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Table with 3 columns: Numbers included, Vol. I-X, and Numbers included. Lists volume ranges for each issue.

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HINTS TO CORRESPONDENTS.

Name and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn. Special Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Minerals sent for examination should be distinctly marked or labeled.

(1) H. W. G. writes: 1. I have a so-called lightning saw, attached to a small machine. The saw works well in logs not larger than 1 foot 6 inches in diameter; by cutting larger logs, the saw will grind the dust into flour, and do no cutting at all. How would it do to file every third tooth down to a scraper, thus making two double teeth for loosening the dust and one double tooth to scrape it out? A. Probably your saw is too small for logs larger than 18 inches diameter. Every tooth should be capable of taking out its own cut. Sharp, well set teeth, proper feed and power will make the saw cut. 2. Will there be any success in taking letters patent for a corn planter which will plant corn in square hills without squaring off or using the rope or wire so-called check rower? A. The success of your corn planter depends upon its utility and originality and your business application. 3. What is the correct name for the gases known in the German language as sauerstoff, wasserstoff, stickstoff, and kohlenstoff? A. Sauerstoff, oxygen; wasserstoff, hydrogen; stickstoff, nitrogen; kohlenstoff, carbonic acid gas. 4. Do you know of any publication, Treatise on Perpetual Motion, in the German language? A. No, and consider any attempt to attain perpetual motion as effort wasted.

(2) M. S. asks (1) a receipt for making soap that will take grease spots out of cloth. A. Powdered fuller's earth 1 ounce; just moisten with spirits of turpentine, add salt of tartar 1 ounce, best potash 1 ounce, work the whole into a paste with a little soap. 2. A receipt for a paste or composition that will polish gold or silver, something to be put up in tin boxes? A. Equal parts of precipitated subcarbonate of iron and prepared chalk. An impalpable rouge may be prepared by calcinating the oxalate of iron. Take quicksilver with chalk half an ounce, and prepared chalk 2 ounces; mix them. When used, add a small quantity of alcohol and rub with chamois leather.

(3) J. A. G. writes: In using borax with salicylic acid to increase its solubility (equal weights of each), are the antiseptic or disinfecting qualities of the acid changed or diminished? Can you name a better plan? Dissolving in water alone is troublesome, and in alcohol is expensive. A. Borax is of itself an antiseptic, and therefore aids in its degree; alkalies and alkaline salts are said to increase the solubility of salicylic acid. Another method consists in dissolving 10 parts salicylic acid in 24 parts ammonia, and then adding 16 parts dilute acetic acid, or just enough to produce a slightly acid reaction. For best culture a solution is made by dissolving one ounce of the crystallized salicylic acid in half a pint of French spirits; of this solution add one ounce to pint of soft water at 60° Fah. In cold weather perform this operation in a warm room. This is said to be the method used by all German masters.

(4) N. B. P.—In casting steel and other metals, does it form any longitudinal grain the way it runs, so that it becomes tougher one way than the other? A. No. 2. If combed and pressed in one direction while wholly in a liquid state, will that make it tougher one way than the other? A. No. Cast steel and cast iron are granular, not fibrous.

(5) E. B. asks: 1. What is the difference between a dynamo-electric machine and a magneto machine? A. A dynamo-electric machine furnishes a cur-

rent which excites its own field magnet. A magneto-electric machine is provided with field magnets formed of permanent magnets, or with magnets excited by a current from another machine. 2. What would be the temperature of a vacuum if no heat was supplied from the outside? A. We do not know by what means the temperature of an absolute vacuum could be determined. The term itself precludes the idea; for to suppose a state of heat or cold implies that something is hot or cold. 3. Would a helix, if formed of steel wire and magnetized, attract soft iron the same as copper wire with electricity flowing through it; and would the attraction be permanent in the steel helix without the use of electricity, that is, if the helix was first magnetized? A. A helix formed of steel wire would act like a copper helix, but not to the same degree. If the steel is hardened, the helix may retain some magnetism, but a spiral form would not give the steel any advantage over magnets of other forms.

(6) W. F. H. writes: Ashes of forest trees here are chiefly carbonate lime. Is this common? Can you supply a few approximate analyses of common forest tree ashes, such as oak, fir, beech, or other? If our ashes are chiefly lime, and no potash to speak of, can we draw any conclusion as to best crop after burning the bush, while land is still too full of stumps to plow? A. The following analyses are taken from Professor Johnson's How Crops Grow, a standard authority on such subjects:

Table with 4 columns: Substance, Oak, Fir, Beech. Lists chemical compositions for various tree ashes.

In each case you will notice that the lime exceeds in amount the other ingredients. We should therefore infer that your finding so much carbonate of lime perfectly normal. It would hardly be safe to calculate in regard to the crops, unless upon exact information.

(7) M. R. W. asks whether there is such a thing possible as keeping in solution the pulp from which fine paper is made, so that it might at any time be spread with a brush in the manner of paint, and then quickly harden and become paper, and adhesive? Or any chemical that will dissolve paper, and hold it in a liquid form? A. As the mixture of paper fiber and water which forms a paper pulp is entirely mechanical, we know of no way of sustaining the paper fiber in the water, except by means of size, water glass, or some similar substance. Collodion is the nearest approach to a solution of paper that we know of.

(8) W. H. K. asks if a battery can be made powerful enough to feed an incandescent lamp. If so, please tell me which kind of battery would do for that purpose, and how many cells of such a battery it would require. A. A battery may be used for supplying an incandescent lamp, but it is not an economical way of producing a light. 10 or 12 cells of plunging bichromate battery will operate a medium sized incandescent lamp; it will require 15 to 20 cells of Bunsen or Grove battery to do the same thing.

(9) N. W. writes: I claim that at the same number of revolutions per minute a 5 ton fly wheel of 30 feet diameter would be as effectual as a 20 ton fly wheel 15 feet diameter, because the rim of the 30 foot wheel has twice the leverage and twice the velocity of the rim of the 15 feet diameter, and what is true of rim is true of the weight in the arms. Other engineers say I am wrong. What do you say? A. You are about right as far as the momentum is concerned, but there are mechanical reasons inimical to the construction of large light fly wheels for the quick running modern engines, such as deep wheel pit, difficulty of truing, as well as height and floor space. The friction in air would also be greater than the additional friction of the smaller and heavier wheel upon its journals.

(10) P. S. M. asks: What are proper speeds for turning soft wood, hard wood, brass, cast iron, and wrought iron, and what are proper speeds for circular and band saws for ordinary wood sawing? A. The cutting quality of woods and metals is so variable that no empirical rule adapted to forms and qualities can be given. A good rule is to give the work all the speed it will bear without injury to tools. These speeds may be from 500 to 1,000 feet per minute for soft woods, about the same for hard woods. 30 to 60 feet per minute for brass, 10 to 30 feet per minute for cast and wrought iron. Much depends upon the size of the cut. Large cut should be slow, while a small water cut may be run at a high speed.

Table with 4 columns: Speed of saws, 8 inches, 4,000 to 4,500 rev. per minute. Lists speeds for different saw sizes.

Intermediate sizes in proportion. Speed for band saws, 2,000 to 3,000 feet per minute.

(11) J. R. S. writes: We have a Worthington pump 10x10x7, double action suction pipe 4 inches diameter, distance from pump to river 2,900 feet, elevation 15 feet. We cannot find out why it does not work well. I think the distance is too far to fetch the water. My friend thinks not. Please give the cause of failure. A. You do not state enough particulars as to the lay of the pipe, or whether you have a foot valve. The pipe should be laid so that the air will naturally rise toward the pump, with a foot valve at the end of supply—an opening or stand pipe near the pump through which the whole pipe may be filled before starting. If there are siphons in the line that will retain air, they should have openings at their apices, with plugs that can be made air tight. The plugs to be used for filling the suction with water; also have a large air chamber near the pump. With these precautions we think you will have no difficulty. Air in a long suction is very elastic, and cushions in the clearance of the pump.

(12) R. D. G. writes: 1. What is the standard taper for steam and gas pipe thread, taps and dies, and number of threads of different sized pipes? A.

Taper of pipe threads, 1/8 inch in 1 foot in diameter; 3/4 inch pipe 27 threads; 1/2 inch and 3/4 inch pipe 18 threads; 1/2 inch and 3/4 inch pipe 14 threads; 1 inch, 1 1/2, 2 inch pipe 11 1/2 threads; 2 1/2 inch and upward 8 threads. 2. What is the best way to braze small articles 1/2 inch to 3/4 inch diameter, outside open forge fire? Can I get heat enough any way from an alcohol lamp? I cannot get gas. A. You may braze small articles with a blow pipe and alcohol lamp, using a large wick, say 1/2 inch diameter, in a side nozzle like a tea kettle spout. This gives you facility for casting a downward flame upon the work. 3. Can you give me dimensions to go by to make a camera box for making 5 inch by 8 inch pictures, such as the amateur outfits sold by dealers? I can buy a lens, and make my own box if I could get measurements. How can I tell the focal distance by a lens, to place the ground glass screen? A. You require a good achromatic lens or a pair to make an acceptable picture. Get the focal distance by casting an image of the window upon the wall or a card, and measure the focal length. Better get the lens before you make the box.

(13) R. A. R. asks: 1. Does water running through piping produce friction? If so, at what rate? A. It does; the amount of friction is governed by the size of the pipe and rapidity of flow, or height of head. 2. Can water be brought a great distance on the siphon system, say 1 1/2 miles, with a fall of 30 feet, the water lower where it starts from than some of the intermediate points? Will a 1 inch stream run through an inch and a half piping one mile with a fall of 20 feet, and no intermediate points higher than where it starts from? Suppose, then, water can be conveyed 1 1/4 miles through piping on the siphon plan, when the fall is 30 feet with intermediate elevated points, about how many gallons of water would run through per day, when the piping at starting point is 2 inches for a quarter of a mile and 1 1/2 inches for a mile? If larger piping is used at either starting point or stopping point, which point is it best to use it at to get the largest flow of water? Or is it as profitable to use 1 1/2 inch altogether, instead of 2 inch a part of the distance? A. If the apex of a local arched siphon is lower than the source of supply, the flow will be forced over it naturally. Or, in other words, if the source of supply is higher than any intermediate ground between it and the delivery, the undulation of the pipe laid over the ground will not materially affect the flow, although the air may have to be discharged at the apices where the undulation is excessive. With 1 1/2 inch pipe the whole distance you will obtain a flow of 8,000 gallons in twenty-four hours. By putting down 2 inch pipe for a quarter of a mile, you will increase the flow about 1,000 gallons per day. We do not recommend two sizes of pipe in the line, but if two sizes are required for special reasons, put the largest at the supply end. In constructing a line over undulating ground that is higher than the supply source, arrangements must be made for starting the siphonage by putting openings with short standpipes at the high points for filling. After filling, the openings must be capped air tight. Cocks or plugs must be used at both ends while filling. Fill at the highest point, or, if you have a force pump, you may fill by pumping in the water at the source of supply, keeping the vents open until they overflow, then cap them.

(14) T. D. writes: A large amount of money is wasted by manufacturers in using a blast for gas. We heat our soldering irons in this way, and have often thought it a wasteful method. Would a row of small holes for small gas jets be cheaper? A. Mixed gas and air, either by concentric nozzles or the Bunsen principle, are now preferred for heating purposes.

(15) A. M. F. asks: What horse power is necessary to get best results to run the screw of a 300 ton boat of 125 feet length? A. The best result does not come especially from the power applied, but depends upon the lines of the boat and the form of the screw. A 75 horse power engine and boiler would probably give you a good working speed of say 7 to 10 miles an hour, according to lines and load. We do not know of the engine you mention, and if we understand your other question, would suggest pure rubber.

(16) T. D. G. asks (1) for the process of tin smelting. A. The metallurgy of tin is given quite fully in the English edition by Crookes and Rohrig of Bruno Ker's well known "Practical Treatise on Metallurgy." Both the English and Continental processes of smelting are described, and illustrations of the furnaces used are given. 2. Will putting limestone in water used for drinking and cooking extract any of the lime, and make limestone water? A. The limestone if added to water will dissolve to a certain extent, and any free carbonic acid forming in the water will combine with the limestone, forming the bicarbonate.

(17) G. H. J. asks (1) the difference between benzine, naphtha, and gasoline. A. The names mentioned are given to products of the distillation of crude petroleum coming over at different degrees of temperature, and consequently they vary in their specific gravity thus: Gasoline is the lightest mentioned, and has a density of 95° to 80° Baume. naphtha 80° to 65° Baume, and benzine 65° to 60° Baume. 2. Where can I find the process of boring artesian wells described, and the tools used? A. The subject of artesian wells has been very elaborately treated in a series of articles contained in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 156, 157, 158, 159, and 160.

(18) M. C. writes: Please give me a receipt for sticking cork to metal, as cork to the keys of musical instruments. Do you know if a palisandre (rosewood) is liable to crack in our climate? If so, what is good to fill surface cracks, besides shellac? I can use the wax that is in use for express packages for cork to metal, but that will require heat, which I wish to avoid. A. For cement use shellac dissolved in alcohol. The condition of the rosewood must be considered before a definite answer can be given. Well seasoned wood should not crack. Filling composition or fillers can readily be purchased from painters or dealers in their supplies. These consist of whitening, plaster of Paris, pumice stone, and litharge with suitable coloring matter selected to match the wood. French yellow, asphaltum, Vandyke brown, and terra di sienna are the principal substances used for the coloring. After the proper shade has been determined, the

selected ingredients are mixed with 1 part japan, 2 of boiled oil, and 3 of turpentine, and ground fine in a mill.

(19) N. Y. K. asks: Will you please tell me of some article that will effectually remove the color from hair? I tried peroxide of hydrogen, but it did not have the desired effect. A. Peroxide of hydrogen is undoubtedly the best bleaching agent that can be used to remove the coloring matter from hair. Gaseous chlorine has been used, but not with such great success as the hydrogen peroxide. In fact, the oxygen is the bleaching agent, and whether it be obtained from the various chlorine compounds or from other substances, its effect must be the same. 2. The best article you know of that will remove hair. A. Electricity is used to remove superfluous hair from the face. Various pastes made from the sulphide of the alkalies and alkaline earths are likewise used. The following is a well known depilatory: Mix 3 parts sodium sulphide crystallized, 10 parts finely powdered quick lime, and 11 parts starch. It should not be applied longer than 2 to 4 minutes.

(20) J. A. writes: Is there any particular rule for the manufacture of triangles? In a portion of this town the ringing of bells on locomotives is so frequent that the ordinary bell alarm on a fire station does not attract the attention of the people, and a triangle is suggested. We want a triangle containing about seven feet long of steel. What width and thickness is best, and is there any particular rule for the make of it? A. For a triangle, take a bar of good tool steel 1 inch square about 7 or 8 feet long. Suspend it by a cord at two points, or lay it upon two pieces of rope upon a bench about one-third of the length from each end. Strike the bar with a mallet and ascertain the axis of vibration by moving the bearings in or out until a full tone is obtained, then mark the bearings and bend the triangle.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

November 18, 1884,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Large index table listing various inventions and their patent numbers, including items like Air compressor, Alarm, Aluminium, Ammonia soda, Anti-friction device, Axle box, Axle lubricator, Balance, Barrel header, Beak horn, Bearings, Belt fastener, Belt tightener, Blackboard, Blanks, Bolt cutter, Book, Book copy, Book, pocket memorandum, Boot or shoe, Boots, machine for making felt, Bottle cooler, Box, Brick machine, Buckle fastener, Buffer, Burglar alarm, Button, Button fastener, Button fastener blank, Button fastening, Car coupling, Car coupling, Car coupling, Car pilot, Car starter, Carpet stretcher, Carrier, Case, Cash indicator, Register, and recorder, Churn, Chains, Chair, Chimney cowl, Churn, Churn, Churn, Cigarmaker's gauge, Clamp, Cleaner, Clock regulator mechanism, Clover huller, Coal cleaner, Cock, cylinder, Twiggs & Porter, Coffee roasting, method of and device for, H. S. Jennings, Coke oven, Cooler, Cotton press packing box, Cotton, treating certain kinds of, W. H. Martin, Coupling, Crusher, Cultivator, Cultivator hand, Cultivator shield, Cut-off valve, Cutter, Cutting apparatus, Damper for smoke consuming furnaces, F. Whitehead, Desk, A. Cutler, Door hanger, Doors, stay roller for sliding, E. Laass, Drawers, Weishampel & Towles, Drawers, dust cover for, A. J. Hamilton, Drier, See Fruit drier, Grain drier, Drier, F. Brotherhood, Drill, See Grain drill, Electric cable support or hanger, A. S. Weaver