

REPAIRING BOILERS.

The following hints in reference to repairing boilers are taken from the *American Machinist* :—

It is commonly noticed in boilers that have seams of rivets exposed to the action of the fire, that after being at work for some time, cracks begin to appear, running from the rivets towards the centre of the plate. The cause is, that one lap being covered by another, prevents the water from getting to the one nearest the fire; consequently the lap nearest the fire becomes hotter, and expands to a much greater extent than any other part of the plate, and its constant unequal expansion and contraction, as the boiler becomes alternately hot and cold, inevitably results in a crack. These cracks may be temporarily repaired by drilling a hole in the bottom or extremity of them, so that the crack is completely drilled out; and, as a rule, this may be safely done if the crack is not more than three inches long, but if of greater length, do not tamper with it, but have the plate out, if possible.

If it is not practicable to take the plate out, cut out so large a piece that the seams of the patch shall be as far from the fire as possible. Let it be well borne in mind that, in addition to the two laps causing unequal expansion, the sediment or scale inside the boiler obstinately sticks in between the rivet-heads and under the edge of the lap, from whence it is seldom or never properly removed in cleaning the boiler. After drilling out the end of the crack, countersink the drilled hole, and also the hole in the seam above it; so that when rivets are again put in, they will meet each other, or nearly so. Let the heads of these rivets be as thin as possible, so as not again to retain the heat, or attract or harbor dirt.

Sometimes it will be observed that a crack in the seam is running from hole to hole between the rivets. This is always dangerous, and the cracked plate should be cut out and replaced by a new one as soon as possible. In putting patches on any part of a boiler, never cut a hole out with square corners, like the inside of a picture frame; but cut the holes which are to be covered with a patch, round, or as nearly circular as possible. But it is always better "not to put a patch on," but to cut out the defective plate and put in a new one, thus making the boiler as nearly as possible what it was when new. In putting a new plate in a very old boiler, it is advisable to have it a little thinner than the old plates were when new, say one-sixteenth of an inch. If putting on a new plate, arrange it, if possible, so that the caulking shall be done on the new iron; but never place the edge of the laps toward the fire, unless a considerable distance from it.

STEEL BOILERS.—We lately alluded to the use of steel in boiler making. A late number of *Engineering* sums up the result in England of the employment of steel as follows: "That of some 80 boiler makers who have fairly tried steel plates, only some eight or nine can be said to have persevered with its use and used it extensively; that when the use of steel plates has been persevered in against the advice and feeling of the boiler maker, the result has generally been unsatisfactory; that it may be taken for granted that the prejudice on the part of boiler makers against the use of steel, is, as a rule, inversely proportionate to the extent of their acquaintance with it." The same article estimates that there are working in the United Kingdom about 2,500 boilers with steel shells and 7,000 with steel furnaces and fire-boxes. It is impossible to tell, says the *Iron Age*, how many are in use in the United States, but the number is far in excess of this, and steel for this purpose is rapidly growing in favour with boiler makers. This is also true in England. The great facility with which low steel can be made by the Siemens-Martin process is doubtless one cause of this increased favour, but the breaking down of prejudice is another.

LAYING OUT CURVES.—A simple instrument has been devised by E. R. Dale, of England, for measuring the diameters of circular curves. It consists of a tube bearing at its lower end a fork, having in its centre a feeler pressed against the curve to be measured by a spring contained in the tube. The upper end of the feeler is fitted with a small rack, gearing into a pinion of the spindle of a hand the motion of which indicates on a graduated disk the diameter of the circle of which the arc is a part. In order to measure with the instrument the central feeler is pushed inward until it, as well as the ends of the fork, touch the arc to be measured.

Furniture.

PRACTICAL HINTS.

POLISHING FRETWORK.—This is rather a delicate job. Polish the wood first, or at least give it a couple of coats; then, when cut, finish off. If the fretwork is sawn, procure a gill of French polish, make a rubber of flannel or of wadding, moisten with polish, cover with linen rag, and then rub with a circular motion. When dry, paper smooth, and polish again; then finish off with spirits. For fancy light wood use the white French polish. The simplest plan is to use a brush polish made as follows: 1 gill brown hard varnish, $\frac{1}{2}$ gill French polish (mix in a bottle if for light wood), 1 gill white hard varnish, $\frac{1}{2}$ gill white polish. Apply with a fine camel's-hair brush. When the first coat is dry, paper smooth and give another coat; then, when dry, a coat of glaze. If carefully done it is nearly equal to polish. Very little varnish should be used at a time, to prevent running.

MORDANTS FOR STAINING WOOD.—Sulphuric acid, more or less diluted, according to the intensity of the colour to be produced, is applied with a brush to the wood, previously cleaned and dried. A lighter or darker brown stain is obtained, according to the strength of the acid. When the acid has acted sufficiently its further action is arrested by the application of ammonia. Tincture of iodine yields a fine brown coloration, which, however, is not permanent unless the air is excluded by a thick coating of polish. Nitric acid gives a fine permanent yellow, which is converted into a dark brown by the subsequent application of tincture of iodine.

EBONIZING.—To French-polish a black sideboard it is not absolutely necessary to use black polish, but it is usual to do so, as it produces a finer black. The sideboard, or any kind of furniture, is polished in the usual manner, by using black polish, and filling up the grain with black; the simplest kind is weak glue and lamp-black. When dry, paper down and polish as usual. The rubber of the polisher should be dipped in ivory-black, or gas-black, moistened with black polish, covered with linen rag, a touch of linseed oil, and used as usual. Black polish is made thus:—One gill dark French polish poured into a clean bottle, then add $\frac{1}{2}$ oz. best ivory-black, or gas-black is best; in fine powder well, shake until mixed, and use as before described. Gas-black is made by impinging a broad gas burner on the bottom of a glue-pot or sheet of metal, and gathering the black as made.

PICTURE FRAMES.—A simple plan for holding frames in position till dry is to tack lengths of wood on a board, and after laying the frame between them, gently press wedges till the joints are home. It is such a common complaint of the non-conformity between the first and last mitre, that gilt corners are made ready, like charity, to cover a multitude of sins. These, if laid on a damp cloth, soon become sufficiently pliable to take the bend of the moulding, and, besides being very cheap, are a great improvement and a blessing to many besides amateurs.

VARNISH FOR TOOLS.—For tool handles there is nothing better than shellac varnish. It should be put on before the handle is removed from the lathe. Use it the same as French polish, and in small quantities.

SIZE FOR PREPARING FRAMES, ETC.—Take $\frac{1}{2}$ lb. of parchment shavings, or cuttings of white leather; add three quarts of water, and boil it in a proper vessel till it is reduced to nearly half the quantity; take it off the fire and strain it through a sieve; be careful in the boiling to keep it well stirred, and do not let it burn.

LAYING GOLD ON FRAMES.—This is a most difficult operation, and requires some practice, but with a little caution and attention, it may be easily performed. Turn the gold out of the book on the cushion; a leaf at a time; then passing the gilding knife under it, bring it into a convenient part of the cushion for cutting it into the size of the pieces required; breathe gently on the centre of the leaf, and it will lie flat on the cushion; then cut it to the sizes required; by bringing the knife perpendicularly over it, and sawing it gently, it will be divided. Place the work before you, nearly horizontal, and with a long-haired camel-hair pencil, dipped in water (some use a small quantity of brandy in the water), go over as much of the work as it is intended to cover with the piece of gold; then take up the gold from the cushion by means of the tip; by drawing it over the forehead, or cheek, it will be damped sufficiently to adhere to the gold, which must then be carefully transferred to the work, and gently breathing on it, it will be found to adhere; but it must be observed that the part it is applied to is sufficiently wet; indeed, it must be