on a table or taking-off board. This press is known as the *drop­bar perfecting machine,* owing to a peculiarity of the arrangement by which the paper is conveyed into the tapes. In front of the feeding table is a rod or bar of steel, along which are fitted several metal disks or bosses about half an inch thicker than the bar itself. These can be shifted, by means of small screws, to any position along the rod to suit the size of the sheet to be printed. To this bar is fixed a short arm, with a pulley at the end, which works round a wheel attached to a cam with a dip. Every time the pulley drops into the dip, the bar de­scends upon the paper, which is laid to marks at the front ; and the bar, possessing a rotary mo­tion from the tapes, runs the sheet between a roller and a small drum on to the inner forme cylinder, as already stated. Other kinds of machines are distinguished as the web, having a web or a series of broad tapes which lie on the laying-on board and are fastened to a small drum underneath it. The drum has a series of small cogs, and when it is forced forward it moves the web or tapes in the same direction. The sheet, having been laid to a back mark on the tapes, is propelled between two revolving rollers and thus taken into the machine.

There are several distinct types of per­fecting presses in use, but we can only notice one or two. In the Anglo- French machine, which was in-vented in England but im­proved in France, grippers are used instead of tapes and

the intermediate drums for conveying the sheet from one cylinder to the other. The cylinders are on a level, but alternately rise and fall, allowing the sheet to clear the forme. Quite recently a single­cylinder perfecting press has been invented. The cylinder is double the usual size and has two printing surfaces and a double set of grippers. Two sheets are printed at each revolution, the first being the white paper and the second the partly printed sheet which has immediately preceded it. The sheet is fed in as to an ordinary single side press, printed on one side, taken off, reversed, again gripped, and perfected, when it is automatically delivered on the table.

It has been mentioned that

250 sheets or a *token* per hour, printed on one side only, re­present the work of two men at the hand-press. Two youths at a perfecting machine will complete from 1200 to 2000 copies per hour, equal to 4000 im­pressions on

one side only,—an increase of about sixteen fold. This, however, does not represent the whole of the superiority of these machines. Sheets much larger than double crown (20 × 30 inches) can hardly be worked at a press ; the machine perfects a sheet nearly double this size—50 × 40 or four royal, so that the proportionate product of the machine to the press is about as 32 to 1.

Perfecting machines are not so much used for book-work as formerly. The single-cylinder machine has been brought to such perfection, and is so superior in its inking arrangements, that printers prefer it. In America nearly all machines are one-sided. For newspapers of limited circulation, however, the perfecting machine is well adapted. Complete copies of a journal are produced as soon as the machine is started ; extra copies can be worked off while news­agents are waiting ; and a number of sheets need not be printed off on one side to be completed when a sudden demand arises.

Fig. 13 shows a new form of French perfecting machine for printing book - work, the Marinoni com­

bined perfecting and duplex single-cylinder machine. The improve­ment in this machine over the perfecting two-cylinder machine de­scribed above consists in the alteration of some mechanical parts, so that the same machine can be used for printing sheets either on both sides or on one side only. It therefore serves the purpose of two single - cylinder machines or of one perfecting machine, the change from one to the other being very simple.

The rotary press differs essentially from the cylinder machine. In the former the printing surface and the impressing surface both rotate continuously, and the paper,—not cut up into single sheets, but carried between the two cylinders in a roll or web, like a ribbon, —receives successively an impression on each side, after which it is cut up into sheets of the proper size and folded as it is run out, the sheets being deposited on a table ready for removal.

As representative of this class of machines we may take the Walter press, whose mechanical arrangement is shown in fig. 14. The paper to be printed from, a continuous web about 8000 yards in length, is wound on a small roller at *P.* It is passed over a tension roller, and then over the damping cylinders *TV, TV,* and thoroughly wetted on both sides. The damping cylinders are hollow, and contain sponges from which the water is distributed by centrifugal force, the outside of the cylinder being covered with