little sal ammoniac. Scrape the tin where you intend soldering. If at all possible, use rosin, as it makes a better job than acid. 6. How can I make whitewash that will not rub off? A. Put a little white glue in the whitewash. 7. What is the name of the best brand of tin that is made? A. There are over three hundred brands in the tin trade; generally, the more letters, as X, XX, XXX, etc., the thicker the tin.

(6) In answer to P. D. P., March 27 (in regard to boiler feed pipe and heater pipes becoming partly filled with hard lime scale), E. A. T. writes: I would say, cut a piece of pipe one or one and a half inches larger diameter than your blow-off or feed, and slip it over it or them wherever they are exposed to great heat, and you will never have any more trouble with their filling up. I learned this from my SCIENTIFIC AMERICAN ten years ago or more, and it has been worth a great deal to me in that time.

(7) F. T. R.—Nitric acid dissolved in twenty to thirty parts of water is used to etch zinc with. An excellent liquid to be used in writing on zinc is ¼ ounce platinum chloride dissolved in 1 pint soft water. It is very expensive. This solution must be kept in glass, and the writing executed with a quill pen.

(8) A. H. asks: Of what shall we compose composition for making job printing press inking rollers? A. To 8 pounds transparent glue add enough water to cover it; let it stand with occasional stirring 7 or 8 hours. After 24 hours, all the water should be absorbed. Heat it in a water bath, as glue is always heated as soon as melted, and when both rise, remove from fire, and add 7 pounds molasses that has been made quite hot. Heat with frequent stirring for half an hour. The moulds should be clean and greased. Pour into moulds after it has cooled a little, and allow to stand 8 or 10 hours in winter, longer in summer. Some use far more molasses, three to four times above quantity, and less water. In this case, after soaking 1 to 1½ hours, the glue is left on a board over night, and then melted with addition of no more water, and three or four times its weight of molasses added. Two hours' cooking is recommended in this case.

(9) W. A. M. asks: If horseshoe magnets are made of fine quality of 18 gauge sheet steel, small in size, polished and nickel plated, would it be necessary to harden the steel to have them retain their magnetism? Would they be more powerful if hardened? A. They will retain more magnetism if hardened, and therefore will be more powerful.

(10) H. C. B. desires a recipe for making a peacock green stain which will penetrate into wood. A. A green stain is produced by a solution of verdigris in nitric acid; then, by dipping into a hot solution of pearl ash, the color may be changed into blue. By varying the strengths of the solutions used, the exact shade desired by you can be obtained.

(11) C. H. T. asks how to make bay rum from the bay oil. A. Take 10 fluid drachms oil of bay, 1 fluid drachm oil of pimento, 2 fluid ounces acetic ether, 3 gallons alcohol, and 2½ gallons water. Mix, and after two weeks' repose, filter.

(12) C. A. K. asks the process for tempering steel springs in the shape of rings 11 inches in circumference. A. Such a spring should be heated in a muffle or oven, lying upon a plate of iron. When at a cherry red heat, it should be dropped in the water edgewise so as to keep its shape. This may be done by dexterously and quickly turning the plate over, so that the spring may drop edgewise. A wire frame is sometimes used, and the spring heated in a charcoal fire and handled by a wire loop, from the frame.

(13) J. S. asks: What will precipitate copper and gold in a cyanide solution? A. They can be thrown down as sulphides by means of hydrogen sulphide, and then brought into solution again by boiling with potassium chlorate and hydrochloric acid. Then the gold can be separated out by adding iron sulphate.

(14) H. W. B. asks: How can I bronze a plaster cast? A. Go over the figure with isinglass size, until it holds wet, or without any part of its surface becoming dry; then with a brush go over the whole, taking care to remove while it is yet soft any of the size that may lodge on the delicate parts of the figure. When it is dry, take a little thin oil gold size, and with as much as just damps the brush go over the figure with it, allowing no more to remain than causes it to shine. Set it aside in a dry place free from smoke, and in forty-eight hours the figure is prepared to receive the bronze. After having touched over the whole figure with the bronze powder, let it stand another day, and then with a soft dry brush rub off all the loose powder, particularly from the points or from the more prominent parts of the figure.

(15) W. S. desires a recipe for making a cheap varnish for varnishing furniture. A. The following is a fine, lustrous polish for furniture: Half pint linseed oil, half pint old ale, the white of an egg, one ounce spirits of wine, one ounce spirits of salts. Shake well before using. A little to be applied to face of soft linen pad and lightly rubbed for a minute or two over the article to be restored, which should be first rubbed off with an old silk handkerchief. It will keep any length of time if well corked.

(16) R. W. W. desires a receipt to make a good water stain to imitate walnut, not to cost too much. A. Take of burnt umber 2 parts, rose pink 1 part, glue 1 part, water sufficient; heat all together and dissolve completely. Apply to the work first with a sponge, then go over it with a brush, and varnish over with shellac.

(17) G. W. H. asks the composition of a fuzee, or large scented match, which when ignited perfumes the air around? A. Dissolve ¾ ounce niter in ½ pint rose water; mix this with ½ pound willow charcoal, and dry it thoroughly in a warm place. When the nitrated charcoal is perfectly dry, pour upon it a mixture of ½ drachm each of the attar of thyme, caraway, rose lavender, cloves, and santal; then stir in 6 ounces benzoic acid. Mix thoroughly through a sieve, then beat in a mortar with sufficient mucilage to bind together. Make into pastils, and dry.

(18) H. M. B. desires a formula of plastic compounds that soften easily by gentle heat, and are easily worked into shape and position by gentle pressure, and will then set rapidly. A. The following mixture, used for making photo. gelatine plates, may be applicable: 70 parts of bitumen are melted at a moderate heat, and to the melted bitumen there are added the following, each being melted previously: 425 of spermaceti, 200 of stearine, and 170 of white wax. All these being incorporated, 70 parts of finely ground black lead are stirred in. This preparation is poured over plates at a temperature of about 40° Centigrade.

(19) J. S. W. asks as to the use of a spray of water for reducing the temperature of a room. A. It may be done by a spray fountain or a spray jet thrown against a muslin curtain. Any means to produce a large evaporating surface supplied with water (cold if possible) will accomplish your purpose.

(20) J. N. W. asks the formula for map engravers' wax. A. You can use a preparation made of 4 ounces of linseed oil, half ounce of gum benzoin, and half an ounce of white wax; boil to two-thirds.

(21) P. R.—To temper a machinist's tap take a piece of iron pipe or old boiler flue, and plug one end by welding. With equal parts of clean white sand and pulverized charcoal, pack your tap in the center of the pipe. Heat evenly in a large fire to a full cherry red; keep it in the fire until assured that the tap is heated through. Then draw the tap from the sand bath, and dip perpendicularly in clear water at a temperature of 70°. Do not let the water splash up on the tap, as it chills the teeth above the water, which prevents their hardening. It should require about 2 seconds to immerse if the thread is 6 inches long. A little experience is worth a page of advice. Quality of steel is of vital importance in hardening.

(22) W. M. R. asks: 1. When water gets low in a steam boiler, and water is pumped in and it explodes the boiler, what is the cause of the boiler exploding? A. Excessive generation of steam by the overheated iron forming the shell and tubes of the boiler. 2. Does water buhble up and down in a boiler like a tea kettle when there is pressure on the water by steam? A. Yes; when boilers are said to foam, their action much resembles a kettle that is boiling over. 3. How many degrees Fahrenheit does iron have to be over 212° Fah., when you put water on it, that it will not generate steam? A. The so-called spheroidal condition of water on a hot iron depends for its exhibition on temperature of both water and iron. Very cold water may become spheroidal on polished iron at 215°. The phenomena becomes more effective at higher temperatures, and is worthy of study as exhibited in working large masses of iron with a wet hammer.

(23) M. E. R.—There are a variety of well pumps to be had through the hardware trade. We know of nothing better than oak for a chain pump box. Your tile drain should not be tolerated near a well. If the drain is necessary in its present position, it should be made of cast iron pipe with lead joints well tamped. There is no simple test for contamination in wells. Poisonous water often looks bright and clear.

(24) W. C. W. asks how the polished ironwork on a printing press can be restored to its former brightness after it has become rusty and black from oil. A. Scrape off the hard oil and clean with kerosene; then polish with fine emery paper. Parts that are rough from rust must be rubbed down with medium emery paper or cloth, then polished with fine emery paper.

(25) G. H. B. asks in what form to put zinc in order to secure the greatest movement of a rod (on the thumb wheel of a lamp) by the expansion of said zinc, to regulate an incubator lamp? A. Make a combination lever of sheet zinc and sheet iron, say of strips 1 inch wide No. 16, fastening each end together by riveting or soldering, and holding them together throughout their length by riveting or winding with twine. Fasten one end to the side or top of the incubator. The variations in temperature will swing the other end to operate a lever upon the rod. Strip should be from 18 inches to 2 feet long.

(26) J. E. E. asks: By what process is "graying" done—with acids—upon polished iron or steel, which is frequently preferred to "bluing"? A. By dipping or sprinkling with dilute nitric acid after heating until blue. 2. How to make a smelter for brazing iron or steel that will fuse at a lower degree than brass. A. By mixing a little more zinc or tin with the brass. Silver is better for steel solder.

(27) G. A. C. asks: 1. What is a good paint for steam pipes when exposed to a very high temperature? A. Finely pulverized plumbago and linseed oil is as durable as any. 2. What is used to mix gilt, gold, copper, etc., for painting steam heating apparatus? A. For ordinary bronzing, the metallic bronze powder is rubbed upon the paint when nearly dry, then varnished with thin mastic.

(28) L. B. asks (1) a process to soften cast iron boxes, to chamber them to receive babbitt. A. Only by long annealing in a charcoal fire and covering over the fire with hot ashes, leaving the boxes to cool gradually. 2. A recipe for cementing cast iron. A. See SCIENTIFIC AMERICAN, February 6, 1886, Cement for Cast Iron.

(29) E. S. asks: 1. Will a leather belt transmit as much power on rubber-covered pulleys as a rubber one? If not, about what is the difference? A. No; 50 per cent in favor of rubber belt on rubber pulley, when both are new. 2. What oil is best for a small lathe and like machinery? I have trouble with the oil gumming. A. Best cold pressed lard oil, with one-tenth kerosene.

(30) F. W. S. writes: The precession of the equinoxes, 20 minutes 20 seconds per year, will amount to one day in about 70 years. In that length of time from 1885 will they fall upon the 20th of the month instead of the 21st, as at present? A. 20 minutes 23 seconds is the true precession in time. This year the equinox occurred on the 20th at about 4:35 P. M. of the astronomical day, which is also 4:35 P. M. of the civil day. The equinox will enter the 19th day, civil time, in 49 years.

(31) J. H. B. asks: What size engine and boiler will run a boat 22 feet long, 5 feet beam, and 3 feet deep, at speed of 9 miles or more an hour? A. 3×4 cylinder; vertical boiler, 26 inches diameter, 45 inches high; 20 inch wheel, 36 inches pitch.

(32) C. M. asks: 1. What can be used to render new patches in an old brick wall similar in appearance to the old? A. We know of no means of accomplishing such result. 2. I have seen something like a charcoal stick, which when burning at one end would cut glass. What is its composition and how is it made? A. Take sticks of soft wood (willow or poplar) of about the thickness of a finger, which must be thoroughly dry, immerse for about a week in a concentrated solution of lead acetate and then dry. See also "Simple Method of Cutting Glass," in SCIENTIFIC AMERICAN for October 31, 1885, page 275.

(33) G. J. E. asks: How can I dilute crude carbolic acid with water? I have not been able to mix it thoroughly. A. Carbolic acid is soluble in 15 parts of water, therefore you cannot expect to make a very satisfactory solution except by using large quantities of water. Heat will facilitate the solution somewhat, but alcohol, ether, and acetic acid are the best solvents.

(34) J. B. W.—Pure water will not affect flues or boiler. If you are using a surface condenser, you are probably pumping oil into the boiler, which may contain acid that will act on the boiler. There is no acid from the brass tubes.

(35) D. & S.—Broken anthracite measures 45 cubic feet to a gross ton, or 50 pounds to the cubic foot, but the specific gravity of anthracite varies from 1·350 to 1·640, or from 84 to 102 pounds per solid cubic foot, so that there will be a variation of from 2 to 3 pounds to the cubic foot as above stated for various kinds of coal.

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

O. H. J.—The specimen is a micaceous schist, partially decomposed, and of no value.

INDEX OF INVENTIONS

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May 4, 1886,

AND EACH BEARING THAT DATE.

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