W. S. will find a recipe for a black finish on brass on p. 208, vol. 26.—F. J. F. will find details of the effects of ammoniacal vapor on p. 266, vol. 31. We cannot tell you of a remedy for the eruptions.—S. A. F. will find full directions for skeletonizing leaves on p. 123, vol. 29.—J. L. will find a recipe for glue that dries rapidly on. p. 33, vol. 31.—D. H. M. will find that the directions on p. 353, vol. 24, are complete.—P. F. S. will find full particulars of the German offer of a premium for a railway coupling on p. 162, vol. 29.—J. S. & Co. should refer to p. 59, vol. 24, for directions for galvanizing iron.—C. F. B. and F. M. H. should see p. 250, vol. 31, for a description of the prismatic fountain.—J. G. can bend timber by the process described on p. 43, vol. 30. Totan buffalo hides with the hair on, see p. 59, vol. 28.—V. will find full descriptions of various forms of unsinkable boats on p. 195, vol. 31.—H. B. T. will find details of the process of making artificial butter on p. 119, vol. 30.—A. & Co. will find directions for putting a black finish on iron on p. 123, vol. 29.—H. T. S. will find a recipe for leathercement on p. 208, vol. 30.—P. H. W. will find directions for gilding on glass on pp. 90, 279, 283, vol. 31.—W. E. will find a description of the process of malleablizing iron on p. 138, vol. 29.

(1) F. D. asks: If a bell glass be inverted in a dish of water, and a piece of meat suspended inside, how will the air affect the meat, the vessel being airtight? A. It will supply oxygen to the tissues of the meat, which will slowly undergo decomposition. 2. What effect will the water have on the meat? A. It will supply the atmosphere around the meat with moisture, and retard the desiccation. 3. What chemical can be put into the vessel that will destroy the decomposing property of the air? A. None which is cheap and easily used. 4. If I place ice in the vessel, will it aid in keeping the meat? A. Yes.

(2) C. T. M. asks: What will counteract the effects of sulphur in my jewelry show case? I have had vulcanized rubber goods in it, and the effect is to be seen on my gold and silver goods. A. Try standing several trays of quicklime in the case.

(3) J. S. T. asks: What is the best method of preparing annatto for coloring butter? Is any other ingredient used with it? A. Annatto contains a coloring matter which is sparingly soluble in water, but freely so in alcohol and ether. Potassa dissolves producing a deep red color; and on neutralizing the solution with an acid, it falls as an orange precipitate. The fixed oils also dissolve the coloring matter of annatto.

(4) J. S. M. asks: What metal is best to use in the seat and face of a steam engine governor, to prevent cutting? A. Hard brass is the best material; but there is none that will not cut under some circumstances.

(5) J. H. asks: Which will give more power, a 9 feet overshot water wheel, or a breast wheel using the same amount of water? A. In ordinary cases, if both wheels were well designed, they would have about the same efficiency.

(6) C. W. G. says: On p. 220, vol. 31, I read that S. T. says: "To find the power of a spring, attach a pulley and cord, with weight, and find how many pounds your spring will raise one foot high in a minute." Would not a similar rule be good to determine the power of a steam engine? If I am obliged to run up the weight more than a foot, should not the final result be divided by said number? Should the pulley be of the same size as the crank circle and keyed directly on the engine shaft? A. The method you speak of will answer, but is not ordinarily very convenient. The pulley can be made of any size.

(7) M. G. says: I have set up 5 stoves which had 6 elbows in the pipe. Pipe from the stove to chimney was 7 inches in diameter with 6 inches entrance in chimney. They all draw well. I have now set up a stove with a similar pipe with a 7 inch entrance in chimney; this smokes the rooms. Can it be possible that there is a draft downwards in the chimney, so that the smoke from the stove pipe descends? A. If the draft of the chimney were good with the six inch pipe, there is no reason why it should not be so with the seven inch pipe, unless the latter is pushed so far into the chimney as to reach the back of the flue, in which case, of course, it would be effectually closed. The pocket formed by the closed fireplace is of course filled with air, and it is not likely that the suction upon this, caused by the ascending current in the flue, could materially affect the draft of the latter. The stove pipe itself, however, may be closed with soot.

(8) A. B. asks: Is it possible to form two numerical squares that shall be to each other as 5 is to 4? A. No.

(9) R. B. W. asks: 1. What are the right proportions of curvature for the concave and convex disks of flint and crown glass, to correct all chromatic and spherical aberration in a 3 inch achromatic object glass for a telescope, focal length being about 4 feet? A. Outside curve of crown lens, 32·25 inches radius. Ditto of flint lens, 67·16 inches. Inside curve proportional to the dispersive powers of the two lenses, varying with different glass. 2. Is there any book giving directions as to forms of lenses, and degrees of curvature, for making, of telescopes, etc.? A. "*Praktische Dioptrik*," J. J. Prechtl, Vienna, 1828, is a complete manual for making achromatic telescopes. The method of local correction, the use of a covered tunnel and artificial star, with tramway to carry the lens, and Faraday's method of clearing melted glass by sprinkling platinum sponge over it, are the chief improvements since.

(10) D. J. M. Y. asks: Does the force of gravity increase or decrease on approaching the center of the earth? A. It increases.

(11) W. H. Jr. asks: What are the comparative tensile strengths of cast and malleable iron? A. Wrought iron has from 2 to 3 times the tensile strength of cast iron.

(12) L. M. D. asks: How is the accuracy of a mercurial barometer tested? A. Usually by comparison with some standard instrument. Read T. A. Jenkins' pamphlet on "The Barometer," etc.

(13) S. N. M. says: Mädler, Mitchell, and other astronomers estimate the velocity of the sun in space at 21 miles a second. On p. 203, vol. 31, you state that velocity at 4 miles a second. Is this a typographical error, or have you later and more reliable observations as authority? A. Struve estimates the sun's velocity at 150 million miles a year, or about five miles a second. Airy thinks it is 27 miles a second. Maps of telescopic stars are now being made, to settle this question 100 years hence.

(14) W. B. F. asks: Is there any machine, device, or means by which one unskilled in mining can with certainty test a locality for gold or other metals? A. There is none.

(15) A. F. H. asks: How can I make a terrestrial telescope, 36 inches long? How long ought the focal length of the object glass to be? A. The focal length of an achromatic objective should be about fifteen times the aperture. A set of eyepieces usually consists of several powers between ten and fifty for each inch of linear aperture, and of one high power of one hundred for each inch of aperture. A terrestrial eyepiece should be of low power. Change all the dimensions of any one of those we have given, uniformly, by simple proportion, and construct your terrestrial ocular thereby.

(16) A. F. C. says: I have a 2½ inch achromatic telescope of 44 inches focus; and with the Huyghenian eyepiece, I get a power of about 80. How high a power will it stand, and how must I construct the eyepiece? A. Working powers run from ten to fifty per lineal inch of aperture. Powers occasionally used on fine nights may run from fifty to one hundred per inch of aperture.

(17) C. W. B. says: A beam is hung by two rods, one at each end, from and parallel to a similar beam. If I shorten one rod, will the suspended beam hang directly under the other as before? A. No. The suspended beam will be deflected towards the shorter rod, and the strain upon the shorter rod will be greater than that upon the longer rod in proportion to the disparity of their lengths.

(18) E. A. B. says: I have a well in a cellar, 42 feet deep and 17 inches in diameter. The ceiling or floor over cellar is 7 feet 6 inches; the kitchen adjoins the room over the cellar. I wish to provide a way to deliver water from the well, into the kitchen, above the floor if possible, at a point about 20 feet from the well, and to have the pump for this purpose at the point of delivery. The lift will not be less than 50 feet. How and with what description of pump can I do this? A. Perhaps the simplest plan would be for you to place a lift and force pump in the well at not more than twenty-five feet above the water, and arrange to work it by means of pulleys and belts operated by hand power in the kitchen. You would require two belts—one running vertically and one horizontally—and a crank at the pump handle and one in the kitchen.

(19) G. W. M. asks: 1. What is the proper size to make the cores of a telegraph magnet? A. About 2 inches long by ⅝ of an inch in diameter. 2. With what sized wire shall I coil it? A. Use No. 22 wire.

(20) J. Q. A. asks: Is there any possible way of controlling a watch so as to make it run exactly, or not to vary more than one hundredth part of a second in twenty-four hours? A. It never has been done. We are not prepared to assert that it cannot be.

(21) R. L. J. asks: What is black brimstone, and is there any other name for it? A. When sulphur or brimstone is moderately heated, it passes into a transparent and nearly colorless liquid; but when the temperature is raised to 482° Fah., this liquid becomes thick and of a dark brown color.

(22) J. S. N. asks: In a hard coal furnace, the acid or gas formed in burning Scranton or Lehigh coal condenses and rots out the pipe, especially when the smoke pipe crosses a cold hall. I have tried common stove pipe, Russian iron, and zinc coated iron, with about the same result. Is there any metal I can use? Will copper, coated with zinc or tin, resist the corrosive action? A. Zinc would hardly answer. Tin would do better; copper would probably stand some time, but its rusting would be accelerated by other causes. Sheet lead would resist the acid vapors, but might not answer so well in other respects. A silicate pipe would do.

(23) P. M. O'F. asks: Are a perspective view and photograph of the same object, from the same point of view, identically alike? To this you answer, no. Please state in what the difference consists. A. In a photograph, parts of an object which are much nearer than others are unduly magnified. 2. Are there any rules by which a draftsman may obtain, without copying from a photograph, the same general outline of an object as can be obtained by photography? A. It might be possible to make rules for the purpose mentioned, but we have never seen any, the ordinary methods for perspective drawing being generally considered better.

(24) F. C. M. says: I have been trying to make a galvanic battery as proposed by Mr. W. M. Symons on p. 209, vol. 31, but without success. Can you aid me? A. Your battery, if constructed as directed, could not possibly have been a failure; and although when in operation you could not feel the current, by applying the terminal wire to the tongue you might be able to detect its presence by taste or sensation. 2. How can I construct one of sufficient power to give a weak current or shocks? A. A small induction coil will best answer your purpose, full directions for the construction of which you will find on pp. 218, 315, 378, 379, vol. 30.

(25) J. B. H. asks: 1. Are coins molded or stamped? A. They are stamped. They could be molded. 2. Can molds or dies be made without the use of engraving, and how? A. The dies are struck from a master die, which is engraved. 3. What kind of metal is best to make the molds of? A. Soft steel is generally used.

(26) H. S. asks: What temperatures are required to volatilize, respectively, gold, silver, zinc, antimony, lead, and copper? A. The question whether certain metals volatilize during the roasting of the same, we cannot definitely answer, owing to very little data upon the subject. Gold melts at 2264° Fah., and Napier considers it to be volatile at a very high temperature; it also volatilizes when remelted in crucibles, especially when combined with copper. If the fused gold has been covered with a layer of bone ash, the ash will be covered with volatilized gold of a purple color. The microscope does not reveal globules of gold in this coating, but grains of gold may be obtained by smelting; so that the question of whether gold is volatile, in a finely divided state or in combination, is still unanswered. According to Deville, gold volatilizes when melting auriferous platinum, and may be collected by condensing the gold vapor. Silver melts at 1904° Fah., and can only be volatilized by electricity or the oxyhydrogen flame. Zinc melts at 770° Fah., and volatilizes at 2264° Fah., and burns at 932° Fah., forming ZnO, which is not volatile. Antimony melts at 806° Fah., and volatilizes at a bright white heat. Lead melts at 626° Fah., boils and volatilizes at a white heat, air being excluded. Copper melts at 2426° Fah.

(27) M. H. McK. asks: Which is best for deafening a floor, filling from the lining of the deafening up level with the joist or leaving a space under the floor? A. It is best to leave an air space above the deafening, for two reasons; it will both deafen better and be less liable to cause a dry rot in the floor plank.

(28) H. S. G. asks: Can I put one water wheel under another to use the water twice over, in a deep fall? A. There is no novelty in this plan. One wheel is better than two when it can be conveniently employed; but sometimes, on account of the great size that would have to be given to one wheel, two are used.

(29) N. S. J. asks: How can I analyze water? A. Apply to a chemist. The knowledge of the method would not aid you without the necessary skill.

(30) P. & B. ask: What is the proper shape for a piece of steel, so that when one end of it is bolted firmly to a solid piece of wood and the steel struck, the sweetest and most voluminous tone may be heard? A. A flat bar, supported on the ends on ropes of straw, is ordinarily used.

(31) W. P. asks: Why does not a pump raise water 26 feet perpendicularly in a mill which is more than 700 feet from the river? A pump in a mill near the bank raises water 27 feet. Is the friction too great for the 4 inch pump, or are we at too great a hight from the water? Shall we put in another or larger pump, or sink the pipe? A. The great length of your pipe causes so much friction that your pump runs away from the water. The remedy is to provide a tank or reservoir at the distant mill and a force pump at the mill on the bank; the water will then be driven through the pipe instead of drawn through it, and the friction can be easily overcome. The water, being discharged into the tank at the distant mill, can thus be taken up by the pump stationed there and supplied where required

(32) A. V. D. V. says: I hold that the following: $7\times3\times2\times5\times0\times5\times6=6{,}300$: is correct. My friend argues that $210\times0=0$ and so on, the answer being 0. Please give us your opinion. A. Your friend is right. You may get a clear idea of the matter by imagining 0 to be a fraction whose numerator is 1, and whose denominator is infinitely large.

(33) W. H. H.—The recipes for colored stars for rockets were from eminent authority, and are correct in every particular.

(34) C. M. C. says: Atmospheric pressure is estimated at 15 lbs. per square inch. If a boiler capable of bearing only 100 lbs. pressure in the open air could be placed in a vacuum, would it not burst at 85 lbs. pressure? In other words, should there be an increase of 15 lbs. made on the bursting pressure of a boiler on account of the resistance of the atmosphere? A. This allowance is always made in proportioning a boiler, by taking the pressure of the steam to be that shown by the steam gage, while the pressure, in reality, is on an average 15 lbs. greater than this.

(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 1-20 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 water glass, 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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