(13) A. F. S. asks how to prepare a good blacking for the interior of telescope tubes. I am about to construct one, and would be very much obliged to you for this information. A. For dead black for inside of telescope tubes use alcoholic shellac varnish and lampblack, equal parts by weight, and thin with enough alcohol to make it flow freely with the brush.

(14) J. L. B.: The method of preparing paraffine paper is as follows: Dissolve paraffine in benzine, and into the warm solution dip the paper, sheet by sheet; let drip off and dry. On the large scale it may be done by letting paper from a continuous roll pass through such a solution, and then between flannel to absorb the surplus. Wax is best dissolved in carbon disulphide, and paper can thus be made ready for use in five minutes. Quite a good plan is to apply the benzine solution of paraffine by means of a sponge.

(15) S. L. asks if there is any chemical or mechanical means for repolishing glass after being scratched? A. Slight scratches may be partially polished out by rubbing the part with rouge wet with water upon a piece of soft leather. If it is a deep scratch, it will have to be ground out with the finest flour emery, such as is used by opticians, and the spot polished with rouge and water upon a piece of soft leather. If you have much of this kind of work to do, it will save time to set up a buff wheel made of wood, and grind out the scratches with fine pumice stone and water. Then polish with a felt buff and rouge with water.

(16) A. S. M. asks: Do locomotives ever work up to 100,000 horse power on the road? A No. What is the highest power ever developed by locomotives? A. About 800 horse power.

(17) J. E. asks: 1. For a test for determining the presence of sulphuric acid in a liquid? A. Barium chloride gives a white precipitate with sulphuric acid. 2. Is there any other chemical that will change starch into sugar? A. Any dilute acid.

(18) F. asks: The best cement for small pieces of ore on wood or metallic substances; have tried glue and whiting mixed.

A. Starch ..... 2 drachms.
White sugar ..... 1 ounce.
Gum arabic ..... 2 drachms.
Water ..... q. s.

Dissolve the gum, add the sugar, and boil until the starch is cooked.

(19) A. L. H. asks what the composition used in common friction matches is.

A. Fine glue ..... 2 parts.
Water ..... 4 "
Phosphorus ..... 1½ to 2 "
Potassium chlorate ..... 4 to 5 "
Powdered glass ..... 3 to 4 "
Red or white lead or smalt sufficient to color.

For complete information consult Dussauce, Practical Treatise on the Fabrication of Matches, etc. SUPPLEMENT No. 84 contains a good account.

(20) G. A. B. asks: Is there not a method of hardening and tempering shears and scissors (both solid steel and steel laid blades) in water without their water cracking or becoming too hard to work, which is preferable to hardening and tempering in oil? If so, please give directions for doing same. If, in your judgment, oil is best, please give the best mode of using it. Is there anything better than oil or water for the purpose? If so, what and how used? A. Shears, if made of low steel, such as shear or double shear or even of American spring steel, should not water crack if properly treated. We fear that you heat them too hot and throw them into the water in any way most convenient. There is probably no better way than, first, to test the hardening quality of the steel by a few trials of the lowest heat that it will harden in water at 70°, or shop temperature. Be careful not to overheat the points, and dip vertically. Oil is preferred by some because it does not chill the steel so quickly as water. If you would like to try the oil hardening, the process is the same as with water, with the same precautions. Use only the best lard oil. If you are making shears and scissors from fine steel, you will probably find all the difficulty in overheating, as fine steel will not stand *high heat hardening.*

(21) J. H. F. asks: 1. Does the steam pressure on a piston head keep up to a given pressure as the piston recedes, or does it diminish gradually? A. The pressure remains the same if the opening to the cylinder be large enough; but if too small, the pressure will fall. 2. State the differences in a large cylinder and a short crank and a small cylinder and a long crank—that is, as to the comparative power obtained. A. Theoretically there is no difference; practically, the friction would probably be most with large cylinder and short crank.

(22) C. C. writes: In your paper of the 13th ultimo, answering query 41, a receipt is given for waterproofing linen garments. Would the same ingredients and application thereof do for worsted and woolen garments without damaging the texture and color? Or in case you know of a superior receipt, would you oblige by placing it in your columns? Would you please answer: 1. After boiling for a quarter of an hour, you say *rinse* out. 2. After being in the solution for 6 hours, wring out and *wash.* Should the rinsing and washing process take place in cold or hot water? A. The following may be tried. Two solutions are prepared. The first, composed of 1 part dry gelatine dissolved in 4 parts of oil, contains a little sulphuric acid. The substances are mingled by the aid of heat, after which about 5 parts of an alkaline solution, 26° B. strong, is added and stirred till cold. To prepare the second solution, dissolve alum, zinc sulphate, and lead acetate in three separate vessels, making each solution of the same degree of density. Mix these in the proportions of 5 parts alum solution, 1½ parts zinc solution, 5¼ parts lead solution. After settling, the supernatant liquid is diluted to 1° to 2° B. Textile fabrics are first treated in a bath containing ½ fluid ounce of the first solution in 9 quarts of hot water; after draining and drying they are left 8 to 12 hours in the second solution, and gradually dried, which finishes the process. See also SUPPLEMENT, No. 317.

(23) T. A. C. asks: 1. Is the tendency of the time to use high speed engines for increase of power? A. Yes. 2. Will an engine with a driving wheel 3 feet in diameter, running at 300 revolutions per minute, exert more power on the line shaft than an engine of driving wheel of 6 feet diameter making 150 revolutions per minute? A. Yes, because the pressure on the piston is expended on an arm or radius of 1½ feet in the first case and 3 feet in the last. Assuming the pressure on the piston to be the same, the power given out is in proportion to the speed.

(24) J. C. G. asks: What process may be used to the best advantage in coloring meerschaum pipes? If a meerschaum pipe is once burnt, can it be remedied so as to continue coloring afterward? A. When once burnt the pipe cannot be satisfactorily colored, unless the burnt portion is removed and the surface again treated by the process by which meerschaum is prepared. The coloring is produced by action of the smoke upon the oils and wax which are superficially on the exterior of the pipe, and are applied in the process of manufacture.

(25) W. H. W. asks: 1. Where can I get selenium, what it costs, and if it would make a good electric conductor? A. Selenium can be purchased in New York of almost any of the dealers in pure chemicals. Its cost is about $4.00 per ounce. Its conductivity varies according to the degree of light or heat to which it is exposed, and it conducts electricity better at a higher temperature than at a low temperature. 2. Can white cast iron be magnetized, and how? A. White cast iron can be magnetized if chilled or hardened. It may be charged with an electro-magnet.

(26) C. F. P. asks for a recipe for making shellac varnish that will be a good insulator of electricity. A. Dissolve the best orange shellac in 95 per cent alcohol.

(27) D. S. asks: What can I put on canvas to make it airtight and flexible? A. Boiled linseed oil is generally used for the purpose indicated. In time the oil will take up oxygen from the air, and in that condition it has a rotting effect upon the fabric.

(28) E. M. G. writes: I would like to have some information on "spongy iron," and how made, if you can give any. A. Pure iron may be obtained by heating pure ferric oxide in a current of hydrogen gas. At a strong red heat the metal is obtained in a spongy state. Spongy iron, such as is used for filtering purposes, is simply metallic iron.

(29) A. B. writes: 1. "To lime whitewash add sulphate of zinc." Is this of any value, and if so, how much zinc must I add? A. Zinc sulphate is added to the lime whitewash to prevent it from souring. It acts as an antiseptic. Less than one per cent should be added. 2. Can ice cream be prepared without eggs and without heating? If so, how? A. Ice cream can be made without eggs by using gelatine, but not without heat, as we know of.

(30) G. L. asks: 1. What article contains the largest amount of butyric acid? A. Butyric acid is found in butter and in various animal and vegetable fats. 2. Can you give me a recipe for preserving eggs for five or six months—a cheap and effective one? A. Consult SCIENTIFIC AMERICAN SUPPLEMENT, No. 317.

(31) G. H. B. asks: 1. What is the process of the manufacture of vaseline? A. Vaseline is obtained by distilling off the lighter and more volatile portions from American petroleum, and purifying and decolorizing the residue by treatment with sulphuric and potassium bichromate and subsequent digestion with animal charcoal. 2. The process of deodorizing alcohol. A. To deodorize alcohol the following is recommended: To each gallon add an aqueous solution of four to eight grains potassium permanganate, shake well, and add, after five minutes, as much calcium chloride, previously rubbed with a little water. Filter the liquor after several hours, and set it aside for a few days. The alcohol will then have lost its chlorine smell and acquired a peculiar flavor, which, however, depends on the proportions of the permanganate and calcium chloride used. If then distilled, the alcohol may be used as the finest cologne spirit.

(32) C. E. H. writes: I wish to do some brazing, and for this purpose I constructed a fire-pot 8 inches in diameter and lined with fire-brick. This is filled with charcoal and attached to a small blower, in imitation of those used with a portable forge. The parts to be soldered are filed clean and placed in position. The solder is then applied, and borax is used as a flux. The fire is raised to its highest temperature we can obtain before the soldering is attempted; but the difficulty encountered is that the copper pipe which we wish to unite will become red hot and all the flux apparently burnt off without melting the solder, or, at least, melt it very imperfectly. What is wrong, and how can I overcome the difficulty? A. You cannot braze copper pipe with the seam side *up* without difficulty. The proper way is to clean the edges and wire the pipe with small iron wire at small intervals to keep the edges together. Then brush a borax solution made by rubbing a piece of borax upon a stone with water, upon the outside along the seam, and also upon the inside if the tube is not long. Then place a few pieces of low or common yellow brass upon the inside along the seam, dipping the pieces into the borax solution before putting them in place. Put one piece close to the end that you begin to heat first. Arrange the fire (which should be charcoal) so that you can incline the tube about twenty degrees. Lay the tube into the fire, *seam down* so as to melt the brass at the upper end first. As soon as the brass begins to flow, gradually draw the tube toward you, looking at the progress of the flow upon the inside, until the brass has flown through the whole length of the seam. If upon examination it is found perfect, take off the wires and boil the tube in a pickle made of one part sulphuric acid to ten parts water, in a copper dish; or, if not convenient, heat the tube nearly red and plunge in the pickle. If places are found not perfect, push a piece of brass and borax solution to the proper place inside and heat as before. Spelter solder that is granulated is made for such uses, and is furnished by most houses that deal in sheet brass and copper, or can be procured at a coppersmith's. A piece of sheet brass, cleaned and clipped with shears, should make good work.

COMMUNICATIONS RECEIVED.

A Challenge for Scientific Men. By H. C.
Electricity in Gold Mining. By O. H. T.
On Sewage. By S. G. J.
On Storms. By A. W.
On the Protecting Qualities of Snow. By E. G.A.
On Cleopatra's Needle. By T. H. H.
On the Siemens Dynamo. By M.
On the Cause of the Aurora. On the Cause of Earthquakes. By W. H. W.
On Aerial Navigation. By F. B.
On the Hydrostatic Paradox. By F. S. H.
On the Vienna Electric Exhibition. By A. P. De R.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

March 27, 1883,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by hand.

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