

produced when the timber is radially sliced, *i.e.*, the logs are first quartered and each quarter is placed at an angle on the slicer.

Formerly veneers were sawn by either the band or circular saw. Whilst sawing has been largely superseded by slicing, certain few timbers—such as black bean and African mahogany (for curl veneers)—are sawn, as they are difficult to slice.

3. *Trimming*.—As the continuous veneer emerges from the peeler, it either winds on to a spindle which is afterwards taken to the trimming machine, or it is conveyed to the latter along a table which may be some 200-ft. in length. The trimming machine is called a *clipper* or *guillotine* as it consists of a long knife which slides vertically in a frame fixed above and across the conveyor table. The band of veneer passes under this knife and is cut transversely into widths<sup>1</sup> on each descent of the knife. Some cutters work automatically; in another type the knife is caused to drop as the operator in charge of the machine depresses a foot pedal.

In many manufactories the veneers are cut to standard widths and these depend upon the sizes of the presses (see p. 102). Any serious defects, such as splits and large dead knots, are eliminated by cutting off the defective sections.

4. *Drying*.—Veneers for good class work must now be dried to a pre-determined moisture content, varying from 4 to 10 per cent. This is known as the *dry-cemented process*.<sup>2</sup> There are many types of dryers. One of the latest, over 100-ft. long, is heated by hot water or steam pipes and the air is circulated by fans. The veneers are passed in at one end between rollers which propel them at the desired speed—depending upon the thickness of the veneers, desired moisture content, etc.—through the chamber towards the exit, where they are cooled before emerging and then removed by hand. This operation only occupies approximately a quarter of an hour.

*Jointing*.—Veneers required for large panels, sliced decorative veneers and those used for cores are jointed in the following manner: The edges must be perfectly straight and clean to ensure a close joint. Hence the veneers are piled to a thickness of about 1-in., clamped together, and the edge of the pile is sawn by a circular saw and spindle with cutterblock—the latter producing a good finish; in one machine the veneers are held flat on a fixed bed by a heavy clamp and a travelling circular saw, followed by a cutterblock of the spindle, traverses the pile to effect the cut.

The two veneers to be jointed have their opposing edges painted with glue. The sheets are placed flat on the table of the jointing machine, one type of which consists of a series of narrow rollers operating over a heated plate and in front of which is a small rotating wheel which dips into a trough containing a solution of formaldehyde. The sheets are fed towards the machine over the solution wheel which moistens the glued edges, and as they are drawn through the machine between the rollers and plate the edges are forced together to form a tight joint.

In another type of machine, called a *taping machine*, a narrow strip of gummed perforated tape (*kraft tape*) is passed over a heated roller which moistens the glue and is pressed over the joint by a second heated roller. Sufficient glue is thereby forced between the joint. This tape is subsequently removed by damping and scraping.

*Repairing*.—Defects, such as pitch pockets and large unsound knots (especially

those liable to become loose) must be removed and replaced with sound veneer. This operation is known as *patching* or *plugging*. The defective portions are removed by a metal hand punch of oval, circular, etc., section which is smartly tapped to give clean cuts. These spaces are immediately filled in with plugs or patches of sound veneer of similar size, shape, colour and grain so as to render the repairs as inconspicuous as possible. The patches have their edges glued prior to placing them in position, after which pressure is applied to make them secure.

5. *Gluing or Cementing*.—The dried veneers are placed on a long belt conveyor and inspected for quality. Those suitable for face veneers and cores are sorted and the sheets are also arranged into sizes. Any defective sheets are sent to be repaired as described above. The sound veneers are conveyed to the gluing machine or *glue-spreader*. This consists of a pair of steel grooved rollers which dip as they rotate into troughs containing the adhesive; these rollers are specially designed to evenly spread the glue or cement over one or both faces of the veneers as they are passed between them. The sheets are placed by hand between the rollers, and, on emerging, are assembled according to the type of press which is to be applied in the next operation.

If cold pressing (see p. 101) is to be employed, 3-ply boards are assembled in the following manner: A 3-in. thick wood board, called a *caul*, of size slightly larger than the sheets of veneer, is placed on a low truck standing at the discharge side of the glue-spreader. A sheet of face veneer (not glued) is placed on the caul with its face-side<sup>1</sup> (or outer surface when assembled) down. The core ply is passed through the machine, which spreads a uniform layer of adhesive on *both* sides. An operator then quickly places this glued core upon the face veneer, taking care that its grain is at *right angles* to that of the face ply. The second face ply is now carefully laid over the core with its face-side up and its grain *parallel* to that of the first face veneer (see p. 98). This operation is repeated until a sufficient number of boards have been assembled to form a pile of about 3-ft. thickness. A thin (about  $\frac{3}{4}$ -in.) plywood caul is placed between the boards at approximately 1-ft. intervals during the piling, and a thick caul is laid on top of the batch which is at once taken to the press.

A multi-ply board is built up in a similar manner, each *alternate* ply being glued on *both* sides and cross-grained assembled. Thus, a 7-ply board would be assembled in the following sequence: Face veneer (face-side down and longitudinal-grained), glued cross-banding (cross-grained), veneer (longitudinal-grained), glued core (cross-grained), veneer (longitudinal-grained), glued cross-banding (cross-grained) and face ply (face-side up and longitudinal-grained).

<sup>1</sup> During conversion in the rotary cutter, the fibres on the concave or inner surface of the veneer tend to separate longitudinally; such splits do not extend to the convex or outer surface and are called *checks*. These are unavoidable if the thickness of the veneer exceeds  $\frac{1}{2}$ -in. Therefore, if the outer veneer is placed "face-side down," as stated above, any checks will be concealed. The outer surface is marked during the cutting operation to ensure correct assembly.

A sheet of veneer straight from the rotary cutter will assume a curved shape. If the sheet is pressed flat the outer surface will be subjected to a compression strain and the inner surface will be under tension which tends to cause the fibres to separate. The term "tight-cut" is applied to the outer surface of a veneer and "loose-cut" to the inner.

<sup>1</sup> The length is in the direction of the grain and the width is tangential to the grain.

<sup>2</sup> Some Russian manufacturers still practise the *wet-glued process*, *i.e.*, the sheets are not dried prior to gluing; the sheets having a high m.c. are glued, assembled and hot pressed. Such plywood boards are only suitable for inferior work.