Notes & Queries

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(1) G. D. T. asks: 1. What is the actual horse power of a steam engine 10 x 14 inches, running at 215 revolutions per minute, with a boiler pressure of 60 lbs., cutting off at ⅕? A. A test would be necessary before this question could be answered. 2. Can the exhaust steam pipe on an engine be turned into the smoke stack without injury to either? A. Introduce the exhaust pipe so that it discharges upward, in the middle of the smoke stack.

(2) F. E. H. says: Please give me a recipe for making Pharoah's serpents. A. The genuine ones are simply sulpho-cyanide of mercury made up by means of gum water into the form of cones, pills, or cylinders. They are still made and sold, on a small scale, in this city. We are not aware of any law specifically referring to them. Several substitutes for the dangerous mercury preparation have been proposed, but the snakes they produce are not so life-like nor so big. The following is said to be the best imitation: Take white sugar 3 parts, bichromate of potash 2 parts, saltpeter 1 part. Pulverize separately and mix intimately; finally press the mixture into small paper cones.

(3) E. L. S. asks: What diameter and pitch of propeller would you advise for a boat 58 feet long, 7½ feet beam, with 3½ feet draft of water, engines having 6 x 8 inches cylinders? A. Diameter 3½ feet, pitch 4½ to 5 feet.

(4) R. S. B. asks: I have some liquid which is neither good old hard cider, for it has a vinous taste, nor yet is it good vinegar. How can I convert it into good marketable vinegar? A. Prepare a large barrel, with a false bottom having a number of holes bored through it. Place this in the barrel about six inches above the real bottom, and fill in above the false bottom to the top of the barrel with good, well burnt charcoal, in coarse powder. Moisten the charcoal thoroughly with some of the cider, cover the barrel with a piece of felt or woolen goods, and allow to remain until there is a perceptible rise in the temperature; then add the cider in such a manner as to keep up a constant percolation of the fluid through the charcoal until the process is complete. The vinegar may be drawn off from a spigot at the bottom.

(5) R. J. C. asks: How much power is there in an overshot wheel propelled by a spout of water 12 inches wide by 3 inches deep? A. A good overshot wheel may give ¾ of the whole effect of the water.

(6) F. O. says: P. is testing a boiler with water from a pipe showing a pressure of 60 lbs. The boiler being filled, the gage shows 5 lbs. The gage is half way from top of boiler: now, if the pressure be added from the pipe, should the gage on the boiler show 60 or 65 lbs.? I claim the cause of the 5 lbs. pressure is due to the weight of water above the gage, and must be added to the 60 lbs., and make the gage say 65. P. says the 6 lbs. has nothing to do with it; the pressure must be 60 lbs. Who is right? A. If the pipe enters the boiler at the lowest point, according to the data furnished, the pressure at the highest point of the boiler would be 60 lbs., and the gage would show a pressure of 65 lbs.

(7) C. G. N. asks: How large a boat will a 3 horse power engine propel, with side wheels? A. Make her from 20 to 25 feet long. Good friction gearing is preferable to ordinary toothed wheels. Side wheels give very satisfactory results in smooth water.

(8) R. B. H. L. asks: 1. What kind of cannon is used for chain shot? A. Chain shot have ordinarily been fired from a smooth-bored gun; but we believe that occasionally a peculiar form of gun has been employed, consisting of two barrels, slightly diverging at the muzzles and having a common vent. 2. How many kinds of cannon have ever been used? A. Cannons are generally classed as muzzle and breechloaders, with smooth bore or rifled barrels. 3. If a cannon 1 inch bore, 70 feet from a target, be loaded with 100 No. 1 shot, to what width would the shot spread? A. It is impossible to give a definite answer to this question, since, as you must be aware, the difference in the performance of different guns, in this respect, is very marked.

(9) T. D. and others.—There is no work on taking the buckle out of saws. It is an art known only to saw makers, and attainable only by long practice and a thorough knowledge of the principle upon which saw plates are worked in order to impart that strain upon different parts so as to overcome the expansion by centrifugal force caused by the velocity of the saws in use.—J. E. E., of Pa.

(10) D. W. W. asks: 1. Is it possible for boiler tubes to get heated to the point of producing a spheroidal state when the proper supply of water is kept up in the boiler? A. Experiments seem to show that, in order that water may assume the spheroidal state, a small quantity must be dropped upon a plate which is heated to a higher temperature than the boiling point of the water. 2. What is the lowest temperature at which the spheroidal state can exist in the case of iron and water, and how is it affected by pressure? A. Under atmospheric pressure, the temperature required is about 290° Fah. In a boiler properly designed, the temperature necessary for the spheroidal state could not be produced, if the ordinary water level was maintained. We have, however, occasionally seen boilers in which the circulation was so poor that tubes were burned out when apparently covered with water.

(11) W. C. B. asks: 1. Is it practicable to pump water through a pipe 150 feet long, it being level from the pump to the well, which is 18 feet deep? Yes. 2. Is it better to have the pipe higher at the well than the pump? A. Lay the pipe as straight as possible, with the highest point at the pump. 3. Should there be a check valve at the well? Yes. Put it at the bottom. 4. What sized pipe should we use? A. A 2 inch pipe.

(12) S. H. S. asks: What is the matter with our stove? When the damper was closed, the draft went around under the bottom of the stove; when the draft is all closed, the smoke or something else will condense into liquid and run through the chimney, through the upper floors, and into the room below. A. This may be owing to some peculiar kind of fuel you are burning, which you do not specify. When the draft is closed the flue soon becomes cold, and the air carrying the smoke precipitates its latent moisture upon the sides of the flue; the moisture naturally carries the particles of unburnt fuel with it. If this is the cause, a more free draft would abate the difficulty.

(13) M. B. says: I have a boat 50 feet long and 10 feet wide. The engine is 8 x 9 inches. What size and pitch of wheel should I use? A. You can use a wheel 3½ feet in diameter, with 5 feet pitch. In general, a wheel that is properly proportioned for speed is likewise suitable for towing.

(14) J. J. says: It is claimed that the outside horse, in plowing a circle, commencing in the center, gains only so much as he gains in the first round and no more, as the inside horse follows all the time after. Others assert that the outside horse gains each round plowed, and will gain in each round so long as they continue plowing in a circle, and that each and every day the outside horse has traveled the farthest. Which is right? A. This is a very pretty question, of little or no practical importance; and we therefore forego the satisfaction of answering it, and throw it open to the competition of those who may be interested in finding a solution.

(15) M. J. asks: What is the method of testing hydraulic cement for water? A. It consists in gaging a small quantity of the dry powder with water, and immediately immersing it in water. If the sharper edges crack or break away after a short time, the cement is too hot or fresh, or is inferior in quality.

(16) J. H. D. asks: What weight can an average horse raise, if hitched to a rope, the rope to pass over a pulley, and the weight attached below? A. The following table, given by Mr. Trautwine, furnishes a fair statement of average results, the speed of horse being miles per hour, and the traction in lbs.:

Speed.	Traction.	Speed.	Traction.
¾	333	2¼	111
1	250	2½	100
1¼	300	2¾	91
1½	167	3	83
1¾	143	3½	71
2	125	4	63

(17) J. A. K. asks: What causes an explosion when water is pumped into a hot boiler? Is it the sudden generation of steam, or does the boiler crack? A. When an explosion takes place under such circumstances, steam is formed rapidly; and the iron, weakened by overheating, cannot resist the pressure.

(18) J. W. A. McC. asks: By what rule can I find out what quantity of water will be supplied by a wooden pipe, with a 3 inch bore, having a head of water of 250 feet, the length of said pipe being about 10 miles? A. If we knew all the particulars of the case, we could only give you approximate rules; and it would be useless to attempt to furnish information from the meagre data you have sent. We hope to treat of matters of this kind, in special articles, before long.

(19) R. E. B. says: If I take out a water wheel 10 feet in diameter, and replace it with one 2 feet in diameter, using the same quantity of water, do I gain any power? A. Not from the fact of its being larger. If the new wheel is a better one than the other, *per se*, there will, of course, be a gain.

(20) T. A. B. asks: Should the balance wheel of a gig saw or vertical re-sawing machine and the gate and connecting rod of the same form a perfect balance, to prevent thump or jar? A. Vertical resawing or other rapidly operating machmery should be balanced so as not only to counteract the weight of the gate or frame and connecting rod, but also the momentous force, and this latter depends upon the velocity at which it is run. I know of no established rule for accomplishing this. About the only way that I know of to get a perfect counteraction is to construct the balance wheel with more counteracting weight than is really required. Then remove the surplus little by little until the machine moves properly.—J. E. E., of Pa

(21) W. M. K. asks: To what extent, if any, will air in an open inverted vessel, mingle and pass off with a current of water when deeply immersed and under a pressure of 500 lbs. to the square foot? Would hydrogen or some other gas remain longer unchanged in bulk than atmospheric air? A. Either the air or hydrogen will be absorbed much more readily by the water, under these circumstances, than under ordinary pressure.

(22) G. H. says: I have in my cellar a horizontal single flue boiler for the generation of steam for heating purposes. Trouble seems to be caused by a sluggish combustion. It does not smoke nor emit gas; but no matter how much coal is put in at one time, the fire burns dull, and it is difficult to raise 3 lbs. of steam and hold it. The flue fills with soot quickly, which hangs in festoons, indicating that there is no draft. A. Your description will not enable us to help you very intelligently; but we would recommend that you see whether the chimney, *per se*, is in good working order.

(23) H. F. J.—We cannot estimate the performance of your engine and boiler accurately from the data sent. If you will put a check valve on the end of your pipe, we think you will have no more trouble.

(24) O. K. and others ask: 1. How is the focal length of a microscope lens calculated? A. Focal length is reckoned from the center of the combination. 2. How can I test lenses for chromatic faults? A. The only test for achromatism is the color; if there is no color, the lens is achromatic. The best lenses are made of two kinds of glass cemented together and burnished in the cell, there being no necessity for removing them. 3. How can I ascertain and compare the powers of microscopes? A. In comparing the magnifying power of microscopes, opticians generally have agreed to consider 10 inches as the distance of distinct vision; then by comparing the real size of the object with the apparent size of the image at a distance of 10 inches, the magnifying power is easily determined. See p. 25, vol. 33.

(25) G. W. S. asks: What should I put on a wooden plug joint to harden the wood (poplar, bass, or lime) and at the same time to keep the joint from moving when fastened in by a screw at right angles to the plug? A. Powdered resin might answer your purpose.

(26) G. W. J. says: 1. I am running a pair of high pressure engines, 15 x 28 inches, with 100 lbs. steam, at 150 revolutions per minute. These engines are both connected to the same shaft, with a fly wheel only 3 feet in diameter but very heavy. On the crank shaft is a cog wheel 2 feet in diameter, geared in another wheel on a countershaft, 5 feet in diameter, or 2½ to one. Connected to this countershaft is a screw 10 inches in diameter, with square thread of 1¼ inch pitch, or 9½ threads to the foot, running through a cast iron nut. How much thrusting pressure do we apply to that nut?

A. The greatest pressure on the nut will be between 9 and 10 times the maximum pressure on the crank pins. 2. Would a cast steel nut work better and cooler than a cast iron or gun metal one? A. With sufficient bearing surface, we think you will find cast iron a satisfactory material for the nut.

(27) W. H. asks: Is there any rule for the weight of green pine timber? What is the difference in weight between green timber and dry timber? A. It would be impossible to answer these questions very exactly, without experimenting in each special case. Dry white pine weighs about 25 lbs. per cubic foot, and green pine from 30 to 37.

(28) J. B. K. asks: 1. Which is the best for a base to plate on (for such articles as spoons and forks), nickel silver, white metal, or albata? A. All these alloys are good for the purpose. 2. Of what metals are these different bases composed? A. Nickel silver is a variety of German silver, of which many kinds are in use. The following is a good one for plating on: Copper 55, nickel 24, zinc 10, tin 3, and iron 2 parts. White metal consists of: Tin 82, lead 18, antimony 5, zinc 1, and copper 4 parts. Albata is another name for German silver.

(29) W. H. E. asks: What should be the number of revolutions per minute of a screw propellerin a model 3 feet 6 inches long, to gain the maximum speed? A. The question is tooindefinite. Probably you could not get a correct solution in any way but by experiment.

(30) W. G. M. says: 1. I have become nearsighted, my eyes being in different degrees affected. I can see to read well at the common reading distance, which does not seem to be the case with others I have noticed similarly afflicted. What has caused it, lamplight or too constantly looking at near objects? A. The natural eye has the power to cause the front of the crystalline lens to become more or less convex as objects looked at are nearer or farther from it. In your case that power appears to be lost by over exertion in looking at near objects. 2. Can my sight be restored? A. Probably it can, with proper care and rest. 3. In looking at distant objects I am compelled to partly close my eyes, when the objects become far more distinct. Why is this? A. In closing the eye, the light passes only through the central portion of the lens, and this part is of longer focus. 4. Will the use of glasses strengthen the eyes, or cause a growing necessity for them? A. If used constantly they will not be likely to remedy the defect. 5. Would their use have a tendency to make both eyes alike? A. Probably not. 6. Should they be worn continually? A. No.

(31) G. C. asks: Is the steamer Great Eastern constructed so as to be divided in any number of parts, each part to sail independently on entering a small harbor or in case of a rough sea? A. If itever was constructed in this manner, the matter was kept a profound secret.

(32) J. P. W. says: In *Science Record* for 1874, on p. 574, are directions for making a portable field camera obscura. I have followed the directions, but it will not work, as the lens will not throw the image downward. A. The difficulty probably is that the lens is not long enough in focus. The distance from the center of the lens to the mirror and thence to the paper should be the focal length of the lens. It will not be practicable to use a lens of a shorter focus than 2 feet.

(33) C. K. asks: 1. Will a good achromatic object glass of 2 inches diameter and 3 inches focus, with an eye lens of ¼ inch focus, make a telescope strong enough to see the phases of the planets Venus and Mercury? A. Yes. 2. Will it show the globular form of Jupiter and the ring of Saturn? A. Yes; with a steady atmosphere you should see the belts on Jupiter also.

(34) J. M. T. asks: 1. I wish tomake a telescope. Which will be the cheapest, a reflecting or refracting telescope? A. In small telescopes there is not much difference. 2. What will an object glass, 2½ inches diameter, of 44 inches focus, cost me? A. About $20. 3. What power would it stand? A. A power of 150.

(35) C. R. says: It is desired to surround upright cylindrical stoves by shields to protect woodwork, etc., from the intense heat radiated. Can you suggest some simple and efficient form and material? There should be a door to permit the introduction of coal. A. Sheets of zinc will be the best, unless you require an ornamental effect. In the latter case, use Russian iron.

(36) J. M. G. says: A steamboat boiler is filled to top of steam chimney with water, and shows 5 lbs. pressure on the steam gage from weight of water in pipe connecting the gage with boiler. In testing the boiler to 60 lbs. water pressure, will it be necessary to show 65 lbs. on the gage in order to have 60 lbs. on the boiler? Will the gage show 5 lbs. more than a gage placed at the pressure pump? A. When there is a pressure of 60 lbs.; at the highest point of the boiler,'underthe circumstances stated, the gage will indicate 65 lbs., and the gage in pressure pump will indicate a still higher pressure, if, as is generally the case, it is subjected to the action of a still higher column of water.

(37) A. N. asks: How can I write or draw on smooth plates of zinc, and afterwards etch the marks in with acid? A. Mix 1 part strong nitric acid and 100 parts water: pour over the plate, and let it run to and fro. Wash with water, and pour weak gum water over the plate.

(38) X.X. X. asks: How can I make a good oleate of soda? A. Oleic acid forms two classes of salts, normal and acid. The normal salts of the alkalies are the only soluble ones. They form soaps, and by the evaporation of their aqueoussolution may be obtained in the condition of an amorphous mass. The isolation of oleic acid in a state of purity is a matter of some difficulty, owing to its tendency to combine with oxygen. To obtain pure oleic acid, olive or almond oil is saponified with potash; the soap is decomposed by tartaric acid, and the separated fatty acid, after being washed, is heated for some hours in the water bath, with half its weight of lead oxide, previously reduced to a fine powder. The mixture is then well shaken up with about twice its bulk of ether, which dissolves the oleate of lead and leaves the stearate; the liquid after standing for some time is decanted and mixed withhydrochloricacid; the oleic acid thereby eliminated dissolves in the the ether, and the etherial solution, which rises to the surface of the water, is decanted, mixed with water, and freed from ether by heat The acid may now be converted into soap by the addition of pure caustic soda, which is afterwards separated from its aqueous solution by the addition of chloride of sodium, and pressed to remove excess of moisture. Owing to the strong affinity of the liquid acid for oxygen, as prepared by the above method, it has a brownish color and a slight odor. See answer to A. B. C., below.

(39) A. B. C. asks: Can oleate of soda be made chemically pure? A. If absolute purity be requisite, try the following: Redissolve the oleate of soda, as obtained by the above method, in water that has been boiled for some time to expel all the air, and again decompose with tartaric acid in vessels filled with carbonic acid gas. Allow the acid to settle, decant the supernatant liquid, and wash with water free from air. Then add a large excess of strong ammonia, and,when solution is complete, precipitate with chloride of barium. The oleate of baryta thus formed is dried and boiled with alcohol. During this operation the salt melts and forms a viscous liquid, but a portion of it is dissolved, and is deposited in crystalline plates as the liquid cools; these are again crystallized from alcohol, and on decomposing them with tartaric acid pure oleic acid is obtained.

(40) W. S. D. says: 1. A church is being heated by a hot air furnace, but there is a fault in the ventilation, which is effected by one large pane in each window hanging on a swivel. When the church cools, there is a cold damp air, and the furnace draws cold air from the inside of the church. A. The supply of fresh air to the furnace should be taken from the exterior of the building, by means of an enclosed shaft, which may be constructed of matched boards for the most part, being of brick near the furnace. Place a valve, or shutter on pivots, within the shaft,to close it when required. Additional openings for ventilation should be provided at the ceiling.

(41) J. F. B. asks: 1. Is it necessary that the wires of a galvanic battery be copper, or will iron wire do? A. Not absolutely necessary; but as the conductivity of copper is about seven times greater than that of iron, it is better to use copper. 2. Is the vapor of a battery, consisting of copper zinc plates, poisonous? A. No.

(42) X. Y. Z. asks: 1. How is an ohm, in electricity, measured? A. An ohm, the unit of electrical resistance, is roughly equivalent to 1 foot 1·9 inches in length of German silver wire of No. 29 British Association gage. It would not do, however, to place much dependence on its accuracy as thus determined, as the resistances of various samples of wire vary considerably. Standard copies of the ohm are supplied by various foreign manufacturers of telegraph apparatus, and possibly, also, by some American houses. 2. How are the connections made in the open circuit system of telegraphy? A. The key is provided with both front and back contact points. At terminal stations the line is connected to the key lever; one pole of the battery and the back contact point are connected to earth, and the opposite pole of the battery to the front contact of the key. Except when the station is transmitting, the lever is allowed to remain constantly on the back contact.

(43) B. S. S. asks: 1. How long will a silver solution hold its strength? A. The cyanide solution should last for months if kept,as much as possible, from the action of air. 2. Ought it be bottled when not in use? A. Yes.

(44) C. R. asks: The quality of the magnet is destroyed by fire. Does this magnetic property of the iron impart itself to the fire? If not, what becomes of the magnetic property? A. The attractive property of a magnet is supposed to depend upon a peculiar arrangement of the molecules of which it is composed. Bodies capable of becoming magnetic offer more or less resistance to an arrangement of this kind. We may, therefore, assume that the molecules of a magnetic substance are in a state of strain. Heat reduces the conditions of restraint by imparting motion to the molecules, and thus allows them to resume their formerposition.

(45) C. A. H. asks: How can I make an electrical machine capable of giving the same power as a Bunsen battery? A. The ordinary electrical machine is not capable of producing a current equal to that from a Bunsen battery. A stick of shellac rubbed with flannel, however, will produce a greater tension, but the current from such a source is infinitesimal. A magneto-electric machine would cost more than the battery.

(46) W. R. asks: 1. What are the best width and thickness of single steel horseshoe magnetsthat will do to form a compound one? A. Make the width about $\frac{1}{20}$ of the length, and the thickness ¼ the width. 2. Of what size should single electro-magnets be to form a compound one? A. An electro-magnet, such as used for the sounders or registers in telegraph offices, will be found sufficient. 3. How shall I temper the magnets? A. For permanent magnets use the best, fine grained steel; temper as high as possible, and then draw, by heat, to a violet straw color. 4.How many feet of wire are required to saturate single bar magnets to form a compound 10 or 12 inches long? A. An electro-magnet, charged by two or three Daniell cells, will answer the purpose.

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

L. L.—It is possible that the mineral was eucairite, with which it agrees in physical character; but the amount did not suffice to determine its chemical constitution. Will you send about 8 grains of the mineral, free from the gangue?—H. M. W.—Thescale consists chiefly of carbonate of lime and sesquioxide of iron. The color does not indicate anything injurious.—L. C. T.—Send us a specimen of your mineral, and we will tell you what it is.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On a Car Brake. By M. M. S.
On Problems in Gunnery, etc. By R. H.
On a Cannon Musical Instrument. By H. M. B.
On Belting. By E. H. D.
On a Geometrical Problem. By J. D. L.
On the Mississippi Improvements. By B. J. B., and by O. P. S.
On the Moon. By J. A. S.
On Employers and Employees. By O. O. T. E.
On a Solar Phenomenon. By J. C.
On Another Explosion. By H. I. F.
On Transplanting Trees. By C. E. H.

Also inquiries and answers from the following:

C. A. W.—R. F. F.—D. L. W.—J. L. R. B.—F. W.—W. R.—C. D.—S. H.—A. F.—W. C. I.—E. W.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appea. 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.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into tne waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells machines for recutting hand saws? Who sells pure bred poultry? Who makes brass castings? Who makes cider mills that grind and press at one operation? Whose is the best boiler for generating steam to heat water in a tank? Who sells platinum, and what is its cost? Who sells machinery for working small screw propellers by hand power?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

February 29, 1876,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Alarm, electric burglar, W. H. Rodgers	174,156
Alarm, electric fire, W. Gates	174,070
Auger, earth, A. W. Morgan	174,083
Badge, H. H. Snow	174,162
Baking sprinkling attachment, A. Rannie	174,300
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Car coupling, J. C. Gentry	174,072
Car coupling, W. G. Hawley	174,133
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