truth. In the nature of such only has the foregoing been set forth. If some future observations on comets, specially directed to their materiality of composition, confirm the present notion, that they have density and transparency, that light in passing through their media suffers no refraction, then we must look for a new form, may be a fourth state of matter, in their constitution.

PRACTICAL ITEMS AND RECIPES.

By R. GRIMSHAW.

[These are in every case drawn from the compiler's personal experience, or obtained by him at first hand from those who have tested and approved them.]

TO CONDUCT OZONIZED AIR use kerite tubing.

TO STRAIGHTEN IRON WIRE AND LIGHT RODS.—Roll between two wide flat boards.

TO DESTROY PHYLLOXERA, sprinkle the vines and saturate the soil with bisulphide of carbon.

QUICK DRYER FOR PRINTERS' INKS.—Use borate of manganese, which will also give a "gloss" effect.

HARDENING DRILLS.—To give drills and other steel articles an unusual hardness, without brittleness, use mercury.

TO CUT INDIA RUBBER EASILY.—Keep the knife-blade wet with water, or, better still, with a strong solution of potash.

VERY POROUS DRAINING TILES are made by mixing large quantities of sawdust with the plastic clay and burning as usual.

SPRINGS OF TUMBLER LOCKS are best made of phosphor bronze, as preserving its toughness and elasticity and avoiding breakage or inaction.

TO WORK CORK into symmetrical shapes, as pen handles, etc., cut approximately to shapes with a *greased* knife, using a drawing cut, and finish with a coarse emery wheel.

HOT BEARINGS are relieved and prevented by the use of graphite as a lubricator—either pure or well mixed in oil. This is good for the heaviest journals and highest speed.

RUBBER VALVES FOR STEAM OR FOR OIL, should be specially ordered for the purpose desired, as they require to be vulcanized at a higher temperature or for a longer time.

TO PREVENT NICKEL-PLATING FROM SCALING off iron or steel objects, copper them first by battery or by simple immersion in a strong solution of sulphate of copper (blue vitriol).

CLEARANCE FOR NARROW SAW BLADES may be given, without either spring or spread set, by grinding the back to a knife edge. This is especially useful for keyhole, pruning and fret saws.

IN BUYING RUBBER GOODS, as car-springs, buffers, etc., *choose light ones*; heavy ones are loaded up with barytes, etc. Color is no test. Never buy old India rubber goods, as that material "perishes" with age.

THE HEATING OF HOT LINK BLOCKS is very common in steam fire engines of the Amoskeag and similar patterns. It may be avoided by substituting for the composition generally used lignum-vitæ or apple-wood blocks.

FILE HANDLES, to firmly hold double-ended or reversible saw-files, may be made by boring half-way down with a large bit, and deeply with a smaller one, thus giving the triangular file section a bearing at two places in its length.

TO GRIND VERMILIONS WITHOUT BROWNING THEM, use a mill having two rollers of diameters three to one, and the same number of revolutions per minute. They have a "slip motion," or true mulling action, and as there is only a line of contact, instead of a great surface, such mills grind cool and do not turn the color.

"FALSE BACK" UNION OR HOSE COUPLINGS are easily made, so true as to be nearly water tight without washers at ordinary pressures, by casting the male first with a square encircling groove, which, after being trued in the lathe and coated with charcoal blackwash, or with graphite, has the female portion cast around it.

TO "BRING UP" A SHORT CIRCULAR SAW TOOTH.—Sometimes one tooth strikes a knot, stone or spike, and loses only the tip end. Instead of filing the whole saw down to agree with the short tooth swage it with a crotched steel tool, gently lifting the tool as the hammer strikes it. This will raise the end, and bring the tooth into line.

TO PRESERVE LEATHER HOSE, BELTING, ETC., in good condition, freely apply crude castor oil, warmed if possible. It increases the pliability of the leather and the cling of belts; does not become rancid. Rats avoid it. In hose, it should be pumped in from the interior under considerable pressure, thus thoroughly filling the pores.

CHEAP SUCTION HOSE for wrecking purposes, bridge caissons, etc.,

may be made by sewing cotton duck into a tube of the desired diameter and springing into it a coil of stout galvanized iron wire, wound on a wooden or other mandrel, a trifle larger than the hose. The ends of the coil must be secured to the couplings. A coat of boiled linseed oil renders it water-tight.

GATES OR LOCKS FOR PNEUMATIC TUBING are best made, instead of with complicated valve chambers, ecc., by simply surrounding the terminus with a snug-fitting sleeve which has about 175° of its circumference removed throughout most of its length, to correspond with a similar opening in the tube. Semi-rotation, or lengthwise sliding, of the sleeve opens full or tightly closes the tube end.

COPYING INK, TO BE MADE WITHOUT PRESS OR WATER.—Well mix about three pints of jet-black writing ink and one pint of glycerine. This, if used on glazed paper will not dry for hours, and will yield one or two fair neat dry copies, by simple pressure of the hand, in any good letter copy book. The writing should not be excessively fine, nor the strokes uneven or heavy. To prevent “setting off,” the leaves after copying should be removed by blotting paper. The copies and the originals are neater than where water is used.

DRAWING ON PHOTOGRAPHS.—Where it is desired to obtain an India ink drawing from a photograph, without resorting to tracing, very nice results are obtained thus: Prepare a print in the usual manner. Instead of toning as usual, fix immediately in “hypo.” Wash well in running water to get out all the hypo. Draw directly on the print with India ink. This finished, bleach with a saturated solution of corrosive sublimate (bichloride of mercury) in equal parts of water and alcohol. Flowing is better than brushing, for applying the bleach, as it avoids smearing.

KEEPING WET PLATES FROM DRYING.—As dry plates are not always obtainable, and ordinary wet plates dry so quickly as not to allow transporting, it often becomes necessary, in order to make a single picture, to carry as much apparatus as would be required to make a dozen or more. A very good method of preparing a wet plate so as to last for several hours consists in flowing the plate (after taking out of the bath) with a mixture of one part of strong solution of silver (eighty grains to an ounce) and two parts chemically pure glycerine. Flow and drain the plate until all streaks disappear and the plate remains smooth. This dispenses with carrying the bath and useless chemicals. The plate may be developed on returning home.