(35) T. C. W. asks: 1. Is paper a good conductor of cold? A. Paper is a very poor conductor of heat and (although it is not the usual way of regarding the subject) of cold. 2. Please name a few good conductors of cold. A. All the metals are good conductors.

(36) G. H. M. asks: Can gas carbon be consumed, or by any means converted into the gaseous state, as the other forms of carbon are when made to deflagrate with niter or other oxidizing agents? At present it resists this treatment. A. It can. When placed in the galvanic focus, it is completely consumed.

(37) T. J. M. & O. H. G. ask: On. p. 300, vol. 31, you say that muriate of ammonia, in vapor, is taken by inhalation for bronchial affections, etc. How is the vapor produced? A. The vapor of ammonium chloride may be obtained in many ways, but perhaps the following is the safest for this purpose: Place a small quantity of ammonium chloride (common sal ammoniac) in a flask, or better still, an iron bottle, and heat strongly. The vapor should be inhaled as it comes over, for if allowed to cool it will gradually condense.

(38) J. S. asks: How high would a balloon have to ascend to get outside of the earth's attraction; and what would become of such a balloon? Would it not float in the endless space for ever? A. A balloon could not possibly ascend to more than 30 or 40 miles, the limit of our atmosphere.

(39) W. W. A. asks: How can I manufacture starch from potatoes? A. In order to extract the starch, the tubers are first freed from adhering earth by a thorough washing, and are then rasped by machinery. The pulp thus obtained is received upon a sieve, and is washed continuously by a gentle stream of water, so long as the washings run through milky. This milkiness is due to the granules of starch which are held in suspension. The milky liquid is received into vats, in which the amylaceous matter is allowed to subside; the supernatant water is drawn off, and the deposit is repeatedly washed with fresh water until the washings are no longer colored. The starch is then suspended in a little water run through a fine sieve to keep back any portion of sand, and, after having been again allowed to settle, is drained in baskets lined with ticking; the mass is then placed on a porous floor of half baked tiles, and dried in a current of air, which is at first of the natural temperature; the drying is completed by the application of a moderate heat.

(40) A. S. G. says: In your reply to J. B. T., (No. 53 in No. 13, vol. 31), your first answer amounts to saying that a vessel will be of the same weight when full of air as when exhausted. This does not seem possible; the vessel would, of course, weigh the same as the materials of which it is composed; but when it is exhausted it would be buoyed up by the external air to just the amount of the weight removed. A. A vessel with a capacity for 60 gallons, when exhausted of air, would weigh nearly an ounce lighter than when full.

(41) W. M. G. asks: What can I put into flour paste to keep it from souring? A. See p. 219, vol. 30.

What is the best motive power for a heavy leather manufacturing machine? A. Steam.

How can I find the weight of a bin of stove coal from the cubic feet of the bin? A. By first determining the weight of a known measure of the material (say one cubic foot) and then multiplying the number of cubic feet contained in the pile by the weight obtained.

(42) B. asks: Are not metallic lamps far safer than the glass ones? A. Glass lamps are conceded to be the safest where burning fluids containing light or volatile oils are used, because of their poor conductivity of heat.

(43) J. P. G. asks: 1. Is ozone poisonous? A. Yes. 2. Is it dangerous to breathe or inhale it? A. Yes. 3. If its fumes were generated in a tight place or room, would it be necessary to remove all eatables to prevent their being impoisoned? A. Not necessarily.

Can a family use water drawn through lead pipes for 20 years without being poisoned? A. Whether the lead acts upon the water depends upon the character of the water. Some waters affect lead, others do not. A very simple chemical test will answer this question.

(44) G. D. F. asks: How can I improve spectacles that are dull and scratched, and make them magnify more? A. There is no other way than to have them reground and repolished.

(45) C. D. C. says: I have been very much bothered with my nickel solution. After an article has been in the solution about an hour, japan-colored streaks appear; and when the plating has been polished, the parts that were clear in the solution stand out in relief equal to the thickness of the plating, no nickel of any thickness having been deposited on the dark spots. The inside of the vat was first covered with black varnish (some kind of preparation of coal tar). The tar got dry on the sides but not on the bottom. I then coated it over with hot asphaltum and turpentine, but the tar mixed with the asphaltum and raised air bubbles in the liquid. The solution had the smell of turpentine and asphaltum. The thing did not work any better, so I filtered the solution and scraped the vat clean inside, but it still works as described. What can I do to clean the liquid and make it work well? A. This is a question best answered by some one who has encountered and overcome such a difficulty in nickel plating. The plan followed in similar cases by chemists is to filter, either through common filters or others having an absorptive action on coloring matters. Further impurities are sometimes gotten rid of by a partial evaporation and crystallizing the pure salts out.

(46) O. H. H. asks: 1. What will remove grease, iron rust, and stains from cloth? What will take out printing ink without injuring the goods? A. The best method is to saturate the spot with benzine, which is a solvent for both grease and printer's ink, and then cover the spot thickly with powdered French chalk, which will absorb it. Repeat if necessary.

(47) J. B. asks: Why will a perspective view taken from a given point not be identical with a photograph taken from the same point? A. Because the method by which objects are represented on paper by the rules of perspective drawing is essentially different from that by which the same objects are projected on a plane surface by the operation of lenses. See our answer to P. M. O'F., No. 23 on p. 314.

(48) A. S. asks: How is an odometer attached to a wheel? A. It generally has a clamp. If not, it can be tied.

Will you please tell me where that engine is that has a cylinder about 108 inches in diameter by 14 feet stroke? A. There were several such cylinders in vessels belonging to the Pacific Mail Steamship Company a few years ago. Whether or not the vessels are still in service, we cannot say.

(49) B. & Co. say: We want to put a whistle on a building. Will a tin boiler holding three gallons of water furnish steam enough to blow the whistle when desirable? A. It will not be very satisfactory unless quite a small whistle is used.

(50) E. W. W. says: A friend of mine claims that there is really no such an apparatus as a suction pump, that water is brought through such a pump altogether by air pressure, and not by suction. Is he right? A. Yes.

(51) M. W. says: I dissolved some tungstate of soda in water, and wet splinters with it and dried them. They would burn about as they would if wet with alum water. How should the tungstate be used? A. It is necessary that the wood be immersed in the solution until the outer pores become well filled.

(52) H. T. S. asks: Will a piston head give the same power if made of a wedge shape, as if it had a plain straight face? A. Yes.

(53) J. B. R. asks: How can I find the specific gravity of any fluid with a specific gravity bottle? A. By finding the weight of a bottle full of the fluid at the given temperature. Then specific gravity = $\frac{\text{weight of bottle filled with liquid} - \text{weight of bottle}}{\text{weight of bottle filled with water} - \text{weight of bottle}}$.

(54) H. J. H. asks: At how much greater pressure are steam boilers tested by hydraulic pressure than would be a safe steam working pressure? A. One third, commonly. 2. What proportion of the effective heating surface should the fire grate surface be? A. From 1-90 to 1-11, according to character of boiler. 3 In what state is a boiler capable of bearing the highest pressure, heated, as when steam is up, or cold? A. Generally when heated. 4. What is tensile strain in steam boilers? A. It is the strain tending to rupture the boiler. Your other questions will be answered in a forthcoming editorial on the strength of boilers.

(55) J. B. S. asks: Is soluble glass manufactured in this country? A. Yes. By liquid or soluble glass is understood a soluble alkaline silicate. Its preparation is effected by melting sand with much alkali, the result being a fluid substance. The various kinds of water glass are known as: Potassa water glass, soda water glass, double water glass, and fixing water glass. Potassa glass is obtained by the melting together of pulverized quartz or quartz sand 45 parts, potassa 30 parts, powdered wood charcoal 3 parts, the molten mass being dissolved by means of boiling in water. Soda glass is prepared with pulverized quartz 45 parts, calcined soda 23 parts, carbon 3 parts; or (according to Buchner) with pulverized quartz 100 parts, calcined Glauber salt 60 parts, and carbon 15 to 20 parts. Double water glass (potassa and soda water glass), according to Döbereiner, is prepared by melting together quartz powder 152 parts, calcined soda 54, potash 70 parts. For technical purposes, a mixture of 3 volumes of concentrated potassa water glass solution, and 2 volumes of concentrated soda water glass solution, is employed. By the name of fixing waterglass, Von Fuchs designates a mixture of silica well saturated with potassa water glass and silicate of soda. It is used to fix or render the colors permanent in stereochromy. Water glass is an important product in industry. It is used to render wood, linen, and paper non-inflammable. It is also used as a cement: in this it is equal to lime, and indeed is known as mineral lime. Another application of water glass is in the painting of stone and concrete walls, and in the manufacture of artificial stone. An interesting and important application of water glass is in the new art of mural and monumental painting, termed by Von Fuchs stereochromy or solid color.

(56) O. C. asks: If heat comes from the sun, how is it that a sunglass does not get hot when held so as to set fire to an object on the side opposite the sun? A. The action of the glass is simply to condense or concentrate to a focal point all the rays of light and luminous heat that fall on its surface. Therefore, the greater the diameter of the lenses, the higher will be the temperature at the focal point, the temperature of the glass remaining the same. Burning glasses are, in many cases, made of pure rock salt, which, because of its diathermancy, transmits with equal freedom the dark and the luminous heat rays, as well as those of light. Heat is a form of motion. The old caloric hypothesis has long since been abandoned.

(57) E. D. D. asks: What is heat? A. It is defined in Watt's "Dictionary of Chemistry" as follows: "The word heat is used in common language, both as the name of a particular kind of sensation and to denote that condition of matter in which it is capable of producing this sensation to us." You will see that heat is defined by stating its effects, since the exact nature of it is not known.

Is there such a thing as an absolute vacuum? What would be the temperature of as perfect a vacuum as could be made? A. See article entitled "A Perfect Vacuum," p. 400, vol. 28.

(58) J. W. W. asks: Has the premium yet been awarded for the best means of propelling canal boats without agitating the water? A. Yes.

In what degree does gas expand on being heated? A. About 1-491 of its volume for each degree Fah. that its temperature is increased.

(59) G. H. M. asks: How can I prepare the percussion powder for brass cartridges? A. Take fulminate of mercury 6 parts, chlorate of potassa 6 parts, and antimony 6 parts.

(60) G. D. H. asks: 1. What are the duties of a bridge engineer? A. He must be able to design and construct bridges. 2. In what manner, and by whom are such men usually employed? A. They are employed by railroad and other companies, city authorities, highway commissioners, and private parties. 3. What is the customary mode of obtaining and of doing the business of that profession? A. By offering your services to those who are in need of them, and demonstrating that you have the requisite skill and experience for the work to be done. 4. What is the best way for a graduate of a school in engineering to acquire a practical working knowledge of any branch of his profession, and of getting established in it? A. The best way to acquire practical knowledge is to practice.

(61) D. B. C. says: 1. I want to build a steamboat, to run against a current of about 3 miles per hour. I wish to make the boat 12 feet wide and 16 long, with a draft of 18 inches. I have two 8 horse engines that make 200 revolutions per minute, and I propose to gear them down to 100 per minute. A. It would probably be better to gear down to a slower speed of wheel. 2. Shall I have to get a license from government? A. Yes. 3. What will it cost? A. It will cost about $40.

(62) J. W. R. asks: What is the best composition to put on a 35 foot furnace chimney, to protect it or make it last? A. There is a black varnish made from mineral oil that seems to answer very well.

(63) A. R. asks: Will a centrifugal water mill go in a vacuum? A. Yes.

Would an ordinary rocket, exploded in a vacuum infinitely large, ascend? A. Yes.

In boiling hay for paper stock in a tub with a loose cover, would there be any economy in using steam under 45 lbs. pressure instead of 20 lbs., the steam being allowed to escape in the hay through openings in the pipe? A. No.

(64) G. W. A. says: I wish to get up a metallic substance to put up cotton in. I want something light, but tough and strong, and thinner than zinc. Zinc is too costly. Can you tell me what metal or combination of metals will answer my purpose? A. You ask rather too much, in requesting us to do your inventing. You should make experiments with different materials until you find what you want.

(65) W. J. A. says: I have a three inch drive well with six feet of water standing, but two or three strokes of the pump empties it. I have a pump with a two inch suction pipe. The well worked very well when first sunk, the pump having one inch suction pipe. I think it is caused by corrosion of the sand screen. I had a well borer to examine it, and he said that it was caused by leaving the mouth of the well open, and he plugged it up. That I found created considerable back pressure on the pump, and at the same time did not give the desired results. Do you think if the well had been closed in the first place it would have retarded or prevented the corrosion? A. Probably your suction is choked, and that causes all the trouble. If there is plenty of water in the spring, it will only be necessary for you to use non-corrosive screens, of brass or galvanized iron.

(66) P. H. W. says: I wish to put a new screw to a steam yacht, the length of which is 42 feet, beam 7 feet. She draws 22 inches forward, and 26 aft. The wheel I now have is 38 inches in diameter, with 5 feet pitch (2 blades). Would I gain anything by using a 4 bladed screw, 36 inches in diameter and of 5 feet pitch? A. A three bladed screw would doubtless be the best.

(67) H. N. asks: 1. Is it safe to run a 3x8 engine at 300 turns per minute? A. Yes. 2. If so what power will such an engine give under 100 lbs. pressure? A. About 9 horse power, with 100 lbs. mean effective pressure. 3. What should be the size of the boiler (upright tubular) and thickness of shell? A. Boiler with 120 square feet of heating surface; shell, about 316 of an inch thick.

(68) A. T. S. says: I am building a small engine 1½x3 inches cylinder. What kind of piston packing is best, and how should it be put on? A. For so small a piston it is generally sufficient to make it solid, with a few grooves. 2, Could I use hemp packing without burning it, using steam at 74 lbs.? How is rubber packing applied? A. You can use either hemp or rubber packing by making a recess in the piston, and neither will be liable to burn out, with proper care. 3. What is the rule for getting size of steam and exhaust pipes? A. Make the steam pipe ¼ inch, and exhaust 5-16 inch, diameter.

(69) S. E. T. D. says: Does a pendulum of a certain length require a certain weight? If so, what should be the weight of a ball to a pendulum making one beat in a second? A. Any weight will answer if the mechanism is adapted to it.

(70) T. C. says: I have built a small pleasure yacht. Length of keel is 25 feet, beam 6 feet 6 inches, depth of hold 3 feet 10 inches. Cylinder is 6x5 inches, and boiler 60x36 inches, with 130 tubes 1¾ inches in diameter and 2 feet long. I drive a 30 inch Delamater wheel. I have driven her 6 miles against a flood tide in 44 minutes, with a pressure of 130 lbs. steam. I propose to lengthen her. How many feet should I add so as to get the utmost possible speed out of her? A. We would not recommend lengthening the boat more than 5 or 6 feet, and probably the present screw would answer. 2. Will the boat be as strong as it was before being lengthened? A. You can make the boat as strong as before by proper construction. 3. Am I required by law to have a licensed engineer and pilot? A. It will be necessary to have a licensed engineer and pilot, according to the requirements of the steamboat law.

(71) A. H. K. says: My son is desirous of learning engineering, both practically and theoretically. Would you advise his attendance at some school of design? A. He can obtain some practice in a technical school; and you will find the Stevens Institute of Technology one of the best. After his graduation, it would be well for him to enter a general machine shop and work there for some time.

(72) C. P. N. asks: How is fermentation controlled, so as to keep carbonic acid gas in the beer, that it will sparkle when filled into the glass? A. By keeping the beer in closed vessels, so as not to allow the gas to escape.

(73) G. F. B. asks: How can I construct a Leclanché galvanic battery? A. The battery consists of an ordinary porous vessel of unglazed earthenware, into which is placed a plate of carbon which is surrounded by a mixture of carbon and peroxide of manganese, tightly packed and sealed with a layer of asphaltum. The cup, thus prepared, is placed in a glass vessel, surrounded with a strong solution of chloride of ammonium (sal ammoniac) to about half its hight. A rod of amalgamated zinc is now placed in the jar, which constitutes the negative pole and completes the arrangements of the cell.

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

A. B. C.—It is muscovite. It contains no silver.—P C. K.—No. 1 is biotite. No. 2 is garnet and tourmaline. No. 3 is quartz and tourmaline. They contain no silver.—R. H. C.—No. 1 is red hematite. No. 2 is hornblende. No. 3 is iron pyrites.—A. C. B.—A qualitative analysis of your mineral shows the presence of oxide of iron, chlorine, sulphuric acid, soda, lime, magnesia, and carbonic acid.—J. L. B.—It is tremolite.—J. E. B.—It is not red but yellow ocher, with a certain percentage of clay. You must have it properly analyzed before the value per tun can be given.—C. P. D.—A qualitative examination showed that, while the specimen sent consisted of a considerable amount of hydrated sesquioxide of iron, yet it also had a large amount of insoluble earthy matter, and we should hardly pronounce it, from the analysis thus far made, a yellow ocher in the proper sense of the word. It would be necessary to make a further analysis and determine the percentage of iron present.—We have received three specimens without any letter, name, or address. No. 1 is mica in decomposed granite. No. 2 is anhydrous sesquioxide of iron. No. 3 is calcite.—We have received 16 specimens in a wooden box, unlabeled. Two are very valuable fibrous brown hematite. Two are impure yellow jasper. Twelve are valuable chromite, and are excellent ore of chromium.

E. R. M. & P. W. ask: What will destroy the smell of naphtha in which rubber has been dissolved?—H. P. says: A lady friend of mine has a pair of scissors, which she uses constantly, and which were used by her mother fifty years ago. The polish upon them is exquisite, and they look as though they just came from the factory. On the contrary, a pair of very beautiful scissors, whose original polish was as perfect as that of the old ones, and which were presented to her two years ago, are dull and tarnished. She showed me also a surgical knife that was brought over at the same time as the scissors; nothing could be more beautiful than the polish, which neither time nor use has dulled while some more modern instruments require constant attention to keep them clean. Can you explain it?—J. H. asks: How can I weld steel?

COMMUNICATIONS RECEIVED.

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

On Developing a Country. By T. H. B.
On the Szaroch. By C. R. S.
On a Friction Brake. By W. G.
On Constant Batteries. By L. B.

Also enquiries and answers from the following:

C. M.—E. L.—R. R. R.—J. H.—A. Y. F.—P. R. G.—C. G.—F. Q.—R. L. B.—A. G.—C. H. S. D.

HINTS TO CORRESPONDENTS.

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.

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 the 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 enquiries analogous to the following are sent: "Where are computation tables published? Who sells horseshoe magnets? Who makes calculating machines? Where can good washing machines be obtained? Who sells a rapid knife cleaning machine?" All such personal enquiries 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

October 13, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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