

THE CENTENNIAL EXHIBITION.

(See page 232.)

In the agricultural hall I discovered a very interesting tool for making fencing which would attract a considerable amount of attention in the machinery hall. Mr. Hall's universal fencing machine is designed principally for producing the rough-and-ready fence invented by the maker. This fence consists of posts placed on the surface—no holes being dug to receive them—in a zig-zag position, and connected by rails screwed into the posts. It is maintained that by placing the posts in this position they afford a mutual support to each other, and no ordinary pressure will upset them; but the machine is equally well adapted for producing ordinary straight fencing. In this country, where machinery is so extensively employed, especially for wood-working, and where great quantities of timber are used for fencing, it is strange that this should be the only fence-making machine we have seen in the Exhibition. The machine consists of a substantial frame of about 8ft. long and 4ft. wide, with three lines of shafting through its length of about 1½in. in diameter. The posts are first sawn by a circular saw to even lengths of 5ft.; they are then thrown on to an inclined plane on the top of the machine, down which they roll and drop into a sliding carriage, where they are clamped and their level adjusted. The post is then moved up on the carriage against a gang of six augers, 2½ in. diameter, placed at unequal distances apart to suit the required position of the rails; on the shank of each auger is a countersink, and the holes are thus bored and countersunk at one operation. The carriage is withdrawn, and if the post is intended for the zig-zag fence it is turned to a proper angle to receive the other holes by means of a short lever inserted into one of the holes already bored, and furnished with a spirit level set an angle with the lever, which indicates when the post has been turned into the proper position. The boring and countersinking proceeds as before, and the post is completed. On one side of the machine is a circular saw, a reducer, and a header. The saw is used for cutting rails and posts to the desired lengths, and the reducer consists of two conical wheels with knives revolving with great rapidity. This reduces the ends of crooked or mis-shapen rails or sharpens posts for driving. The rail is then placed in the header, a conical shell with knives on the inside; this forms the circular tenon and shoulder. The rail is held while being headed by a sliding cam which prevents it from turning, and is very quickly released. A great saving in the cost of making fencing is effected by the use of this machine.

Messrs. J. A. Fay and Co., of Cincinnati, Ohio, show some of the best wood-working machines in the Exhibition. Many of these tools are at work in England, but doubtless they are not known to all of your readers. Their patent variety wood worker performs a great number of operations, no less than twenty-six varieties of work being shown on a diagram of the capabilities of this tool issued by the makers, but these may be practically reduced to about fifteen different classes. The iron platens are planed perfectly true and have independent vertical and lateral adjustments. The vertical adjustment is very quickly made by means of hand wheels and bevel gear, placed in the most convenient position for the operator. When facing or planing out of wind, the vertical and lateral adjustments can be made simultaneously, thus constantly retaining the proper distance between periphery of cut and the edge of table. All of the different functions of the machine are secured by the use of two tables, while other machines of this kind have three tables, thereby effecting a saving of time in making adjustments. The tables or platens are made with grooves to receive the gaining frame, and are made continuous by hard wood filling pieces connecting the two tables at each side. For sawing, an extra table can be inserted between the other two, making a solid and continuous saw table. The arbor is of steel, of large diameter, and revolves in bearings supported on the column. One bearing is cast solidly to the column, and the other is movable, being planed in a seat, the height of which to the centre of the arbor is equal to one-half the diameter of the large t head to be used. The movable or outside bearing is readily detachable for the purpose of substituting different heads by loosening a bolt at the bottom. This is a very important and advantageous feature, as it gives greater stability to the arbor, and obviating its liability to spring, renders the machine capable of performing a larger range of work. Another very important advantage will be found in the fence, which requires no separate adjustment. Being attached to and forming a part of the forward table, it always maintains its proper position in relation to the knives. The fence has lateral adjustment, is fitted to receive pressure springs for holding down the stuff, and swings

to different angles for beveling work. Each machine is provided with an 8in. three-knife planing head, rabbeting, jointing and capped heads, and is fitted to receive expansion gaining head and paneling heads, and when desired can be fitted on opposite sides with boring and routing table, which has vertical and lateral adjustment to suit the size of the stuff being worked. Of course Messrs. Fay and Co. exhibit a band saw, without which no stand of wood-working machinery would be complete, and the upper wheel is made of steel with india-rubber tire, which, from its lightness and elasticity, reduces the strain upon the saw when starting and stopping. The four-roll planing and matching machine has two important features, one being that the whole of the front portion of the frame, with the feeding rolls, can be swung to one side, and thus give ready access to the cutter heads. The matcher heads can be quickly lowered below the frame by means of two square keys when it is desired to plane only. The beading attachment is placed upon the pressure bar over the under cylinder, so as to gauge the depth of the bead from and by the surface of the board, and secure automatic adjustment of the beading shaft at all times. A double-deck planer is used for thickening or truing on one side only; their universal wood-worker is a moulding machine, with a "Variety" machine, previously described, attached to it, and is a very compact and useful article for performing a great number of operations. The patent band re-sawing machine is provided with a great number of adjustments, the most important being a strut, not shown on cut, which gives outside bearings to the upper and lower wheels. It consists of a hollow rod, furnished with an india-rubber spring buffer at its upper end, and a screw coupling at the centre by which the pressure on the outside bearings can be regulated. The wheels are 5ft. in diameter, and the distance between their centres is such that there is but a comparatively small portion of the saw blade left unsupported, and consequently less liability to deviate from a straight course. The tendency of the saws to "run" has hitherto been a serious drawback in the use of a band saw for re-sawing. The upper wheel revolves on a 2½in. shaft, running in long self-oiling bearings, has a vertical adjustment of 12in., and can be adjusted so that the saw will run at any desired point on its periphery. The feed rolls are connected by expansion gears, operated by friction. This friction is operated by a shaft connected with a lever in front of the column, by different movements of which the feed is instantly started or stopped, and graduated from fine to coarse. The feed is strong and powerful, and is under complete and immediate control of the operator. The feed rolls are adjusted to and from each other by levers attached to their sliding frames, operated by hand lever rack and pinion. The hand lever is retained in position by ratchet and pawl, and a sufficient pressure can be obtained to take out and warp in the stuff being sawed, and the feed rolls next the column can be fixed as guide rolls in any desired position. The machine is fitted with patent roller guides for the back and sides of the saw, which form a perfect guide for the saw and prevent "buckling." They are always in a true vertical line with each other, and the upper guide has a vertical adjustment to suit different widths of lumber being worked.

The American File Company, of Pawtucket, Rhode Island, and the Nicholson File Company, of Providence, Rhode Island, display beautiful collections of every known variety of file.

Messrs. Hoopes and Townsend, of Philadelphia, exhibit car forgings, bolts, nuts, rivets, and chain-links, of the highest excellence of workmanship, and well arranged, including beautiful nuts, said to be punched cold; also specimens bent and broken to show the quality of the materials. In fact, one of the most important and interesting features of the Exhibition is the large display of manufactured articles and tools, and also samples of castings and forgings, seamless and welded tubes, &c. The castings comprise the largest water main I have ever seen, namely, one for the Croton Aqueduct at New York, 72in. diameter and 12ft. long, exhibited by Messrs. R. D. Wood and Co., of Philadelphia. These articles are nearly all very tastefully arranged, and are interesting to examine and prove the high degree of excellence to which American manufacturers have attained in the production of these articles, which were formerly all procured from England; but a written description could only consist of a bald enumeration of the various goods exhibited, and, therefore, I refrain from sending it; but I think a great many of the English manufacturers who may visit the Exhibition will be interested and surprised at this display.

The Pottstown-Iron Company, whose works are at Montgomery County, show specimens of ore raised from their own mines in Chester County, and fine iron plates 18ft. by 6in. by ½in.