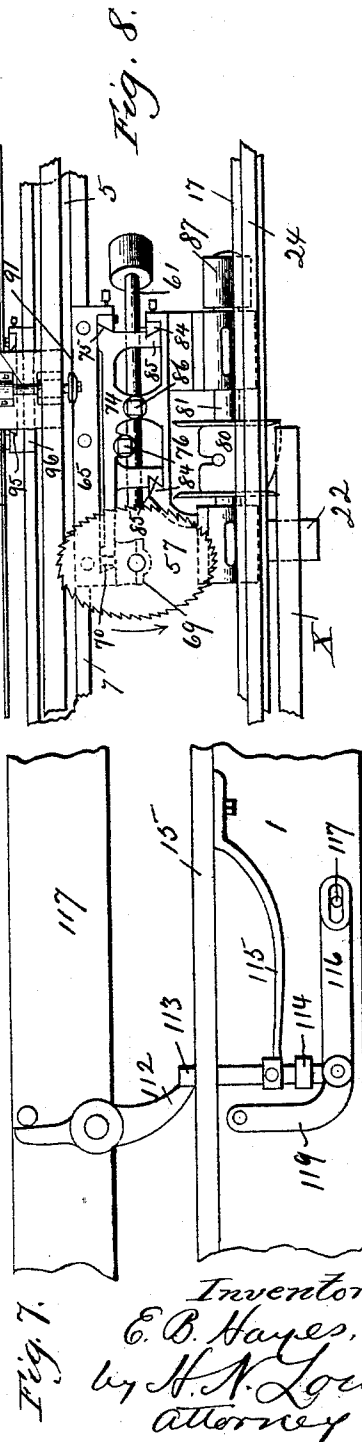
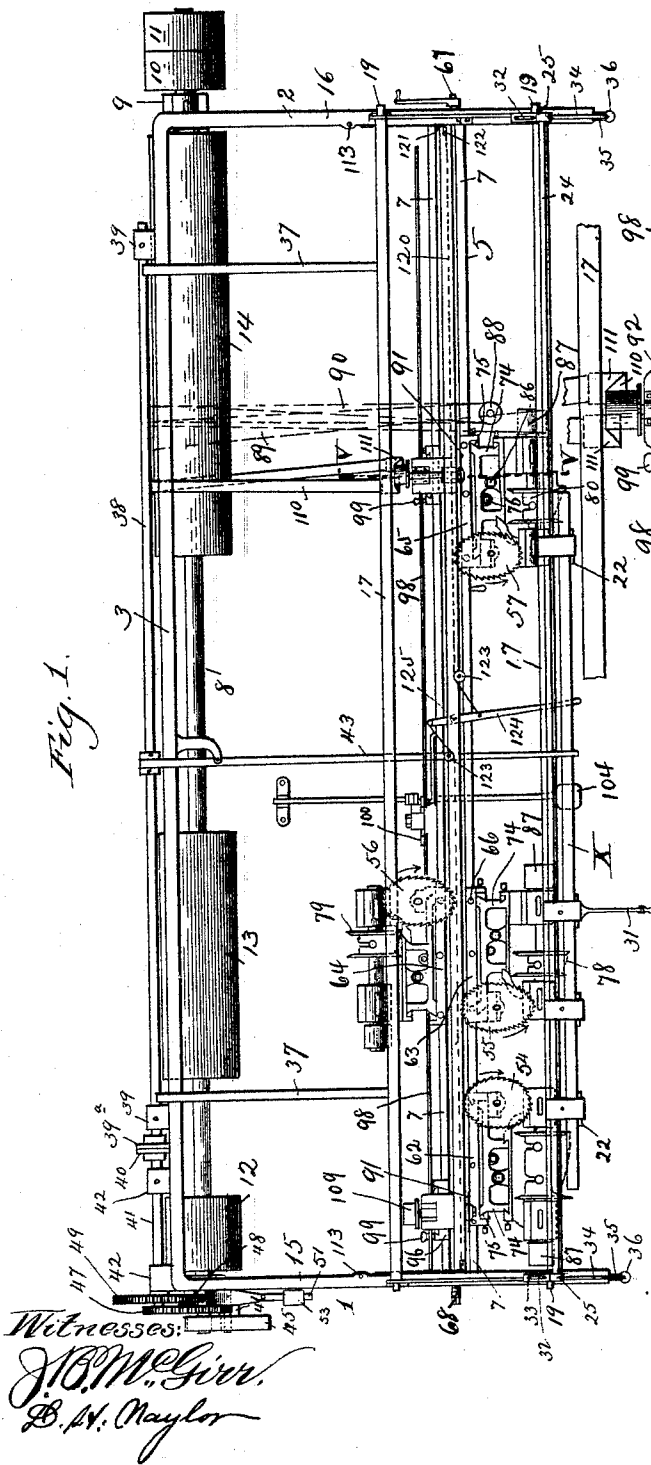


E. B. HAYES.
DOOR MACHINE.

No. 497,978.

Patented May 23, 1893.



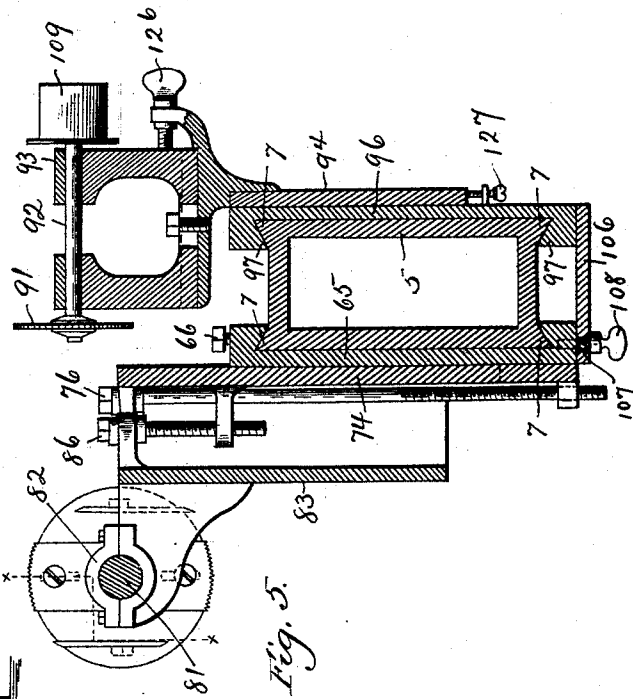
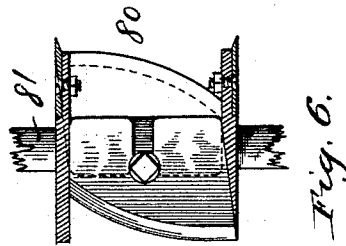
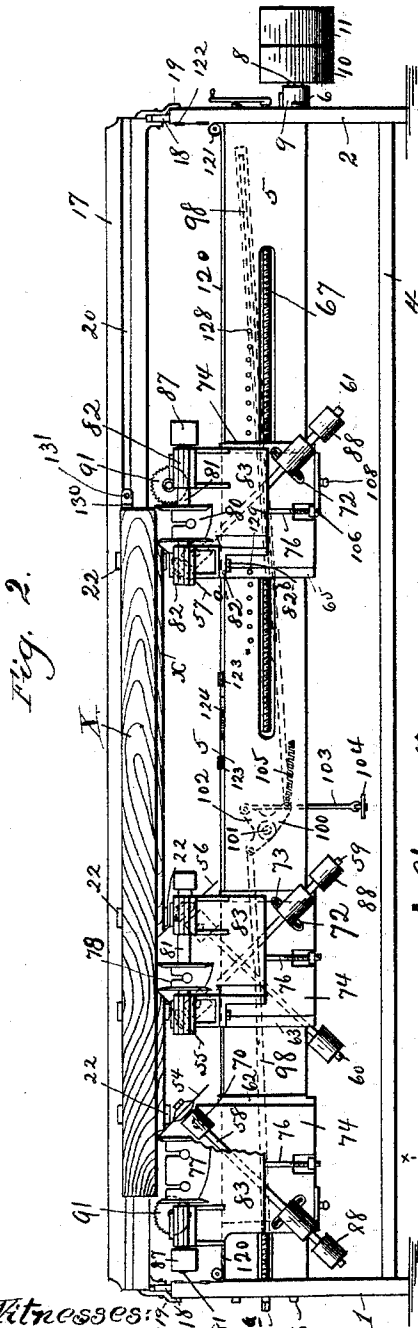
(No Model.)

3 Sheets—Sheet 2.

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Witnesses:
J. B. McGinnis
B. H. Naylor

Inventor:
E. B. Hayes,
by *H. N. Low*
Attorney

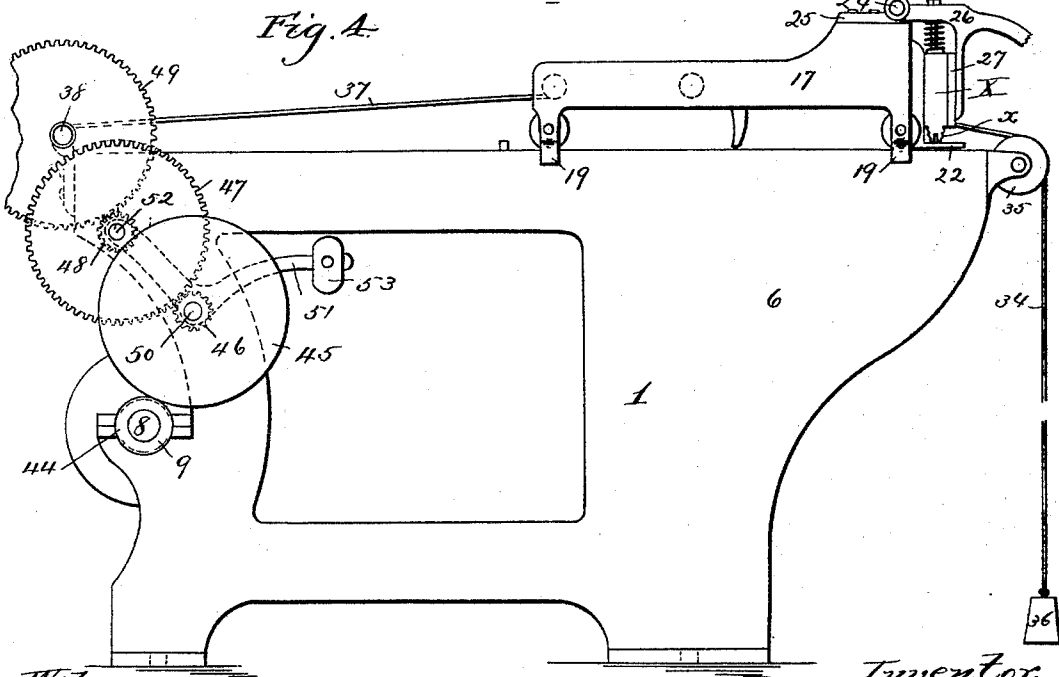
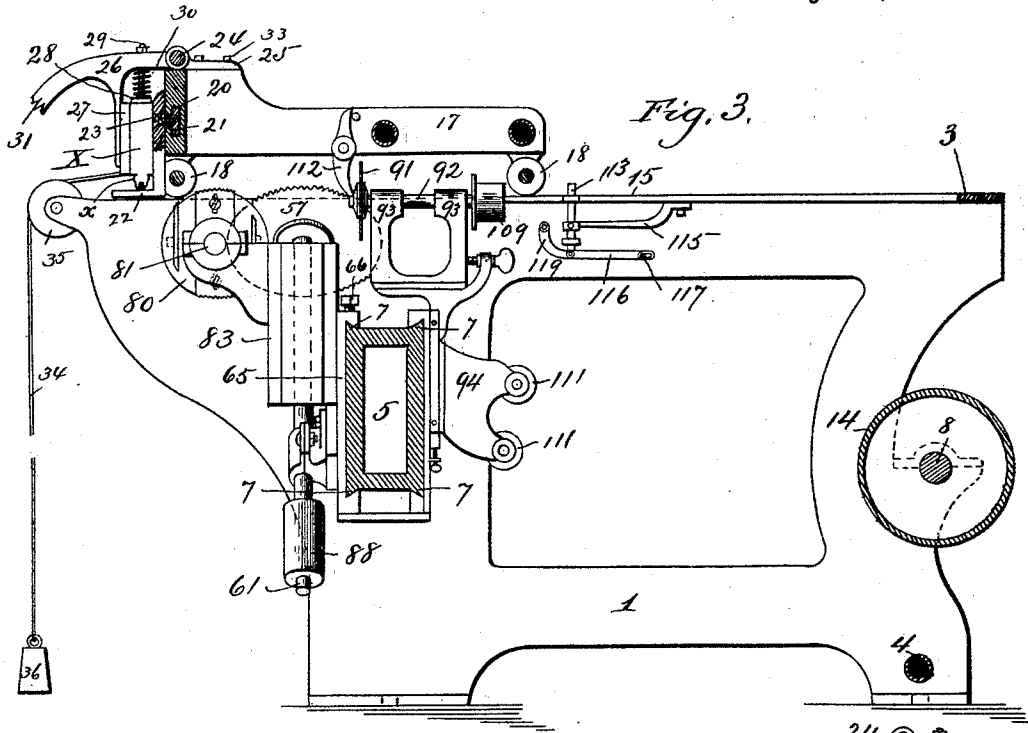
(No Model.)

3 Sheets—Sheet 3.

E. B. HAYES.
DOOR MACHINE.

No. 497,978.

Patented May 23, 1893.



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UNITED STATES PATENT OFFICE.

ELI B. HAYES, OF OSHKOSH, WISCONSIN.

DOOR-MACHINE.

SPECIFICATION forming part of Letters Patent No. 497,978, dated May 23, 1893.

Application filed April 23, 1892. Serial No. 430,355. (No model.)

To all whom it may concern:

Be it known that I, ELI B. HAYES, a citizen of the United States, residing at Oshkosh, in the county of Winnebago and State of Wisconsin, have invented certain new and useful Improvements in Door-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to make and use the same.

My present invention is adapted for forming recesses in the edges of boards, strips, or pieces of wood, and is especially designed for mitering and removing portions of the moldings on the edges of door stiles. I have further provided means for mortising the ends of the stiles to receive a short or stub tenon on the relish of the rail.

With such object in view my invention consists in the parts and combinations thereof hereinafter set forth and claimed.

In order to make the improvement more clearly understood I have shown in the accompanying drawings means for carrying the same into practical effect, without however intending to limit the invention in its practical applications to the particular construction which, for the sake of illustration, I have delineated.

In said drawings—Figure 1 is a plan view of a machine for the manufacture of door frames, embodying my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a transverse section and Fig. 4 an end elevation of the machine. Fig. 5 is a sectional view on a larger scale on line V—V, Fig. 1. Fig. 6 is a view of one of the cutter heads. Fig. 7 is a detail view enlarged illustrating the means for arresting the work-carriage. Fig. 8 is a plan view on a larger scale of one of the miter saws and its co-operating devices.

Referring to the drawings, 1 and 2 indicate end frames connected by longitudinal rails 3 and 4 and supporting a guide beam 5, which latter is bolted to said end frames at 6 and has at its edges ribs 7.

8 indicates a longitudinal power shaft mounted in bearings 9 in or on the frame and provided with tight and loose pulleys 10 and 11, and with pulleys or drums for driving the sawing and cutting mechanism. Suitable pulleys for this purpose are shown at 12, 13,

and 14. In order to permit both the longitudinal adjustment and longitudinal movement of certain parts of said mechanism I make said pulleys of elongated or drum shape as shown.

The main frame is provided with transverse tracks or ways 15, 16 on which is supported a carriage 17. The latter is preferably carried by rollers 18 which run on said tracks, and has lugs 19 which engage the sides of the main frame at suitable points to keep the carriage in proper alignment with the sawing and cutting devices.

The carriage has a longitudinal T-groove 20 in which fit slides or blocks 21 to which are attached brackets 22 by clamp screws 23. These brackets are adjustable longitudinally on the carriage, by loosening screws 23 and moving the slides to the desired points, to accommodate the length and character of the work and to correspond with the positions of the cutters and saws.

X indicates the stile or other piece of work, resting on the brackets 22 with its moldings α downward.

A longitudinal rock-shaft 24 is mounted on the carriage in bearings 25 and carries clamp arms 26 to which are attached clamp pieces 27 adapted to bear against the front of the stile. Said pieces are of hard wood by which marring of the work is prevented and the clamp piece permitted to extend to the line of cut without danger of injuring the tools.

28 indicates pressers carried by the arms 26 by means of bolts 29 which pass up through or are attached to the pressers, pass up through said arms, and are held from falling out by nuts on their upper ends. Springs 30 between the arms and pressers hold the latter down tightly upon the top edge of the stile.

31 is a handle for operating the shaft 24, formed preferably of an extension of one of the arms 26. The bearings 25 have slots 32 engaged by bolts 33, and the shaft 24 is thus adjustable forward or backward on the carriage according to the thickness of the stile to be clamped.

The carriage is normally held in its forward position by cords 34 attached to the carriage, passing over pulleys 35 and connected with weights 36. Straps 37 limit the forward movement of said carriage, and serve as means for

moving it backward to and over the cutting apparatus. For such purpose the straps are attached to a shaft or drum 38 mounted in bearings 39 at the rear of the main frame. Said shaft carries a friction disk 39^a and is longitudinally movable to cause the latter to bear against a corresponding disk 40 mounted on a shaft 41 journaled in line with the shaft 38 in bearings 42. The shaft 38 is moved to cause said disks to engage by a shifting lever 43 extending to the front of the machine and adapted to be operated by the hand or knee of the workman. The shaft 41 is actuated at a relatively slow speed from the power shaft 8 through a train of speed-decreasing gearing comprising preferably friction wheels 44 and 45, pinion 46, gear 47, pinion 48, and gear 49, best seen in Figs. 1 and 4. The wheel 45 and pinion 46 are formed together, or are rigidly secured to the same shaft 50, the latter being journaled in a lever 51 which is fulcrumed on the shaft 52 which carries the combined gear and pinion 47, 48. A weight 53 on the end of said lever maintains an operative engagement of the friction wheel 45 with the wheel 44 on the power-shaft. The shaft 41 is thus normally kept in rotation ready to cause the carriage to be moved back whenever the lever 43 is operated.

54, 55, 56 and 57 indicate the mitering saws. I may here remark that the number, and positions, of these saws may vary to suit the requirements of the work. I have shown and will now describe them as arranged for the mitering of a door stile at four points, two miters for the lock rail and one each for the top and bottom rails. The saws are carried by shafts 58, 59, 60 and 61 mounted in suitable bearings connected with sliding plates 62, 63, 64 and 65, which latter inclose the ribs 7 on the beam 5 and are longitudinally adjustable thereon to bring the saws into place, according to the length of the door and proportions of the upper and lower panels, to cut the miters at the desired points. The plates are clamped in place by set screws, 66. The end plates 62 and 65, and one of the middle plates, say that shown at 64, are more often adjusted, in changing from one size of door to another, and these plates I prefer to operate by screws 66^a, 67, and 68 which are mounted in the main frame and engage threaded ears on said plates. One of the bearings, 69, of each miter saw shaft is pivoted on a bolt 70, and the other bearing 71 has slotted ears 72 engaged by bolts 73, whereby a slight angular adjustment of the shaft may be effected to obtain a perfect miter. The bolts 70 and 73 engage a plate 74 which slides vertically (for purposes of adjustment, to regulate the height of the saw) in guides 75 formed on the plates 62, 63, 64, and 65, and may be moved vertically or toward and from the work-carriage by screws 76.

The cutter heads which remove the portions of the molding contiguous to the miter-cuts are shown at 77, 78, 79, and 80 and con-

sist of any well known device suitable for the work, such as the cutter known as the dado head or dado saw. These cutters are carried by shafts 81 mounted in bearings 82 on plates 83. The latter have guides 84 which engage corresponding guides 85 (Fig. 8) on the saw-supporting plates 74 and are vertically adjustable on the latter by screws 86 to bring the top edges of the cutters into line with the edges of the saws. The cutter heads are longitudinally adjustable on their shafts so that their cuts may coincide with the inner ends of the miter saw cuts. One of the bearings 82 is made readily removable to give access to the cutter head for the purpose of removing or changing it, being mounted on a flange 82^a (Fig. 2) formed on the plate 83, where said bearing is held in place by a bolt 82^b. The cutter shafts have pulleys 87, and the miter-saw shafts pulleys 88, which are respectively driven from shaft 8 by belts 89 and 90 crossed as shown in Fig. 1.

By employing two separate cutter-heads 78 and 79, one for each of the saws which make the lock rail miters, I am enabled to conveniently adjust the machine (by screws 68) for different widths of lock rail, the cutters being of such width as to lap by one another.

By reference to Figs. 1 and 8 and the arrows marked thereon, it will be seen that the edges of the mitering saws, at the point where they operate on the work, run in the same direction in which the carriage moves as it carries the work up to the saws. I am thus enabled to produce a much smoother miter cut than could be obtained by any other relative movement of the carriage and saws, avoiding roughing up the grain at the end of the molding, or taking a chip out of its obtuse corner. I have further provided for forming in the edge at the ends of the stile longitudinal recesses or grooves for the stub tenons on the relishes of the stile.

91 91 indicate saws or cutters mounted on transverse shafts 92. Each of the latter fits in bearings 93 mounted on a vertically adjustable plate or slide 94 working in guides 95 formed on plates 96. The latter have two horizontal guides 97 (Fig. 5) which fit over the ribs 7 of beam 5, thereby rendering plates 96 and saws 91 longitudinally movable in the main frame. The saws are thus moved toward each other, and caused to enter and form longitudinal mortises in the lower corners of the stile (the work-carriage and stile being at such time arrested and held with the stile between and in line with the saws, as hereinafter described) by rods 98 having slots through which pass set screws 99 engaging the slides 96. The inner ends of said rods are pivoted to the upper and lower arms of a crank-lever 100 (Fig. 2). The latter is mounted on a pivot 101 and has a third arm 102 with which is connected, by a rod 103, a treadle 104. A spring 105 tends to maintain the normal position of the crank-lever with the saws 91 in their outermost situations. Slides

96 may be connected with the neighboring supports of the outermost miter-saws so as to be adjusted therewith by horizontal plates 106 (Fig. 5) each of which is bolted to a slide 96 and has a slot 107 through which passes a clamp screw 108 into the miter-saw support or carriage. When the latter is to be adjusted horizontally by its screw, according to the length of the rail, the slide 95 may be caused to accompany it by loosening the clamp screw 99 and tightening the clamp screw 108. When the adjustment is complete said screws are respectively tightened and loosened, thus releasing the slide 96 and connecting it again with its actuating rod 98.

The saw shafts are provided with driving pulleys 109, actuated by belts 110 (Fig. 1) which pass under guide pulleys 111 and thence around the drum 14.

The work carriage is provided at each end with a pivoted dog 112 (Fig. 7) adapted on the forward or inward movement of the carriage to engage a corresponding pin 113 on the main frame. The pin is so situated that when it thus arrests the carriage and work the stile will be in line with the saws 91. The pins 113 are each mounted so as to be movable vertically in a bearing or perforation in the end frame and in a bearing 114. The pin is normally held up or projected by a spring 115 and can be drawn down by a lever 116 which is loosely pivoted at 117 engages the pin by a pivot 118 and has an angle arm 119 to which is attached a cord 120. The latter runs over and under pulleys 121, 122 to a pulley 123, and thence to a lever 124. The two cords, one from each pin, are attached on opposite sides of the pivot 125 of said lever, so that a movement of the latter can retract both pins and permit the further inward movement of the carriage. On the return of the carriage the dogs 112 will trip easily over the pins 113. Each plate or slide 94 is made in two parts (Fig. 5), the upper of which is adjustable horizontally forward or backward on the lower by a screw 126. The vertical adjustment of the slide 94 as a whole is effected by a screw 127.

Sizes of doors ordinarily vary by two inches, and to obtain rapidity and accuracy of longitudinal adjustment of the saw 57 and cutter 80, and of the corresponding mortising saw 91, without measurement, I provide the beam 5 with a series of holes 128, and the sliding plate 65 with a pin 129.

The general mode of operation of the machine is as follows:—A stile being put in place on the carriage and clamped by handle 31, the lever 43 is caused to bring the friction disks 39^a and 40 into contact, thus moving the work toward and over the miter-saws 54, 55 and 57 and over the cutters 77, 78 and 80 which remove portions of the stile molding, as best seen in Fig. 2. The carriage moves on until arrested by pins 113, whereupon treadle 104 is depressed and saws 91 thereby

caused to cut the mortises in the lower corners of the stile. While the carriage is thus momentarily at rest the friction gearing will slip. By lever 124 the pins 113 are now drawn down and said gearing will carry the carriage on and past the saw 56 and cutter 79, completing the miter for the lock rail. Lever 43 is now released and the carriage is returned by the weights 36.

The end stop for the stile is shown at 130, fitting in the groove 20, in which it is clamped by a screw 131. By adjusting this stop to the left, and using only the saws 54 and 55 and cutters 77 and 78, the muntins may be properly mitered.

While I have described this machine as adapted for door-stile mitering, it will be understood that it can be used for sash, or for other purposes for which it is suitable.

What I claim is—

1. In a door machine the combination with a mitering saw adapted to make a miter-cut across the stile molding, of a rotary cutter mounted in proximity to said saw and having its edge parallel with the stile and its corner in line with the extreme edge of the saw and adapted to remove a portion of the molding contiguous to the miter-cut, and a movable work carriage having means for holding the stile perpendicular to its plane of movement, such plane being parallel with the plane of the base of the molding, substantially as set forth.

2. In a machine for mitering molded stiles, the combination with the mitering saw, and a cutter-head mounted in proximity thereto, of a work supporting carriage having means for holding the stile in a position perpendicular to the movement of the carriage, and a power mechanism connected with said saw and carriage and geared to move the carriage toward the saw in the same direction in which revolves the point of deepest penetration of the operative portion of the edge of the saw, substantially as set forth.

3. In a door machine the combination of a series of mitering saws and supports for the same independently adjustable longitudinally of the machine, a longitudinal work carriage extending in the direction of said series of saws, means for holding a stile on said carriage in a position perpendicular to the direction of movement of the carriage with the base of its molding in a plane with the extreme cutting edges of said saws, and mechanism for actuating the carriage in said plane, substantially as set forth.

4. In a door machine the combination of a support adjustable longitudinally of the machine, a mitering saw carried thereby, and a cutter for removing a portion of the molding mounted with the saw on said adjustable support in proximity to the saw, substantially as set forth.

5. The combination with a frame piece or beam, a slide longitudinally adjustable there-

on, a plate vertically adjustable on said slide, a mitering saw mounted on said plate, a second plate vertically adjustable on the first plate and a cutter carried by the second plate, substantially as set forth.

6. The combination with a frame piece or beam of a pair of saws or cutters 91 for grooving the edges of the stile at the ends, slides 95 longitudinally movable on said beam, supports for said saws vertically adjustable on the slides, and mechanism for actuating the slides, substantially as set forth.

7. The combination of a series of mitering saws, cutters mounted in proximity thereto, a work carriage adapted to move across said saws and cutters, grooving saws or cutters for operating on the edge of the stile at the ends, and stops which engage the carriage and arrests its movement with the stile in line with the grooving saws, substantially as set forth.

8. The combination of a series of mitering saws, cutters mounted in proximity thereto, a work carriage adapted to move across said saws and cutters, grooving saws or cutters for operating on the edge of the stile at the ends, stops which engage the carriage and arrest its movement with the stile in line with the mortising saws, and a friction gearing connected with the carriage for actuating and permitting the arrest of the same, substantially as set forth.

9. The combination with the work carriage, of the brackets 22 longitudinally adjustable thereon, the shaft 24 mounted on the carriage, clamp arms 26 longitudinally adjustable on said shaft and having clamping pieces to engage the front of the stile, and pressers for

engaging the top of the same, substantially as set forth.

10. The combination with a longitudinal beam or support having a plate longitudinally adjustable thereon, a mitering saw and a cutter supported on said plate, a slide 95 movable on said beam and a grooving saw supported thereon, and means for connecting said plate and slide to adjust them together, substantially as set forth.

11. The combination of a series of mitering saws, a corresponding series of cutters, a work carriage movable transversely of said saws and cutters, a longitudinal shaft or drum 38, straps 37 connecting said carriage and drum, and means for rotating the drum, substantially as set forth.

12. The combination with a longitudinal beam or frame piece, of slides 95 movable thereon and carrying saws or cutters 91, rods 98 adjustably connected with said slides, and means for reciprocating said rods, substantially as set forth.

13. The combination of a series of mitering saws, and corresponding cutters cooperating therewith to form mitered recesses, of a carriage for holding the work and two series of pressers operating on the side and edge of the stile to bring all parts of the molding into line for the mitering operation, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

ELI B. HAYES.

Witnesses:

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H. N. LOW.