

D. S. H. asks: 1. What fraction of a horse power will an average man exert by working a treadle? A. About one seventh. 2. In the description of the new domestic steam engine, p. 386, last volume, it is said: The boiler contains water enough to furnish some 42 foot-pounds for 4 or 5 hours. Does this mean 1/42 of a horse power? A. Yes. 3. What is the best appliance to prevent belts slipping on a wooden pulley? A. To make the face of the pulley as smooth as possible.

F. M. says: A friend of mine, in speaking of cosmical systems, describes them as machines moving without friction according to the laws of mechanical equilibrium, every part being physically connected with the rest. That, for instance, two bodies would form a couple, each moving with force in the inverse ratio of mass and distance around their common center of gravity. Whereas, in our solar system, there are many bodies, the moving force of each is one of a couple, the other being the mass of the primary on the opposite side of the center of gravity; there being, however, a common center for the system as a whole. Is this a correct representation? A. Yes, substantially.

J. W. C. asks: How can I stick the bottom of a glass goblet to the bottom of a glass globe so that the goblet will make a standard for the globe, and the joint be waterproof? A. Use some of the cements sold at the drug stores for cementing glass.

J. C. W. asks: Can salt be used more than once in making ice cream, or does contact with the ice chemically change it into a different article from chloride of sodium? A. It is not changed. The salt could be recovered by evaporation and used again.

J. D. L. asks: With Mr. Ericsson's floating ball, if a great mountain could be suddenly placed by the side of it, would it not draw the ball over to that side of the cup next to the mountain? A. We think so.

F. M. F. asks: 1. Can you give me a recipe that will preserve a minnow, so that it will be flexible, to be used for bait? A. Try dipping it into glycerin. 2. Will mineral water keep if carefully sealed? A. Yes.

L. M. asks: Is there a material, a good non-conductor of heat, that is suitable for covering glass blowers' tools? A. Porcelain is used for purposes similar to that mentioned.

J. E. L. asks: 1. What will be the best method for refining solder? A. Re-melting. 2. What is a recipe for gas fitters' cement, such as is used on iron pipe? A. 4 parts black resin, 2 parts brick dust.

B. W. S. asks: 1. Is the atmosphere heavier or lighter on a cloudy, damp day? A. The latter. 2. Why is it that smoke rises so much more slowly on a damp day? A. Because the weight of the column of air which issues from the chimney and contrasts the smoke is equal to or greater than the weight of an equal bulk of the surrounding atmosphere.

M. E. W. asks: Does the increase of the thickness of ice, when freezing, occur on the upper or lower side of the ice? A. On the lower side.

J. A. H. says: An almost insuperable objection to the use, in Southern waters, of steam barges by parties for their private use and pleasure is the requiring, by government officials, of the employment of licensed engineers and pilots. Is there such a law? If so, why does it not apply equally to New York as to Georgia and Florida? A. If the boat is used by the owner alone, it is not necessary to employ a licensed engineer. But if passengers are carried, or the boat is let to other parties, the case comes under the United States law.

F. H. A. asks: How is the gilding put on spelter trimmings for gas fixtures? A. With tin solder, fill all the holes and defects, and scour the piece by passing for a few seconds in a boiling solution of 100 parts water with 5 or 6 caustic soda, and rinse in fresh water. Then steep for half a minute in a pickle of 1 part sulphuric acid in 10 water, and rinse with boiling water. Then put in a cold or warm electro-bath of copper or brass until it is covered with a metallic coating, which will be the work of a few moments. If the deposit is black and dull, scratch-brush it, and dip again into the bath.

H. J. F. asks: Can you give me a recipe for removing medicine stains from white linen without injuring it? A. When we know the character of the medicine, a recipe can be given for removing the stain which it makes, but no general recipe can be given for removing all medicine stains.

H. A. B. asks: How can I soften finished machine work without discoloring or spoiling the polish? A. Place the finished work in a box made airtight with clay, and pack around the work shavings and turnings of the same metal as the work itself; let the box be kept in a furnace sufficient time to heat the work to a dull red, when the furnace fire may be allowed to go out, and hence the box to cool gradually; or otherwise, take the box from the furnace and cover it with ashes, lime or sand, so as to cool gradually, and your finished work will be softened without losing its finish.

F. C. B. asks: 1. How large should be the core of an induction or Raunkorff coil to produce the best effect? The coil is to be 8 inches in diameter. A. See p. 379, vol. 30. 2. What is a commutator? A. A commutator serves to break contact or send the current in either direction. 3. How long a spark should a coil 3 inches in diameter and 6 inches long give? A. This depends upon the size and quality of wire used, also upon the construction of the coil.

A. asks: Please give me a method of mixing walnut graining color in oil, so as to allow pencil in imitation of the growth. I cannot get the white shade behind the pencil. A. Grounds for graining are made of white lead colored to suit the special purpose.

T. A. P. asks: How can I bronze tin or any white metal? A. Try the following: Take 1 pint strong vinegar, 1 oz. sal ammoniac, 3/4 oz. alum, 1/2 oz. arsenic; dissolve the three last in the vinegar, and the compound is fit for use.

H. W. D. asks: What is good for a pain in the lower part of the back? I have a friend who has been afflicted with a pain in the lower part of the spine for about eight years. Would not electricity, applied by a good operator, be good? The spinal marrow and nerves appear to be affected. Would not electricity tend to irritate and excite the nerves? A. Electricity under the direction of a physician skilled in these matters, is frequently applied with benefit in such cases.

J. S. asks: How can I bend glass tubing? A. By heating the tube, slowly revolving it at the same time, in the flame of an ordinary gas burner. It should be held in the same direction as and not across the flame. When it softens take it out, and bend very gently. Repeat until the proper curvature is obtained. This method gives a beautiful curve. When cold, wipe off the soot.

O. A. Jr. says: Several of my neighbors own a spring of water together. Said spring is some 10 feet higher than my outlet. The main pipe runs up and into the reservoir in my kitchen, and makes a turn out and downward and goes on to my neighbors below. In the bend in the pipe a small hole is made from which I receive my share of water. In order to have the water run out of the hole, I put in a straight compression cock, in the pipe leading from the tub; and closing said cock would back up the water and make it run as I desired for a few days, then sediments of some kind would collect and partially stop up the hole in the cock; then I would get more than my share of water. The water in the spring is clear, and there is a good copper strainer at the spring. Can I make a filter of some kind to put in at the spring, which would be better than a strainer, to prevent foreign matter in the pipe? A. Probably you can overcome the difficulty by using a valve which will give the full opening of the pipe.

T. M. J. asks: 1. Water is composed of 8 parts oxygen and 1 part hydrogen gas. Can these gases be separated? A. Yes, by the galvanic current. 2. Are ginger drinks injurious to the health? A. No, if not taken immoderately.

G. B. S. asks: In your answer to L. E. R., for a polish for walnut, you say: "Melt 3 or 4 pieces sandarac of the size of a walnut, and add 1 pint boiled oil and 1 dram Venice turpentine," etc. You must use something else besides sandarac, as it will not melt in oil. You can dissolve it in alcohol or turpentine, but it will all curdle up as soon as it is mixed with the oil. A. Melt your gum separately, and then mix with boiling hot oil.

P. S. asks: 1. Will it do to run lightning rods into a cistern of water outside a house? Would it injure the walls of the cistern? A. The walls of your cistern would probably remain intact until the lightning struck. 2. Will it do to have 4 points of lightning rods all drawn together and down one rod to the cistern? A. There would be nothing gained by multiplying the points in the way you speak of. The safety of these rods consists mainly in their stoutness.

P. says: I have a piece of machinery with polished iron shafts. It stands in a damp place. What varnish will effectually prevent rust, without injuring the polished surface? A. It will be your best plan to buy some transparent varnish from a manufacturer.

P. V. J. asks: 1. In working a telegraph the keys and receivers of which are 1/4 of a mile apart, do I need an intensity or a quantity battery, and how, is each made with a Bunsen battery? A. Connect your zinc of one cell with your copper or platinum of the second cell. 2. In what proportion should I mix sulphuric acid and water for a Grove battery? A. About seven of water to one of acid.

D. H. H. asks: 1. Is the black lead known as German lead (not plumbago) found anywhere else than in Germany (Bohemia)? A. Yes, in many places in this country. 2. Is it supposed to exist in sufficient quantity to supply the large demand for it for foundry facing, polish, etc.? A. Yes, in sufficient quantities to last many years.

F. E. W. says: Some time ago I noticed among queries the question: What will remove Indian ink marks? Your answer was, I think, that you knew of nothing. I have just come across the following: Rub well with a salve of pure acetic acid and lard, then with a solution of potash, and finally with hydrochloric acid. Sometimes these marks may be obliterated by blistering the skin and keeping the blister open for a while. When the new skin grows the marks will have disappeared. A. These remedies are a good deal worse than the Indian ink stains. They amount to an absolute removal of the skin.

R. F. L. asks: 1. What preparation can I apply to large wooden friction wheels to prevent silvering up on the face? A. There is no effective method of preventing the silvering of large wooden friction wheels. 2. What kind of paper is used for small friction wheels, and how is it used? Is it clamped between flanges, with or without glue, or is it put on in layers with glue? A. Paper friction wheels are of thick brown paper, put together in layers without glue, under hydraulic pressure.

F. H. L. asks: Will you give me a rule for computing the length of a pendulum rod for any clock in any part of the world, as clocks require longer or shorter rods according to locality? A. We suppose you refer to the length of the seconds pendulum. Its length in feet = 3.26058 - 0.008818 x the cosine of twice the latitude of the place. Having found the length of the seconds pendulum, that of any other can readily be calculated by observing that the vibrations made by two pendulums, in a given time, are inversely as the square roots of their lengths.

S. R. L. asks: What sized boiler shall I use for an engine 3 1/2 x 2 1/2 inches? What should be the weight and size of the fly wheel? A. Calculate the probable power from the proposed speed and pressure, and allow from 15 to 20 square feet of heating surface per horse power. Make a fly wheel from 12 to 15 inches in diameter, weighing from 50 to 60 lbs.

F. H. asks: I am using a powder, for welding steel rails into frogs, which I believe is composed of caustic soda and borax. What does caustic soda add to the welding properties of the powder? It is very bad for the health of those using it; and if you could inform me of some flux that I could use for welding steel rails at a very high heat, to keep them from cracking, I would be thankful. A. There are several patent compounds in the market, but we know very little in regard to their merits. If you insert a notice in our "Business and Personal" column, you will probably hear from the manufacturers.

A. A. W. says: I am running a pair of 18 inch engines; they both exhaust into one pipe. Would there be any difference in power if each engine had a separate exhaust, and does not the exhaust of one engine throw a back pressure on the other? A. It depends a great deal upon the size and arrangement of pipe. If properly proportioned, one pipe will answer as well as two. As to your query on water pipes, you do not send sufficient details.

G. A. N. asks: Will a boiler 10 1/2 inches diameter x 26 inches high, with 26 one inch tubes 12 inches long, made of 3/8 iron with flue sheets 1/4 inch thick, be of sufficient capacity to drive an engine of 2 inches bore x 7 inches stroke? What pressure would such a boiler carry with safety? A. The boiler is rather small.

W. H. S. says: In an argument on cannons, an Englishman asserted that the largest guns in the world were made in England. This the American would not admit, saying that the 20 inch guns at the Riprap or Fortress Monroe, were the heaviest. A. We believe that some 20 inch guns, the largest of which we have heard, have been made in Europe.

G. F. T. & Co. ask: Please give us the best manner of cleaning gilt frames. A. Use a sponge moistened with urine or oil of turpentine.

E. W. says that W. E. M. can bleach tallow without injuring it, as follows: Heat the tallow to 120°, keep it hot at least 50 minutes, then dash water into it, and stew the water and tallow for a few moments. If correctly done, the tallow will be in small lumps like shot, or butter when it first comes in the churn. Skim the tallow and melt it again, remove all the water and stir the tallow while cooling; this makes good tallow for some purposes. I do not know much about an engine cylinder; but for launching a ship, the tallow must be freshly rendered beef tallow. Five per cent of mutton tallow will spoil launching tallow. Mutton tallow will not slip like beef tallow. Tallow can be heated until it will scorch a feather without apparently injuring it; but it will not slip after that, but will dry like linseed oil. For friction, use beef tallow rendered before decay commences, with but little boiling; for belts and the like, mutton tallow is best. For paint or making a hard surface, superheated tallow is best, because it will not slip.

J. H. J. says, on the subject of draining a cellar, p. 379, vol. 30: My cellar is sunk in clay ground, and after heavy rains would be flooded with water coming in below the wall. In such a case the cellar wall should be built on a trench filled with broken stone, with a tile or a broken stone drain to an adjoining low ground. My walls not having been so built, I proceeded thus: I made a slight trench at the inner foot of the outer wall, so as to catch the drainage, which was all brought to the front and carried under the wall. I then made an outside drain, five feet deep to one foot deep, in which I laid a brick drain (brick on edge covered with cross brick) and refilled the trench. This was 35 years ago. Occasionally I am told that water is standing in the cellar floor. By way of instruction, I take my informant to the outfall of the covered drain a rod, with my cane, removes few leaves which had gathered upon the opening, and forthwith a bright stream of water would flow out. At the same time when I made these drains, I dug a well in one of my cellars to the gravel bed below (12 feet) walled it with bricks and covered it securely. Into this well are made drains, 10x12 inches, filled with broken stone and covered with earth, which keep every apartment dry. I have no need of cement and prefer the dry clay. Beds of solid clay have drainage seams in them, which would not be suspected. Many years ago I purchased a lot adjoining my own grounds; this lot had on it a small brick house, under which was a cellar frequently filled with water that the family occupying the house used the cellar as a cistern. Within my own grounds I made a large cave, covered with logs and earth, for storing vegetables in winter. At times the bottom of the cave would be almost filled with inflowing water. To remedy this, I dug and walled a well in one corner of the cave down to the gravel. The remedy was complete, and after that the cellar spoken of, distant sixty feet from the well, was drained and dry.

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

W. S. V.—No. 28 does not contain tellurium. It contains silver, copper, arsenic, and antimony, and the green color is due to the second and fourth of these substances. No. 26 is a variety of the rare mineral or white, having a specific gravity of 3.74. No. 27 is a variety of serpentine of unusual hardness and high specific gravity (2.74), and is probably to be referred near the variety bowenite; No. 29 is prehnite.—P. S.—No. 1 is amphibole. No. 2 is ferruginous sand rock. No. 3 is quartz. No. 4 is quartzite with yellow ochre. No. 5 is minute rock crystalline bluish quartz. No. 6 is peacock coal. No. 7 is magnetite imbedded in quartz. No. 8 is magnetic oxide of iron.—D. B.—An analysis of the clay shows silica, silicate of alumina, and lime (very small quantity). It will not burn to a stone when kept at white heat for 10 minutes. What was done to it to make it burn to a stone?

S. C. H. says: I have a drawing in Indian ink on tracing cloth. I wish to mount it by pasting on a paper background, and then varnish the surface. What kind of paste and varnish should be used?—W. C. says: In your last issue E. H. R. asked: In the driving wheel of a locomotive, where does natural philosophy place the fulcrum, the power, and the weight, respectively? I think that the axle bearings are the fulcrum, the pressure of steam in the cylinder the power, and the locomotive the weight. [This general idea is correct, but some modifications are required. Perhaps one of our readers will point them out.—Eds.]—J. A. asks: What is the *modus operandi* of putting on the seed bag on well tubing to stop water in rock boring? The bore of the present hole is 5 1/2 inches diameter and 500 feet deep; we are going to bore 500 feet more of 2 1/2 inches diameter.—W. Z. asks: Can you give me a formula for a jet black steel ink that will not rub off when handled or exposed to the weather?—F. W. M. asks: How can I stain bamboo and rattan a black color?—M. J. S. asks: How can ink ribbons for hand stamps be saturated with inks of different colors, and how are the inks prepared?—R. S. asks: How can I take the moldiness out of hams? What will prevent a ham from molding without injuring its taste?—W. H. G. asks: What will protect gold jewelry from the stain caused by heat of the blaze while soldering? The trouble with borax is that it runs the solder in the wrong place.—J. S. W. says: We all know that, when a fresh green board or plank is first exposed to the air, it will shrink from its original size. Now if a hole is drilled in the middle of it, say of an inch in diameter, will the hole remain of the same size? Will it shrink longitudinally or transversely with the shape of the plank, or both?—W. F. W. asks: How can I glaze earthenware jugs, also the snuff jars used in tobacco stores?—O. P. B. asks: How can I paint an outside door so as to prevent its blistering, cracking, and peeling?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects: On Railway Earthwork. By J. B. On the American Log. By S. B. On Cobalt and Nickel. By G. W. B. On Raiding Ants. By J. S. D. Also enquiries and answers from the following: C. W.—W. N. W.—H. W. D.—F. W.—F. H. D.—G. T. B. S.—G. S. R.—J. H. W.—R. A.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Several correspondents request us to publish replies to their enquiries about the patentability of their inventions, etc. Such enquiries will only be answered by letter, and the parties should give their addresses.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.

[OFFICIAL.] Index of Inventions FOR WHICH Letters Patent of the United States WERE GRANTED IN THE WEEK ENDING June 9, 1874, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

Table listing various inventions and their patent numbers, including items like Air compressor or blower, Anchor, Animals, marking, Morgan & Decker, Auger, hollow, J. Benham, Awning, street car, J. T. Crow, Bag holder, J. Benson, Bag holder, B. B. Downs, Baggage seal, F. W. Brooks, Bale tie, G. B. Ford, Bale tie, cotton, G. Brodie, Basket cover, R. H. Wheeler, Basket, wire, J. Horrocks, Bedstead, cabinet, C. A. Mendum, Belt tightener, S. E. Jewett, Boat, life, F. J. Frackell, Bolt, seal, C. F. Dodge, Boiler, sectional steam, H. B. Smith, Boiler, steam, C. H. Haswell, Boiler, wash, H. Calkins, Boiler, feed water heater, Whitney & Hale, Boot heels, burnishing, C. J. Addy, Boot heels, etc., trimming, L. Graf, Boot shanks, etc., forming, H. C. Saurtleff, Boot tree, J. Howe, Boot tree lock, J. Howe, Bottle, glass, T. P. Spencer, Box and can machine, D. J. Stuart, Breakwater, floating, A. Deane, Bridge gate, draw, F. Baier, Bridle bit dies, Clapp & Van Patten, Bridle snap, J. Kennedy, Brine into meat, injecting, Fox & Edwards, Bronzing machine, E. P. & L. Restein, Brooch, H. A. Church, Burner, candle, G. Hollister, Burner, lamp, A. Combs, Butter worker, J. C. Rorick, Callipers, J. W. Barsantene, Can faucet, oil, F. Spinning, Can, milk, D. Munch, Can, oil, S. W. Valentine, Can opener, Hockensmith & Weaning, Car awning, street, J. T. Crow, Car brake, J. A. Collins, Car brake, railroad, C. Scoubersky, Car brake (r)pe couplings, E. W. King, Car coupling, C. H. Babcock, Car coupling, G. W. Clark, Car coupling, W. D. Condon, Car coupling, M. Kurtzman, Car coupling, L. Schmid, Car coupling, J. Singer, Car spring, H. S. Manning, Car spring, railway, A. D. Fox, Car starter, J. Clark, Car starter, A. E. Hotchkiss, Car wheel, J. Pearson, Carbureting air and gas, G. E. McFaddin, Carding machine, feed, W. Carlisle, Ca pet stretcher, H. W. Cotpell, Carpet sweeper, J. W. Fisher, Carriage curtain fastening, J. E. Ely, Carriage curtain fastening, A. T. Rice, Carriage window frame, F. A. Nelder, Chain links, making, A. M. & B. F. George, Chair, folding, E. Tucker, Chair, opera, W. A. Slaymker, Cheese mill, L. P. Smith, Chimney top, W. H. Connor, Churn, E. W. Kitchen, Churn, M. Sullivan, Clamp, Britton & Thayer, Clamp, Joiner's, E. H. Peck, Clothes wringer, Witzl & Hawkins, Coal, etc., unloading, J. Foreman, Compasses, dumb, W. S. Cronace, Composition, waterproofing, M. Brylawski, Compound, leather stanz, H. D. Bageau, Cooking apparatus, B. Giles, Cooler, milk, Bunnell & Brown, Cotton stalks, pulling, J. Sampson, Cow fetter, H. J. Sadler, Crane, hydraulic hoisting, J. L. Penneck, Cultivator, H. Cargo, Cultivator, J. D. W., & W. J. McGee, Cultivator, W. M. Watson, Curry comb, L. Draper, Cutter, sausage meat, J. Knopp, Cutter, vegetable, W. Kimmel, Digger, potato, J. C. Hewitt, Door spring, Sherman & Smith, Dovetailing machine, W. F. Moody, Drawers, E. Well, Drawing and spinning top roll, J. T. Harris, Drill chuck, G. Odholm, Drilling machine, metal, F. E. Reed, Drum, T. Rawson, Dyeing cotton yarn, R. & J. Garsed, Egg beater, W. O. Crocker, Egg beater and mixer, J. F. Landis, Egg carrier, W. O. Strong, Electroplating, apparatus for, Lovejoy et al., Engine governor stop, T. Warren, Engine balanced slide valve, O. H. Castle, Excelsior machine, D. S. Bailey, Eyelet setting machine, A. B. Edmands, Fan, automatic, T. Freshour, Fertilizer distributor, J. Sensenig, Fertilizers from night soil, G. E. Noyes, Fire arm, revolving, O. Jones.

Table of patent entries with columns for inventor name, title, and date. Includes entries like 'Fire kindler, Long & Coates' and 'Flax hackling and combing, J. C. Todd'.

Table of patent entries, continuing from the previous table. Includes entries like 'Table, extension, C. P. Lenz' and 'Valve, ironing, A. and R. O. Applegate'.

APPLICATIONS FOR EXTENSIONS. Applications have been duly filed and are now pending for the extension of the following Letters Patent.

EXTENSIONS GRANTED. 28,644.—PUMP.—N. S. Beal. 28,670.—RAILROAD BRAKE.—N. Hodge.

DESIGNS PATENTED. 7,488.—WIRE CORD.—G. W. Kingsley, Buffalo, N. Y. 7,489.—OIL CLOTHS.—C. T. Meyer et al., Bergen, N. J.

TRADE MARKS REGISTERED. 1,821.—Tobacco.—S. M. Bailey, Richmond, Va. 1,822.—Whisky.—C. Rebstock & Co., St. Louis, Mo.

SCHEDULE OF PATENT FEES. On each caveat \$10. On each Trade Mark \$25. On filing each application for a Patent (17 years) \$15.

CANADIAN PATENTS. LIST OF PATENTS GRANTED IN CANADA MAY 29 TO JUNE 10, 1874.

Table of Canadian patent entries with columns for inventor name, title, and date. Includes entries like 'I. Atkinson, Hamilton, Ont. Improvement in curing and packing meats'.

Table of patent entries, continuing from the previous table. Includes entries like 'William West and P. West, Toronto, York county, Ont. Improvements on the manufacture of burial cases'.

Table of patent entries, continuing from the previous table. Includes entries like 'E. M. Jones, Brockville, Leeds county, Ont. Improvement on tucking devices'.

Table of patent entries, continuing from the previous table. Includes entries like 'J. W. Meaker, Detroit, Wayne county, Mich., U.S. Improvements to hatchways for hot-ways in stores'.

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