W. LEVIN.

MORTISING AND TENONING MACHINES.

No. 194,304. Patented Aug. 21, 1877.

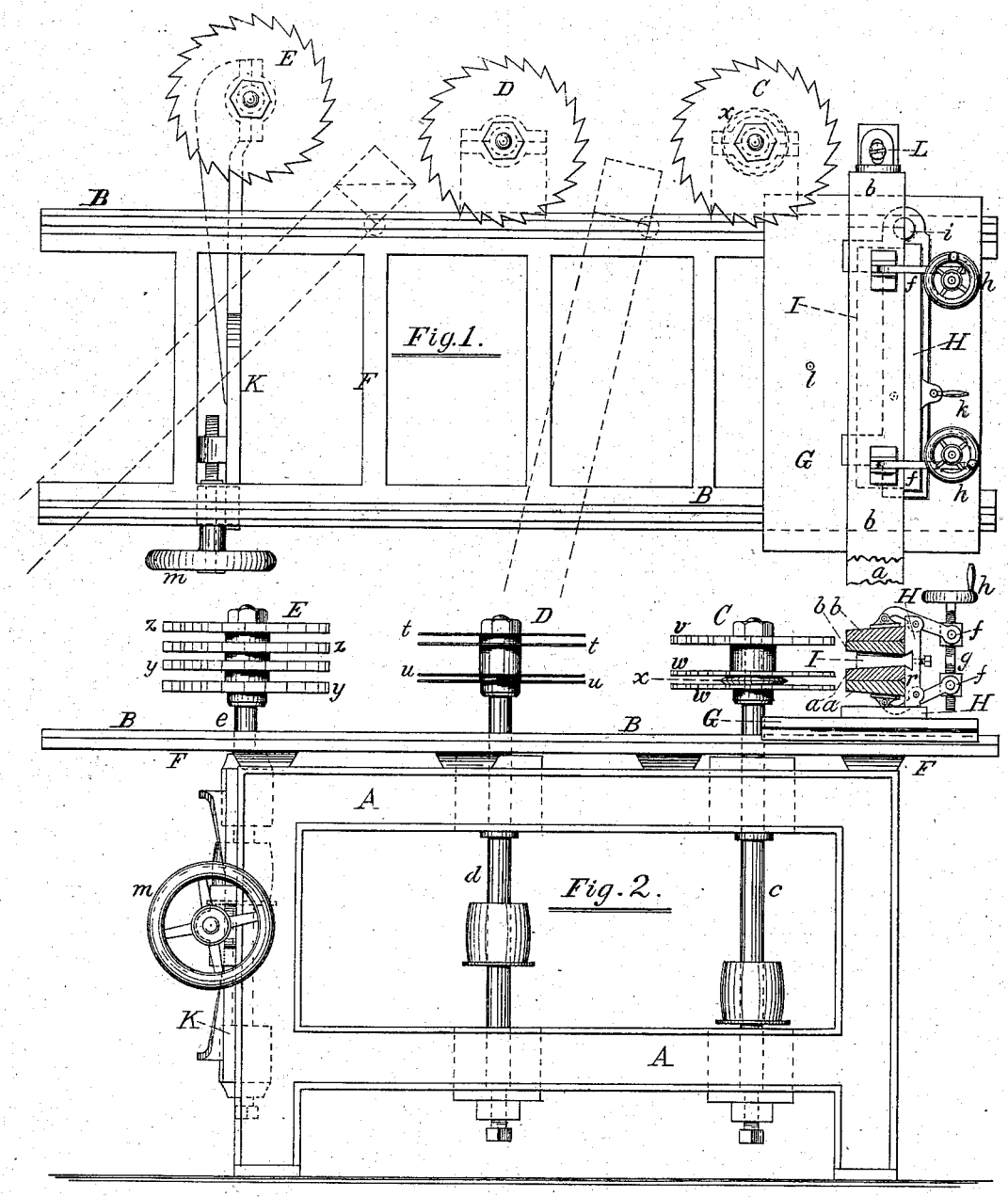

Fig. 1.

Fig. 2.

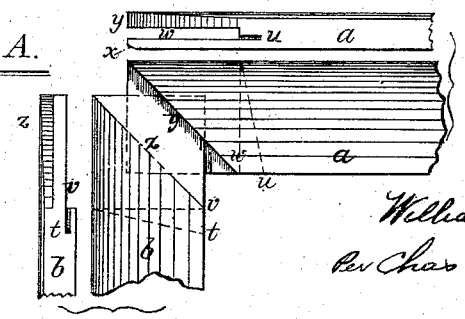

Fig. A.

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WILLIAM LEVIN, OF NEW YORK, N. Y.

IMPROVEMENT IN MORTISING AND TENONING MACHINES.

Specification forming part of Letters Patent No. **194,304**, dated August 21, 1877; application filed June 27, 1877.

To all whom it may concern:

Be it known that I, WILLIAM LEVIN, of New York city, State of New York, have invented certain new and useful Improvements in Mortising and Tenoning Machines, of which the following is a specification:

The special object of this invention is to provide an organized machine to rapidly and perfectly form the joints at the corners of "stretcher"-frames—that is, those frames used for the canvasses of oil-paintings; and in order that the invention be properly understood, the nature of the work to be accomplished, which is somewhat intricate, will be first explained.

In the annexed drawings, Figure A represents the corner portion of a stretcher, showing the form of joint employed, and which, it will be seen, is a compound of the mortise, tenon, and miter. The tenon *b* is like any ordinary tenon, except that the front side is mitered or cut at an angle of forty-five degrees, instead of square across, as it is on the rear side, and the front of the mortised piece *a* is likewise cut diagonally to match therewith, so that the corner of the frame thus presents the appearance of a mitered joint in front and of a mortised joint behind. It thus requires two cuts—a square and a diagonal one—to form each mortise and tenon; a square cut, *v*, across the back of the tenon-piece *b*, to form the back of the tenon; a square cut, *w*, through the center of the piece *a*, to form the mortise; a diagonal cut, *z*, to form the mitered front of the tenon, and a like diagonal cut, *y*, to miter off the front of the mortised piece *a* to correspond therewith. Besides these main cuts there are small oblique ones *t u*, to form sockets for reception of the wedges used to expand the frame, thus making three cuts on each end of each of the four pieces of the frame.

Now, heretofore, this work has been done by hand—that is, each cut is made separately by presenting each single piece of the frame and each end of that piece successively and in different positions to the action of a circular saw, a process manifestly quite slow and laborious.

Now, my invention has for its object to effect these several cuts at once on the four pieces of the frame, and in addition to the novel combination of mechanical devices employed, a very distinguishing and important feature of my invention consists in the mode, as hereinafter described, in which the several distinct pieces of the frame are arranged or grouped with relation to each other and to a group of cutters corresponding to the several cuts to be made and disposed definitely to the group of pieces by which all the cuts are made by one traverse of the machine, and the right and left handed cuts on the opposite ends of the frame-pieces are made without discrimination by the same mechanism and manipulation.

The accompanying drawings present in Figure 1 a plan view of the machine, and in Fig. 2 a side elevation thereof.

The frame of the machine is indicated by A A, in the top of which is fixed the bed F, provided with parallel ways B B, running lengthwise of the machine. C D E are a series of circular saws arranged outside the ways and disposed in line therewith. These saws, which are adopted as a suitable form of cutter, are mounted on vertical arbors *c d e*, which are journaled in bearings attached to the frame of the machine and provided with pulleys, by which power is applied to rotate the saws. G is the work-table, which rests on the ways B B, and is free to slide back and forth thereon past the series of saws. H is the work-holder, on which the work is clamped, and which is pivoted to the table at *i* in line with the periphery of the saws C D, and is thus capable of being set at various angles to the series of saws to effect both the straight and oblique cuts, being provided with a catch, *k*, which engages with a set of holes, *l*, in the table corresponding to the correct angles at which the work is to be set.

As shown in Figs. 2 and 3, the work-holder is provided at about midway of its height with a projecting ledge, I, which is arranged in fixed definite positions with the saws, and forms the support for the work, to each side of which the work *a a b b* is clamped. The clamping device consists of levers *f f*, arranged transversely above and below the ledge, their shorter arms being provided with pivoted shoes, which take a flush and firm

bearing on the surface of the stock, and their longer arms being connected by a right and left threaded screw-stem, *g*, working in nuts secured to the levers and operated by a hand-wheel, *h*.

As represented more clearly in Fig. 2, the four pieces *a a b b*, to compose one frame, (being cut to the right length from stock previously prepared of the correct transverse shape,) are clamped to the work-holder at once, two above and two below the ledge, like pieces being placed together, and preferably the longer side pieces *a a*, in which the mortises are cut, being placed below the ledge, and the shorter end pieces *b b*, on which the tenons are cut, being placed above the ledge, the ends of the pieces projecting sufficiently within the range of the saws to effect a proper cut, which is determined by an adjustable gage, L, on the fixed frame of the machine, but opposite the ledge when the work-table is at its starting-point, as shown in Fig. 1. Now, the several saws correspond to the several cuts to be made on all the four pieces, as indicated by the corresponding letters in Figs. 2 and A, each saw forming a distinct cut, and being of the right thickness to form the complete cut at one sweep, and, as will be understood, they are, of course, so arranged on their arbors relatively to the work on the ledge as to effect the required cuts uniformly in the proper places, the relative arrangement of the pieces of the frame, and of the cutters to correspond therewith, however, being peculiar, as will be fully described farther on.

The first series of saws, C, make all the square or cross cuts on the four pieces; the second set, D, which are thin, make the four cuts for wedge-sockets; and the third set, E, make the miter-cuts. This particular order of saws is, however, mostly arbitrary, but it is here described, as it is the one thought fit to adopt. The arbors of the first and second series of saws C and D are set in fixed bearings, and are in line with each other, but the third set of saws, E, which made the miter-cuts, have an adjustment at right angles to the line of motion of the work-table to suit work of various widths—that is for wide or narrow frame strips—and, in order to effect the miter-cut properly, these saws project beyond the line of the others a distance equal to half the length of the miter-line, as shown in Fig. 1. The arbor *e*, on which these saws are mounted, is therefore journaled in a transversely-sliding frame, K, which extends across one end of the machine, and moves in slides (not seen) attached to the fixed frame A, and is regulated by the adjusting-screw and hand-wheel *m*. It will be noticed, on reference to Fig. 2, that besides the series of saws *w w v* in the group C, which make the square cuts for the joints proper, there is an additional saw, *x*, of much smaller diameter, having a V-shaped periphery, which extends within range of the stock only to the depth of the V, and is just on a level with the meeting-surfaces of the mortise-pieces *a a*, so as to divide the V-cut equally between the pieces, and thus have the effect of chamfering off the back edges on the ends of these two pieces. This chamfering is to correspond with the slight bevel *r*, Fig. 2, on the back edge of the stock, such bevel being provided so that the finished frame will have a uniform bevel extending around its back edge, this being usual on stretchers. This chamfering is required only on the mortise-pieces, and hence but one of these saws is needed, which is arranged between the two mortise-saws *w w*.

In making the square cuts, the work-holder is placed at a right angle, and the table moved by the operator past the first set of saws, C, thus making all the square cuts *w w v* at once, including the chamfering cut *x*. It is next set at an angle of about twelve degrees, and moved past the second set of saws D, which make the cuts *t u*, for wedge-sockets in the four pieces, and it is finally set at an angle of forty-five degrees, and fed past the last saws, E, which make the miter-cuts *z y* on the four pieces. These different positions are shown by full and dotted lines in Fig. 1. Thus all the cuts on one end of the four pieces are made at one traverse of the machine. To cut the other ends, and complete the frame, the table is slid back to the starting-point, the stock unclamped and simply reversed end for end, and the previous action repeated. Now, it will, of course, be understood that the joints on the opposite ends of the frame-pieces are right and left handed with relation to each other; but, notwithstanding this, they are cut, as has been described, by identically the same mechanism, and the same manipulation. This is an important feature, and results from the peculiar manner in which the several pieces of the frame are arranged relatively to each other upon the work-table in connection with the peculiar arrangement of the group of cutters to correspond therewith, and to which special attention is desired.

It will be noted that the stock for the frames, as indicated by *a a b b* in Fig. 2, is uniformly beveled on one side, and that the other side is flat, excepting the slight bevel *r* on the mere edge. The flat side corresponds to the back of the frame and the beveled side to the front, being so made in order to have the front of the frame a little flaring. Now, it will be seen that the frame-strips are placed together back to back, their flat back sides in contact with each other and their beveled front sides in contact with the supporting-ledge, which is also beveled to counteract the bevel of the stock so as to always present the flat meeting-surfaces square with the saws and the rest of the machine. Now, it is from these meeting back surfaces that the positions of the saws are gaged and the work or action of the machine regulated as from a fixed point, any variance in thickness of stock—such as for a light or heavy frame—being therefore thrown to the front or beveled sides, and is

provided for by increasing or decreasing the thickness of the ledge so as to always maintain the meeting surfaces of the flat backs in the same definite position relatively to the saws, &c. This adjustment is made by employing a thicker or thinner ledge, the same being made removable for that object, or by placing on or removing from the ledge a thickness of packing.

Now, the result of this arrangement of the several pieces of the frame, and the definite disposition of the cutters to correspond thereto, is, first, that thus placing the two distinct pieces of the frame back to back causes like parts of the several joints to come in similar positions, relatively, to the saws, &c., for both the right and left ends of the frame-pieces, so that right and left handed work is done by the same mechanism and the same manipulation, with the fewest movements, changes of position, and with the least mechanism; and, second, that a single adjustment of the ledge, as described, will answer for all the four pieces.

This feature, therefore, obviates the necessity of a right and left arrangement of cutters and a right and left movement and adjustment of the work to and from them, besides rendering the adjustment for variance of thickness on all the four pieces a simple matter, which otherwise would be quite difficult.

I thus accomplish at once, or nearly so, all this intricate series of cuts to form the complete frame by a mechanism not complicated and by a manipulation quite simple, thus saving, it is estimated, nine-tenths of the labor and time that have been required to do the same work heretofore.

The features which I claim as new, and desire to secure by Letters Patent, are as follows—

1. In a machine for jointing stretcher-frames, a series of cutters adapted to act simultaneously on two or more of the several distinct pieces of the frame, and corresponding to the several cuts to be made in the said pieces, the said cutters being arranged to correspond with the herein-described arrangement of the pieces of the frame in a group back to back, and having their position and action gaged and regulated from the meeting back surfaces of the said group of pieces, by which means right and left handed work is performed without discrimination, and rapidity of execution and compactness and simplicity of mechanism are secured, substantially as herein set forth.

2. The mode, herein described, of rapidly forming the several corner-joints of stretcher-frames, viz., by arranging the several pieces of the frame in a group with their flat back surfaces in contact with each other, and submitting such group to the action of a series of cutters adapted to act simultaneously on the several pieces of the group, the said cutters corresponding to the several cuts to be made in the said group of pieces, and arranged to correspond with the aforesaid grouped arrangement of the frame-pieces, substantially as and for the objects herein set forth.

3. In combination with the series of cutters C D E adapted to make a distinct series of cuts, and with the sliding work-table G, movable past said cutters, the swinging work-holder H, pivoted to said table and capable of being set at various angles at positions between said cutters, substantially as and for the purpose set forth.

4. In combination with the cutters C D E and sliding work-table G, the work-holder H, provided with a central supporting and separating ledge, I, arranged in fixed definite position with the cutters, and adapted to receive the several distinct pieces of the frame on each side thereof with their variable and beveled sides in contact therewith, substantially as shown and described.

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