table slides adjustable for height to support the wood while it is pushed along over the knives by the hand. A fence guides it in a straight line. Exact thicknessing is done on another type of machine, the panel planer or thicknesser, in which the cutter cylinder revolves above «the table and the stuff is fed through by rollers above and below. By altering the height of the table the thickness of wood can be varied. Double machines include a cutter cylinder above and below the timber, so that the upper and under sides are planed simultaneously. *A* combination of the hand-planer and the thicknesser is useful in cases where space or expenditure must be limited.

When large quantities of planed stuff are wanted, such as for flooring-boards, &c., other types of machines are employed. The four-cutter planers are the most rapid in output, and the timber is passed through them at a high rate, ranging up to 150 ft. per minute. There is first a revolving cutter cylinder, which roughs off the underside of the stuff, whence it passes (being propelled by rollers) to a fixed knife which imparts a very smooth face. A little farther on in the machine two vertical cutter blocks are encountered which carry cutters to plane or tongue or mould the edges, after which another cylinder above finishes the top face. Similar types of machines, are made to produce mouldings, using four cutters shaped to suit the pattern required.

Moulding is also done on the vertical spindle shapers, which carry a cutter or cutters, at the top of a spindle projecting through a flat table. The work is slid over the table and controlled by touching a collar below the cutter. Any form may be given to the cutters to produce different profiles. Some special moulding machines

use a cutter at the end of a spindle projecting downwards from an arm overhanging a table, an arrangement which enables recessing and carving to be performed.

Boring machines comprise rotating spindles and feeding mechanism to actuate augers. The single spindle machines are satisfactory enough for ordinary work, but when a number of differently sized holes have to be bored in a single piece of work, or in rapid succession, it is the practice to employ a machine with a number of spindles, so that a succession of augers of graduated diameters may be ready to use at will.

Mortising or cutting slots ís done in vertical machines with a reciprocating spindle, operated either by hand or by crank disk, and pulleys. The tool that cuts the mortise resembles a wood­worker’s chisel, but is of stouter form and has a suitable shank to fit in the spindle. The latter can be reversed to turn round and let the chisel face in the opposite direction for cutting at each end of a

mortise. A boring spindle ís often incorporated with the machine to make holes for the mortising chisel to start in (fig. 66). Another class of mortiser employs a square hollow chisel, inside of which an auger rotates and first bores a hole, leaving to the chisel the duty of finishing out the corners. The chain mortiser is another type; it has an endless chain of flat links, sharpened to make cutting teeth, and is run around a bar and a roller at a high speed, so that when fed into the wood a recess or mortise is cut out.

Tenoning machines, designed to cut the reduced ends or tenons to fit in mortises, perform their work by the aid of cutter blocks, revolved on horizontal spindles above and below the timber, which is fed laterally upon a sliding carriage.

Dovetailing is effected by revolving cutters in machines having mechanism for pitching out the cuts, or if the work warrants it an entire row of dovetails is made at one traverse, by fitting a row of