 parts tin. 2. What is meant by heating surface in boilers, and how is it computed? A. The term heating surface, as ordinarily used, refers to the surface which has water on one side, and flame or the products of combustion on the other. 3. I have a peculiar kind of steel which I cannot harden by fire and water, neither will it caseharden by prussiate of potash. What can I do with it to harden it? A. Assuming your account to be correct, we judge that you cannot harden it.

(6) A. Van B. writes: A correspondent in your last issue asks how to keep rubber belts from slipping. Mine slipped considerably, but I checked it by throwing powdered rosin in between the belt and pulley while running. The pulley soon becomes covered with a tough black coating, very much like leather, and there is no more slip. [This expedient can be used to advantage in certain cases, but it is better to have a belt large enough to drive without using any preparation.—Ed.]

(7) E. B. C. asks: 1. Does a more powerful battery produce better results in telephone or microphone? A. A powerful battery is not required for either. 2. Can you give me a short description of the principle and construction of the aeroplane? A. We think it has not been perfected.

(8) A. T. L. asks for a recipe for a liquid boot or shoe polish. A. Clausen's ink is made as follows: Nutgalls, 8 parts; logwood extract, 10 parts; boil together in water, q. s., and add Castile soap, 4 parts; glycerin, trace. Crooker's—Logwood extract, 6 ozs.; water, 1 gallon; ivory black, 15 oz.; glycerin, 1 oz.; bichromate of potassa, 0.125 oz.; coppers, 0.125 oz.; boil together. Sefton's—Orange shellac, 64 ozs.; alcohol, 4 gallons; pure asphaltum, 60 ozs.; neat's foot oil, 1 pint; lampblack, q. s. Ovington's—Water, 1 gallon; logwood extract, 6 ozs.; water, 1 gallon; borax, 6 ozs.; shellac, 15 oz.; water, 0.5 pint; bichromate of potassa, 0.375 oz. Mix the solutions, and add 3 ozs. ammonia. Shaw's—Borax, 3 ozs.; orange shellac, 5 ozs.; water, q. s.; boil and add soluble aniline black or nigrosine, q. s. Rub the spots with strong aqueous solution of ferric chloride, and dry before applying the dressing.

(9) J. S. & R. M. write: 1. We propose putting in a steam engine of 20 horse power, and we are informed there is an engine that weighs 2,700 lbs., that has a balance wheel weighing 500 lbs., cylinder 10 x 10 inches, cutting off at $\frac{3}{4}$ stroke, running at 180 to 200 revolutions a minute, and they say that it is 20 horse at 70 lbs. steam. Will such an engine develop 20 horse power? A. The engine would develop 20 horse power under the above conditions, if well constructed. 2. How can we calculate the power of an engine? A. To determine the power of an engine, multiply the mean pressure on the piston in lbs., by the piston speed in feet per minute, and divide the product by 33,000.

(10) A. L. G. asks: 1. With a boiler 15 inches in diameter by 30 inches in height, with five $\frac{1}{4}$ inch tubes 18 inches long, firebox 12 x 12, and all made of iron plates $\frac{1}{4}$ inch thick. What is the greatest number of pounds of steam to the square inch it will hold, and what fraction of a horse power will it give to an engine having a cylinder 2 x 4 inches, situated 2 feet from the boiler, and connected by 40 inches of steam pipe? A. You can carry 150 lbs. of steam, and might develop 1 horse power. 2. What is meant by the pitch of a wheel in a propeller, and what is the inclination of a cylinder? A. The pitch of a propeller is the distance it would advance in the direction of its axis at each revolution, if it worked without slip. The inclination of a cylinder refers to the angle made by its axis with a horizontal or vertical line.

(11) J. H. asks: 1. Has steel been used for portable boilers? A. Yes. 2. What size boiler is required for an engine having a 3 x 4 inch cylinder? A. Diameter, 24 inches; height, 45 inches; heating surface, 65 to 70 square feet.

(12) J. A. M. asks: How large must an air pump be for an engine steam cylinder 8 x 8, making 100 revolutions per minute with 90 lbs. of steam, allowing the pump to be 4 inches stroke, double acting, to be attached to surface condenser? A. Diameter, $3\frac{1}{4}$ inches.

(13) J. A. F. asks: 1. What shall I paint my boiler and smoke stack with, and where can I get the paint? My engine is a thrashing engine, and of course is out of doors during the fall of the year. A. Get some black varnish made from petroleum, from a dealer in machinists' supplies. 2. How shall I care for the boiler inside? A. Leave the boiler perfectly dry, unless you can coat the interior with oil. 3. What shall I do for the engine. Is it necessary to take the piston out of cylinder and oil it? A. If the engine is to stand for some time, remove the piston, coat it and the cylinder with tallow; the same for the journals. Cover all finished parts of the engine with a mixture of white lead and tallow. 4. I find my steam gauge does not indicate less than 10 lbs. when boiler is cold. What is the trouble and how can it be repaired? A. In such a case it is best to send the gauge to a maker for repairs.

(14) "Zebra" wishes to know the best test of the genuineness of white lead; also the simplest way to try the comparative value of two samples of ground white lead. Also the name of the best work to consult upon the manufacture of Portland cement. A. See answer No. 29, p. 283, current volume, SCIENTIFIC AMERICAN. Also pp. 102-105 Normandy and Noad's "Commercial Analysis." The relative value of different samples of white lead in oil is roughly judged from the weight of a given measured quantity, the covering properties when compared on glass with a sample of finest white lead, and the color and general appearance of the sample. You may consult Reid's "Manufacture of Portland Cement."

(15) J. B. B. asks: Can I arrange an electric battery so as to heat a platinum wire for the purpose of cutting wood? Is it practicable? A. Two or three Bunsen cells will do it. It is impracticable save as an experiment.

(16) D. S. M. asks how to color butter to make it yellow, without injuring it in any way. A. A little annatto is often used. If pure, it is not injurious.

(17) H. C. M. asks: What substances are there that will absorb light during the day when exposed to light, and give it out again at night? A. 1. Heat strontium theosulphate for fifteen minutes over a good Bunsen gas lamp and then for 5 minutes over a blast lamp. 2. Heat equal parts of strontium carbonate and lac sulphuris gently for 5 minutes, then strongly for 25 minutes over a Bunsen lamp, and finally 5 minutes over a blast lamp. 3. Precipitate strong aqueous solution of strontium chloride by means of sulphuric acid, dry the precipitate, and heat it to redness for some time in a current of hydrogen, then over a Bunsen lamp for 10 minutes, and for 20 minutes over a blast lamp. Mix any of these with pure melted paraffin for use as a paint, and expose for a time to sunlight. The two former yield a greenish phosphorescence in the dark, the latter a bluish light.

(18) Z. asks: Is the Great African Desert below the level of the sea, and if so, could it be made into an inland sea by flooding from the ocean? A. A considerable, though relatively small, portion of the Sahara is below the sea level, and the flooding of the lowest portion has been proposed. The greater part of North Africa lies at a higher level, the exception being a chain of old lake beds or chotts on the border of Algeria.

(19) J. P. L. asks: How can I make a filter to cleanse rain water from smoke as it passes from the roof to the cistern? The coal which is burned here (bituminous) gives us a great deal of trouble in this regard. A. The carbonaceous matters may be removed by passing the water through a large barrel half filled with fine gravel and pounded, freshly-burnt charcoal (free from dust), distributed in alternate layers, each several inches deep. Over this spread a clean piece of bagging, and fill in with fine gravel or coarse clean quartz sand for 12 inches or more. The inlet pipe should discharge at the bottom of the barrel—the filtered water flowing from the top.

(20) F. E. H. asks: Can percussion caps be so composed as to explode when pierced by a sharp pointed needle? If so, of what should they be composed? A. Such an arrangement is employed in the needle gun. The composition may be of mercuric fulminate.

(21) C. A. N. asks: What is the horse power of an engine 30 inches stroke, 14 inches cylinder, 51 revolutions per minute, 60 lbs. mean pressure in cylinder? A. Piston area = 153.94 square inches. Piston speed = 255 feet per minute. Indicated horse power = $\frac{153.94 \times 60 \times 255}{33,000} = 71.4$.

(22) P. O. asks: If I admit steam 100 lbs. pressure in a cylinder 15 x 24 inches, and cut the steam off when piston has traveled 6 inches, what will be the pressure at 6 inches, 12 inches, 18 inches, and 24 inches, or just before it exhausts? A. The pressure will vary about in the inverse ratio of the volume, so that, approximately, vol. of cylinder up to point of cut-off + clearance vol. of cylinder at any point of expansion + clearance vol. = pressure above zero, at the given point. = pressure above zero, at point of cut-off.

(23) H. T. S. asks: What size should I make the holes in the side of a fan wheel, 20 inches in diameter? Also what size should the nozzle be? A. Allow an opening of from 17 to 20 square inches at inlet and discharge.

(24) E. M. D. writes: I am constructing a telephone according to directions in SCIENTIFIC AMERICAN SUPPLEMENT No. 142, using a bar magnet in place of horseshoe magnet and soft iron core. 1. Would it reduce the strength of bar magnet to cut a thread on one end of it? A. No. 2. Will a bar magnet, used in Bell telephone, lose its power to such a degree as not to work? A. Not readily. 3. Is No. 22 copper wire of sufficient size for a telephone line of 1,000 feet? A. Yes; but larger would be better.

(25) S. & Y. write: We have a pair of burrs on which we grind plaster. The burrs are about 4 feet in diameter and $1\frac{1}{2}$ foot thick. We are running them as an over runner at this time, but wish to change them and make the lower burr run instead of the upper. Can a pair of burrs of the above size be run in that way, and if so, what is the maximum speed at which they can be run? A. If properly arranged, you can run them, after the change, as fast as is allowable for over-running stones.

(26) J. J. asks: Which tire makes a wheel the strongest, 1.25 x 0.56 inch iron, or 1.25 x $\frac{1}{8}$ steel tire? A. The steel tire will be the strongest, comparing good qualities of steel and iron.

(27) E. L. W. asks: Is a ton (2,000 lbs.) of first class coke equal in heat giving power to a ton (2,000 lbs.) of coal? If not, please give me the relative value of coke and coal in heat giving power? A. Calling the evaporative power of good anthracite coal 1, good bituminous coal rates at about 0.92, and coke from 0.89 to 0.95.

(28) J. W. S. asks what to impregnate paper with to give it an agreeable smell while burning. A. You may try a strong ethereal or alcoholic solution of benzoin, tolu, storax, olibanum or labdanum. To burn well the paper should first be impregnated with an aqueous solution of niter and dried.

(29) M. G. asks whether hydrogen and oxygen can be produced as rapidly and copiously in the decomposition of water by the galvanic battery as by the action of sulphuric acid on zinc or lead in the one case, and by heating chlorate of potassa in the other. A. Yes, with a very powerful current.

(30) T. G. H. asks for names of useful treatises on mechanical movements. A. "Scientific American Reference Book," and "507 Mechanical Movements."

(31) R. B. T. writes: We have just set up a new engine; the cylinder is 8 x 12, has a common slide valve. We think the valve is too short; it is set 0.125 inch open when on center, takes steam 10 inches before cutting off; the exhaust is very free. The engine runs about 110 revolutions per minute. We think we could save steam by using a longer valve, and cut-off about $\frac{1}{2}$ stroke, and make the exhaust space in the valve shorter, so that it will shut in a portion of the exhaust and form a cushion for the piston. About how much of the exhaust can we shut in without overdoing it? A. You can obtain a good action by making the ratio of compression equal to the ratio of expansion, with the proviso that the final cushion pressure must not exceed the initial pressure.

(32) D. B. L. writes: Our boiler after being repaired was tested at 110 lbs. cold water pressure. Three days after it gave out where it was repaired at 58 lbs. steam pressure. To find the leak we put on 80 lbs. cold water pressure, and could not find it. We then put steam pressure at 40 lbs., which made the leak very great, whereas with cold water pressure we could find none. Can you explain it? A. The phenomenon is probably due to the change of shape in the boiler when heated.

(33) F. C. writes: Our engine is a plain slide valve engine, 24 x 9, steam following almost to end of stroke. How shall I make a valve to cut off $\frac{3}{4}$? Our exhaust now is 1 inch, steam ports 0.75, bridges 0.75. Length of valve $4\frac{1}{2}$ inches, cavity $2\frac{1}{2}$, travel of valve 2 inches. Will I have to enlarge the steam chest; the valve uses the whole length of it now? A. As the length and travel of valve must be increased, it will be necessary to lengthen the steam chest, unless you can apply an independent cut-off valve.

(34) T. P. writes: A small basement room 9 feet high is to be heated by a furnace in an adjoining room. By carrying the hot air pipe through the partition midway between the floor and the ceiling it will stand at an angle of about 45°. If carried through at the top of the room it will of course be nearer vertical. In which position of the hot air pipe will the room be most easily heated? A. Place the hot air pipe in the position first described. Take the cold air from a point near the floor through a flue opening above the roof.

(35) G. M. P. asks: What is a good and cheap substitute for salt for raising the temperature of water to 230° Fah.? A. An oil bath is often used instead. Chloride of calcium will answer as well as salt, though not so cheap.