March 6, 1951 S. P. HOVEY 2,544,499

COMBINED FRAME SQUARING AND NAILING MACHINE

Filed June 10, 1950 5 Sheets-Sheet 1

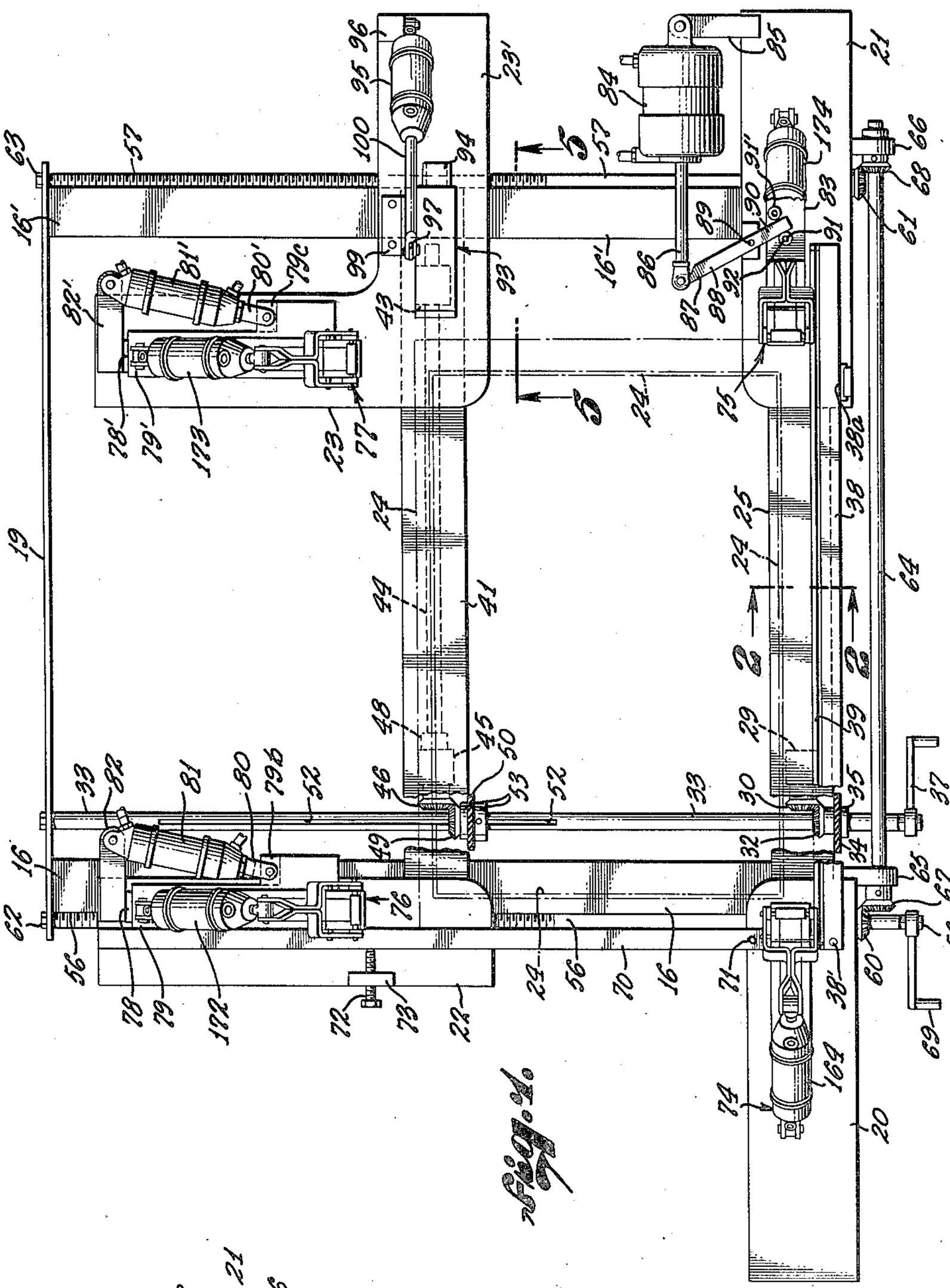

Fig. 1.

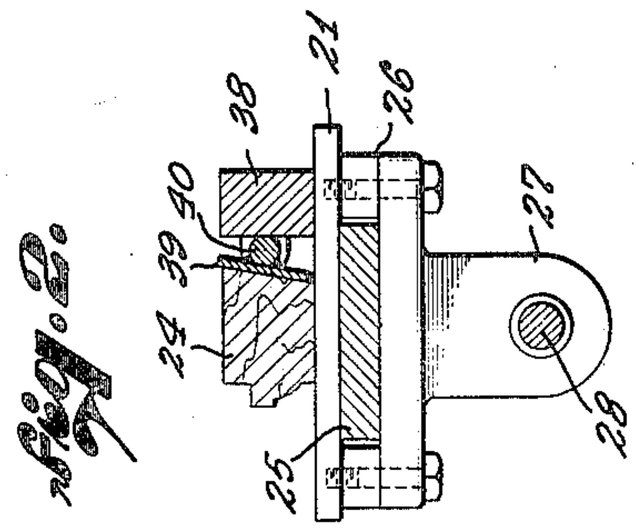

Fig. 2.

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COMBINED FRAME SQUARING AND NAILING MACHINE

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Fig. 3.

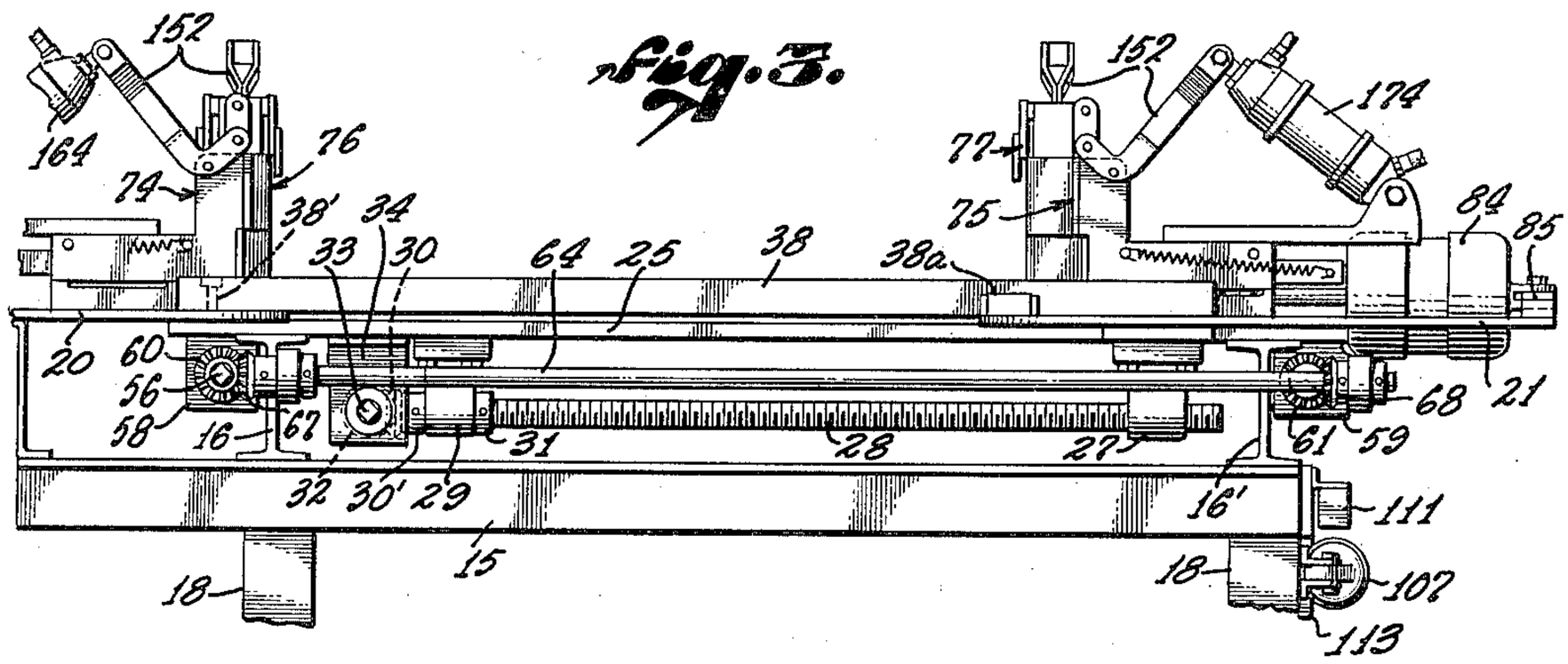


Fig. 4.

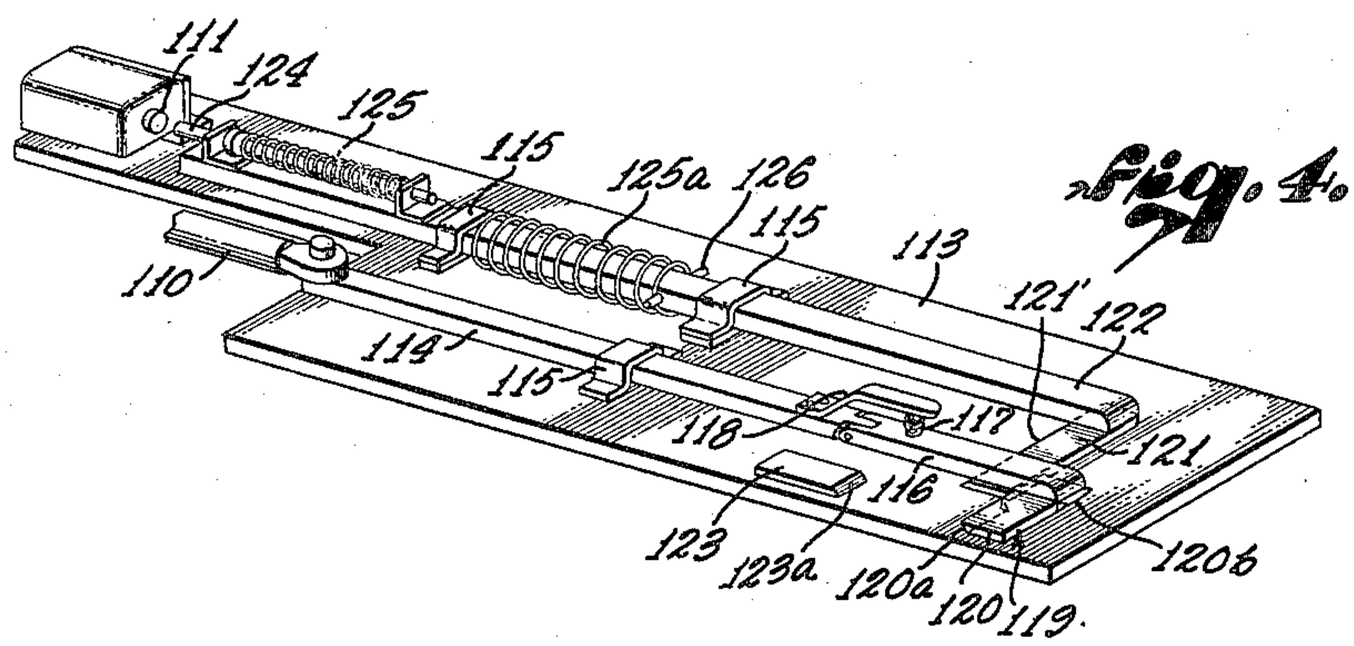
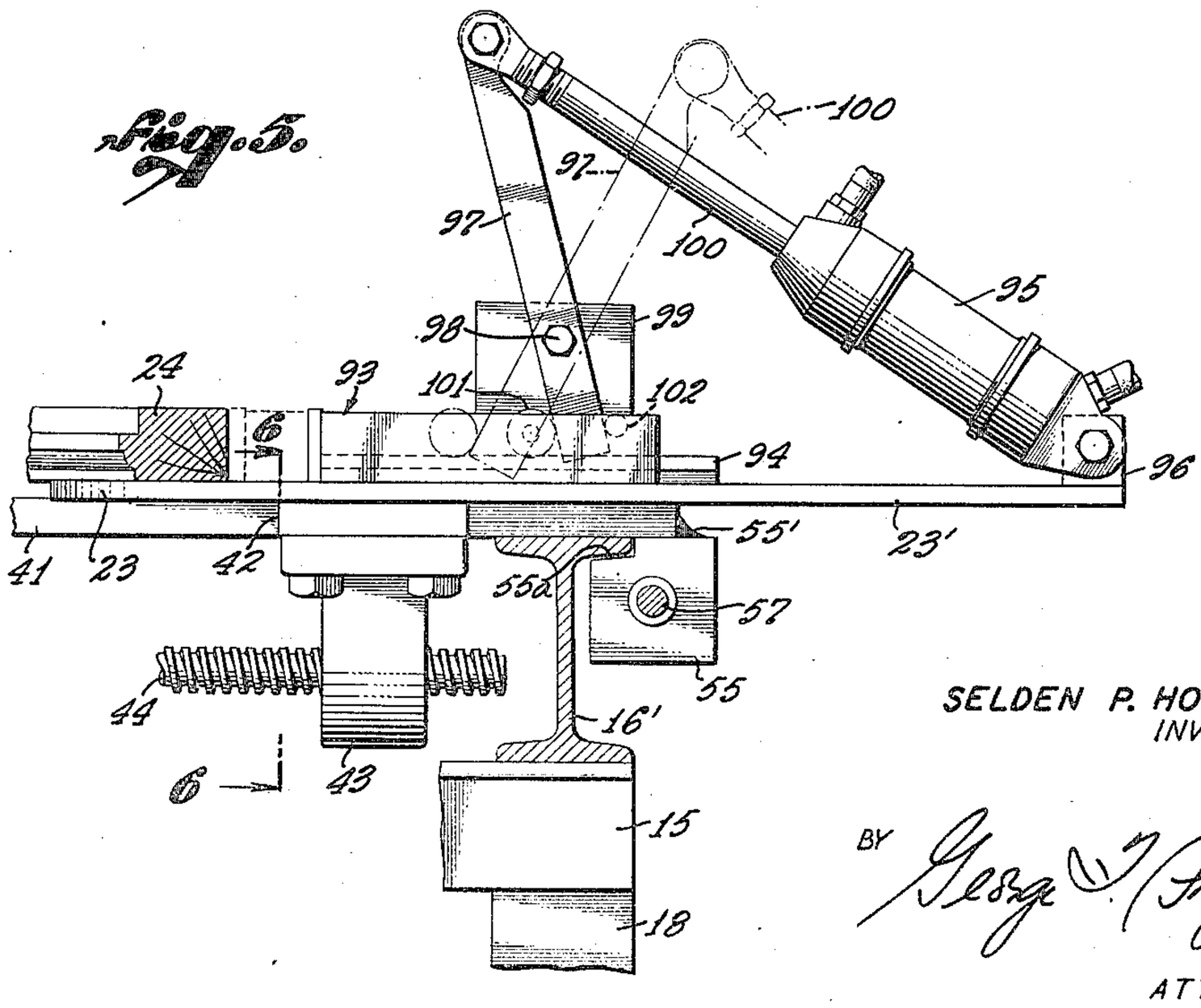


Fig. 5.



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COMBINED FRAME SQUARING AND NAILING MACHINE

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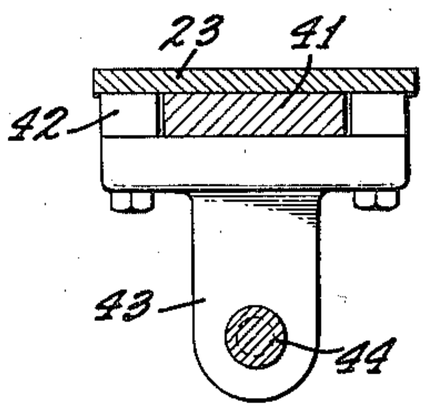

Fig. 6.

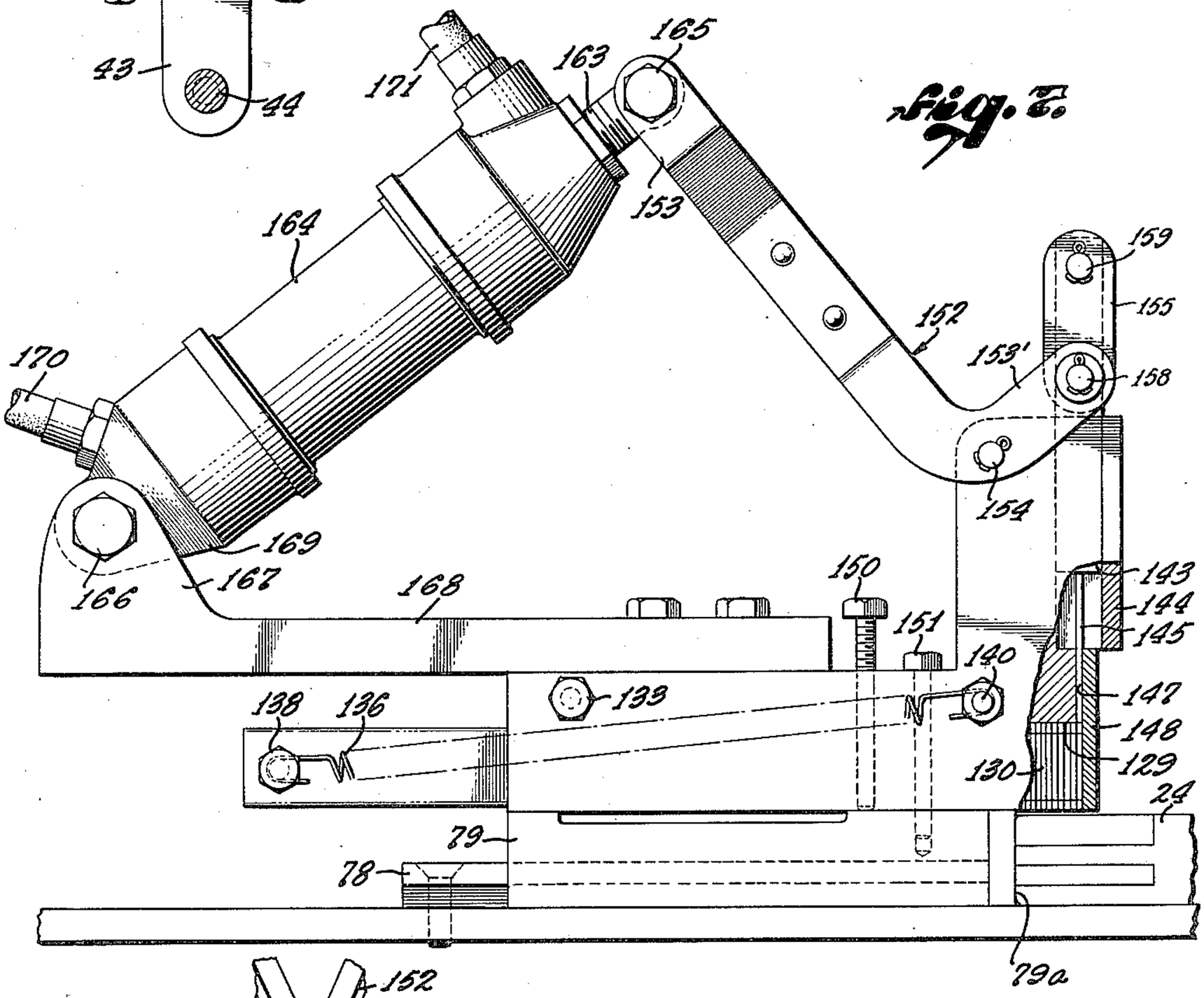

Fig. 7.

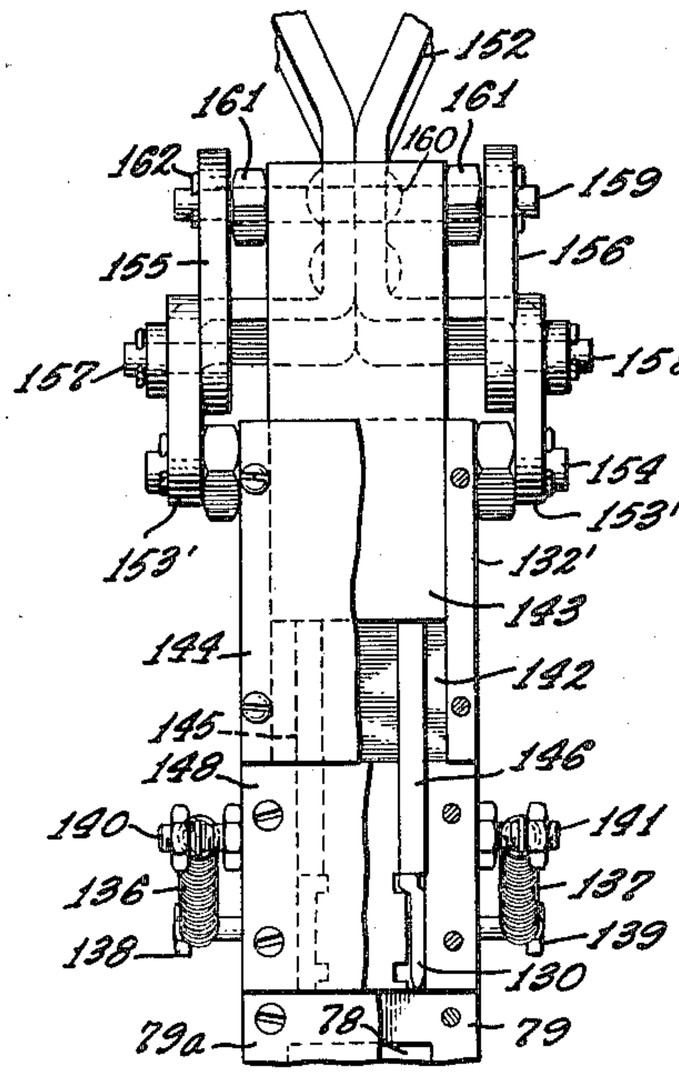

Fig. 8.

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COMBINED FRAME SQUARING AND NAILING MACHINE

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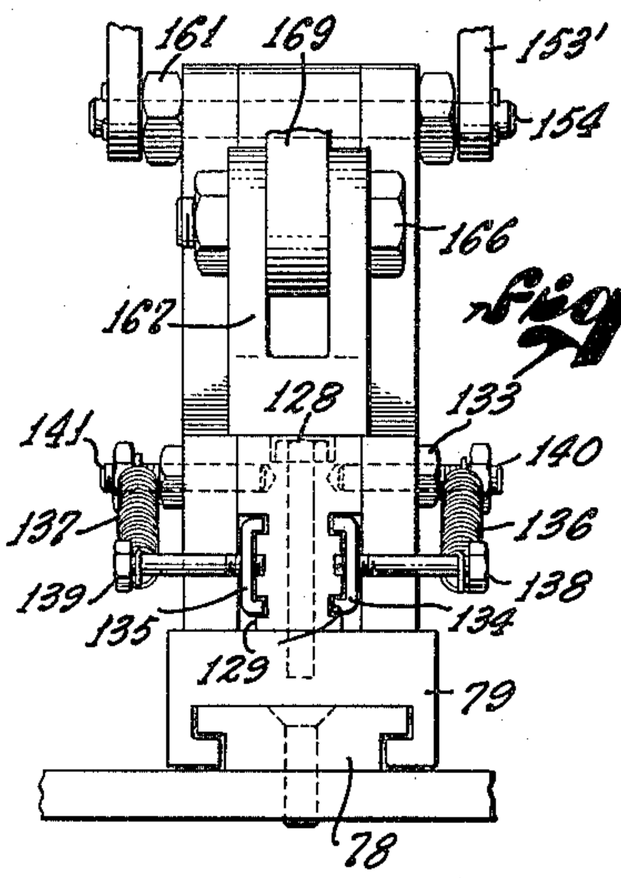


Fig. 9.

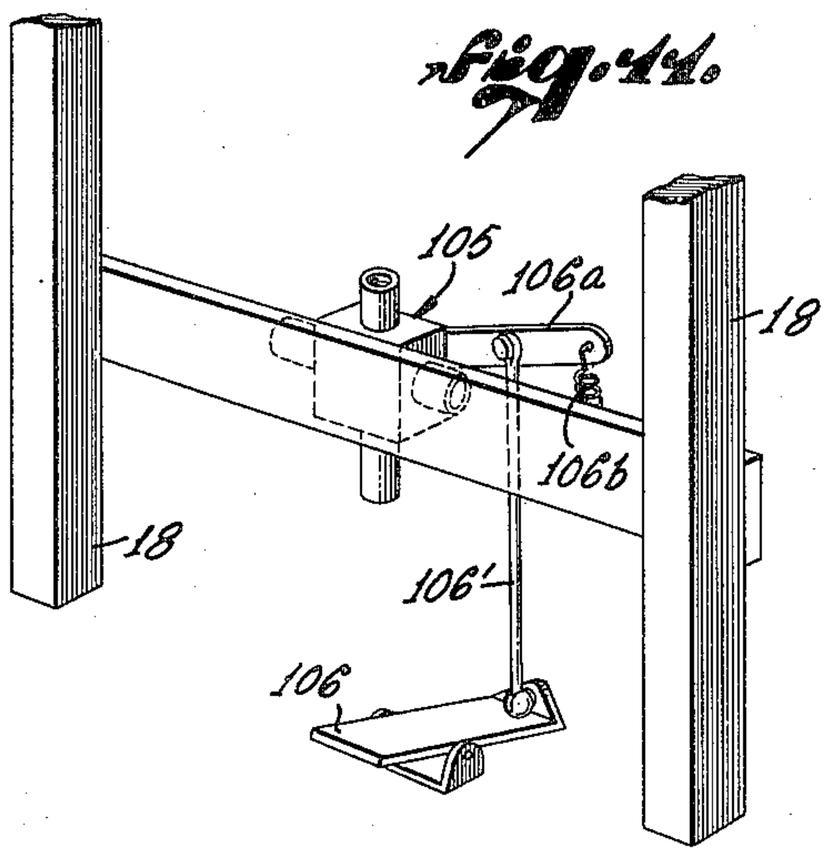


Fig. 11.

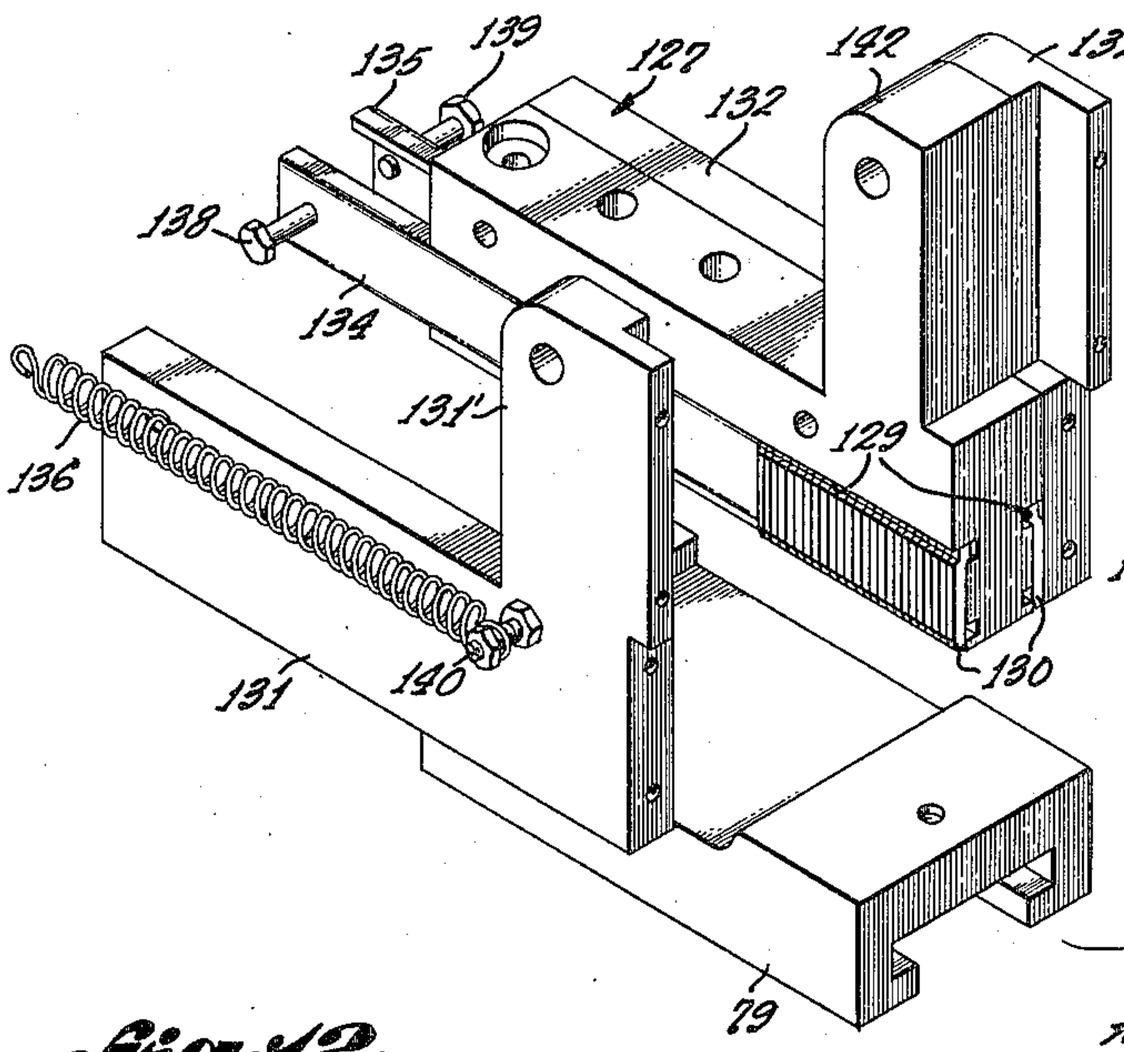


Fig. 12.

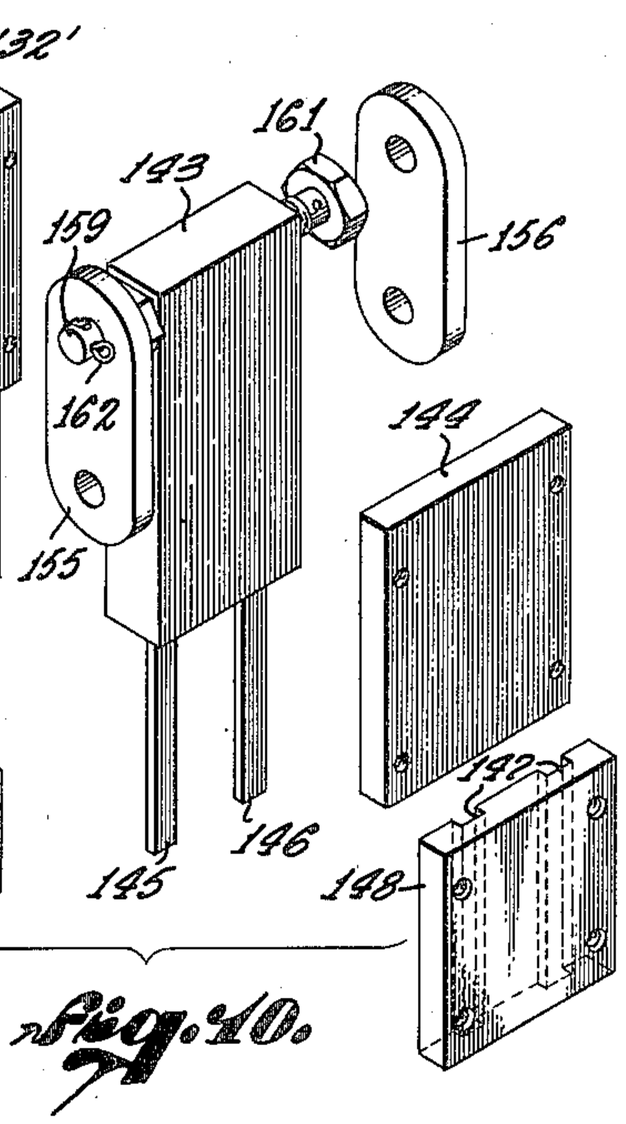
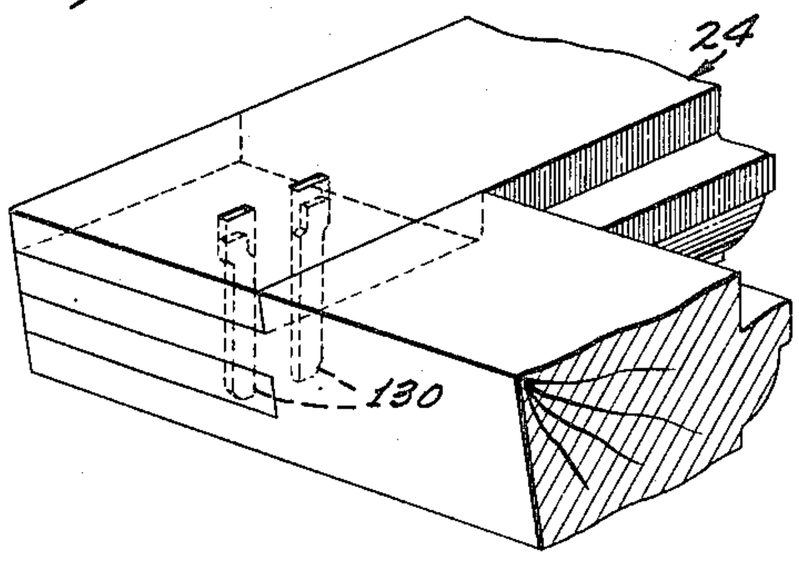


Fig. 10.



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Filed June 10, 1950 5 Sheets-Sheet 5

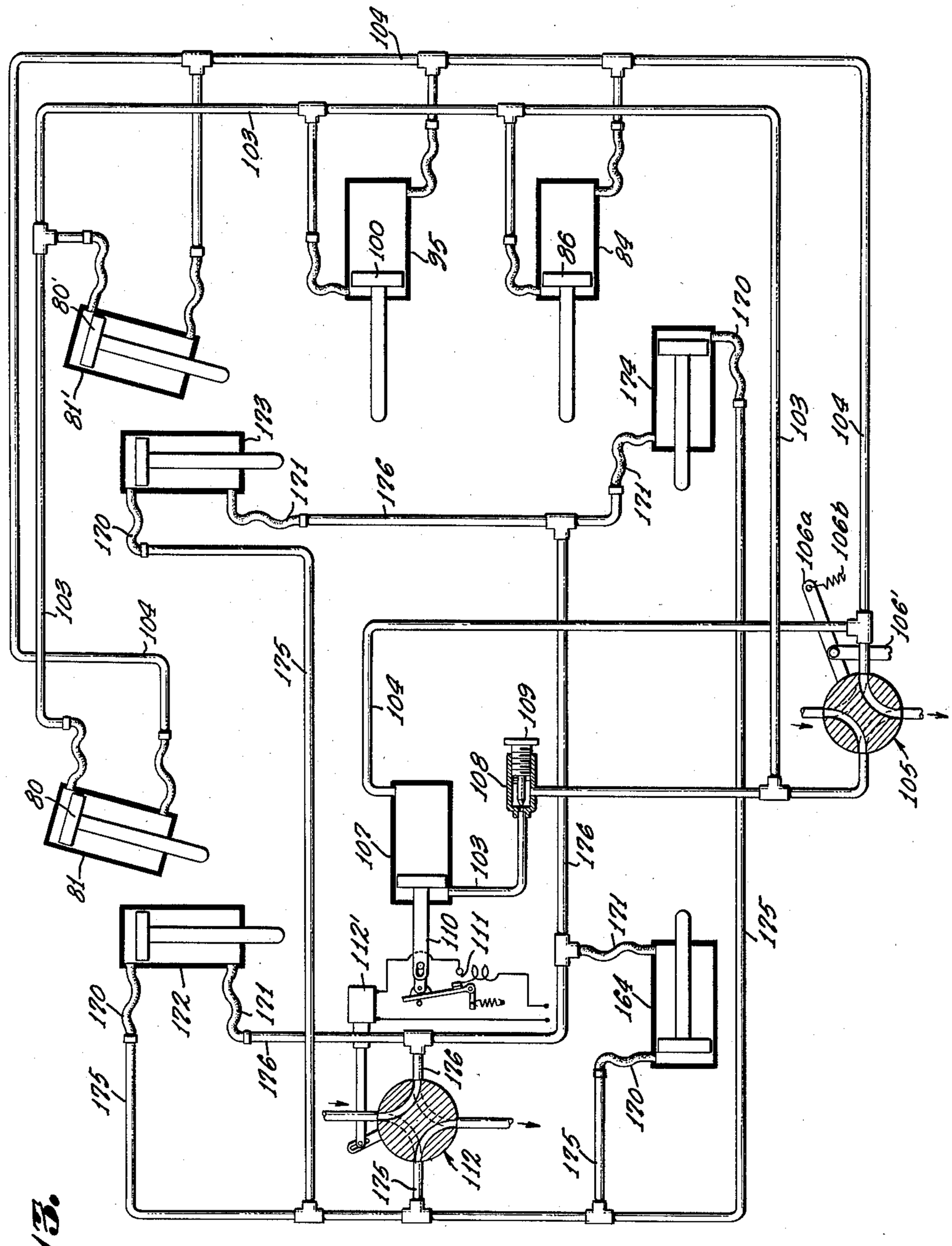

Fig. 13.

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Patented Mar. 6, 1951 2,544,499

UNITED STATES PATENT OFFICE

2,544,499

COMBINED FRAME SQUARING AND NAILING MACHINE

Selden P. Hovey, Hawthorne, Calif.

Application June 10, 1950, Serial No. 167,324

18 Claims. (Cl. 1—1)

1

The machine of my invention is intended for use in mass production of prefabricated wooden constructional elements, and is particularly designed to provide a machine by which wooden frames, such as window sash, frames for screens, or the like, may be produced rapidly and accurately.

The machine of the invention will be hereinafter described with reference to the production of window sash assembled from precut lengths of sash-forming members which are brought into accurate relationship and nailed together by the machine, but it is to be understood that the machine is not necessarily limited to the manufacture of window sash since it may be adapted to the production of various constructional elements made up from precut members to be accurately assembled and permanently secured in assembled condition by automatically driven fastening means.

In modern wood millwork, window sash are produced in various standard sizes, and considerable saving in time and labor is effected by producing them in large quantities for builders, the same being true, of course, for other standard units, such as window casements, and doors and door frames.

It is an object of my invention to provide a machine which is readily adjusted to frames of different proportions which, after initial setting, is operated very simply but will produce a large output of accurately finished frames.

A further object of the invention is to provide a machine for squaring up and nailing frames for windows and the like provided with means for initially adjusting the nailing devices to enable frames made to different thickness of lumber to be accurately operated on by the machine.

In modern mill practice, many frames, such as window sash, are formed with mortice and tenon or like joints at the corners. The force required to fully engage the frames at each corner depends on the area of the interengaged elements forming the joint and, since this area is generally greater at the bottom of the window sash, greater force is required to fully engage the joints at the bottom of the sash. It is another object of the invention accordingly to provide pressure applying means arranged so as to provide greater force at points where it is needed.

Yet another object of the invention is to provide a machine which will first fully engage the joints at the corners of the frames and ensure that they are accurately squared up and, after

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this operation is completed, will drive nails through each corner joint.

A further object of my invention is to provide automatically operated nailing devices arranged so that nails may be accurately driven into the frames without danger of being driven crookedly or fouled in the nailing device.

Other objects and advantages of the present invention will be hereinafter apparent from the following description, particularly when taken in connection with the accompanying drawings, in which

Figure 1 is a plan view of the machine, a frame, such as a window sash, to be squared up and nailed being indicated by broken lines;

Figure 2 is a cross-section on the line 2—2 of Figure 1;

Figure 3 is a front elevation of the machine with parts broken away to shorten the view;

Figure 4 is a perspective view of time delay mechanism seen in Figure 3, and drawn on a larger scale;

Figure 5 is a cross-section on the line 5—5 of Figure 1, and drawn on a larger scale;

Figure 6 is a cross-section on the line 6—6 of Figure 5;

Figure 7 is a side elevation of one of the power operated nailing devices incorporated in my machine as shown in Figure 3, but drawn on a larger scale;

Figure 8 is a fragmentary elevational view, looking from the right in Figure 7;

Figure 9 is a fragmentary rear elevation of the nailing machine shown in Figure 7, looking from the left of that figure;

Figure 10 is an exploded view of the principal parts of the nail driving device incorporated in my machine;

Figure 11 is a fragmentary detail view, drawn on a larger scale, showing the arrangement of the foot operated valve used to set the machine into operation;

Figure 12 is a fragmentary detail view, drawn on an enlarged scale, showing the mortice and tenon connection of the sash members at each corner; and

Figure 13 is a schematic diagram of the arrangement of the pressure cylinders by which the machine is operated, and of the pipe lines leading pressure fluid to the cylinders, and of the valves controlling the flow of pressure fluid to the pipe line.

The machine, referring now to Figures 1 and 3, comprises a horizontal frame having a front transverse member 15 of angle iron and members 16, 16' of I section welded thereto and

extending rearwardly therefrom. The frame includes a support element, the legs 18 of which are of a length to raise the frame to a comfortable height from the ground. The rearward ends of the I beams 16 are connected together to provide a rigid rectangular frame by a flat bar 19 to which the I beams are welded or otherwise secured.

Mounted fixedly at the left front of the frame is a plate 20. At the opposite front end of the frame a plate 21 is mounted for movement to or from plate 20. Spaced rearwardly of plate 20, a plate 22 is adjustably mounted for movement toward and from plate 20, and spaced rearwardly of plate 22, a plate 23 is adjustably mounted for movement toward and away from both plates 22 and 21.

The plates 20, 21, 22, 23 provide supporting surfaces for the corners of a partially assembled window sash 24 to be nailed in final assembled condition, and also support pressure applying and nailing mechanisms to be later described.

The plates are adjusted relatively to one another to fit the particular size of window sash to be handled and, for this purpose, a front transverse member 25 of the frame is formed as a flat bar secured at its ends on the top flange of I beams 16 and 16'. The plate 21 is mounted on a slide 26 movable along the bar 25. The means for moving slide 26 comprise a lug 27 projecting downwardly from the slide and provided with a screw threaded bore in which a screw threaded shaft 28 is engaged. The left-hand end of shaft 28 is carried in a bearing 29 secured to the underside of member 25, and a bevel pinion 30 is mounted on the end of the shaft. Shaft 28 is plain at its left-hand end and held against axial movement in bearing 29 by collar 30' of pinion 30 pinned to the shaft on one side of the bearing, and collar 31 pinned to the shaft on the opposite side of the bearing.

Pinion 30 is rotated by a bevel gear 32 pinned to an adjusting shaft 33 rotatably mounted at its forward end in a bracket 34 secured to the underside of member 25 and held against axial movement in the bearing by the collar of bevel gear 32 engaging against one side of the bracket and a collar 35 also pinned to shaft 33 and bearing against the opposite side of the bracket. The rear end of the shaft 33 extends through the bar 19 and is secured by a ball thrust bearing, not shown, and held in place by a nut threaded onto the end of the shaft 33. Shaft 33 is rotated by a crank 37 and, as should now be understood, rotation of the shaft will cause adjustment of plates 21 and 23 simultaneously toward plates 20 and 22, movement of plate 23 in this manner being effected by the arrangement later described.

A rectangular bar 38 is secured at its left-hand end by a bolt 38' to the top of plate 20, and toward its right-hand end is engaged by an abutment 38*a* secured to the top of plate 21, the abutment sliding along the front face of the bar 38 as plate 21 is moved. Since the bottom member of a window sash is usually bevelled to prevent rain beating through the joint between the sash and window sill, a metal bar 39 is provided, welded to a heavy rod 40 which is pivotally mounted in small brackets secured to the inner side of member 38.

Movement of plate 23 simultaneously with plate 21 is secured by the arrangement shown in Figure 5. It is to be noted that plate 23 is mounted for movement to right or left with plate 21 and

also for movement forwards or backwards with plate 22.

By referring to Figure 5 it will be seen that plate 23 is mounted on a transverse flat bar 41 and is carried by a slide 42 adjustable along the bar by a construction identical to that described with reference to the slide 26 on which plate 21 is mounted, so that it is not thought necessary to repeat that description. The slide 42 is moved along bar 41 by means including a lug 43 secured to the underside of the slide 42 and provided with a screw threaded bore in which a threaded shaft 44 is engaged. Shaft 44, at its opposite end, is carried in a bearing 45, referring now again to Figure 1, secured to the underside of the bar 41. A bevel pinion 46 is pinned by its sleeve to the shaft 44, the sleeve abutting one side of the bearing 45 and preventing axial movement of the shaft in one direction while movement of the shaft in the opposite direction is prevented by a second sleeve 48 pinned to the shaft and abutting the opposite side of bearing 45. The bevel gear 46 is engaged by a bevel gear 49 mounted on the shaft 33 and partially supported by a bracket 50 secured to the underside of bar 41. The sleeve of said bevel gear 49 carries an inwardly projecting key 51 engaging in a keyway 52 longitudinally cut in the shaft 33, and the gear 49 is retained in position on the bracket 50 by rings 53 pinned to the sleeve of the bevel gear 49 on opposite sides of the bracket. Rotation of the shaft 33 will, therefore, cause rotation of the shaft 44, although the bar 41 may be, and ordinarily is, also in movement toward or from the front of the machine during initial adjustment.

Bar 41 is secured for sliding movement on the I beams 16, 16' by a short length of square bar 55 welded across each end of the bar, one such weld being indicated at 55'. The bar pieces 55 are machined along the inner upper edges, as indicated at 55*a*, to conform to the contour of the outer flange of the I beams 16, 16' and each is drilled with a passage, the wall of which is furnished with a screw thread.

A pair of screw threaded shafts 56, 57 are mounted at their forward ends in brackets 58, 59 secured to the underside of the flat bar 25 at the front of the machine, and bevel pinions 60, 61 are mounted on the front ends of the shafts. The shafts 56, 57 are held against axial movement relative to the brackets by means similar to those previously described for shaft 28. The rear ends of the shafts 56, 57 are passed through openings formed in the bar 19 and are supported by thrust bearings, not shown; the shafts being held against withdrawing movement by nuts 62 and 63 threaded onto the shaft ends respectively. Shafts 56 and 57 are simultaneously rotated by means of an adjusting cross shaft 64 supported in the bearings 65 and 66 mounted on the I beams 16 and 16' and carrying at opposite ends thereof bevel pinions 67 and 68 meshing with pinions 60 and 61, respectively. A crank 69 may be mounted on the forward end of shaft 56 for rotating the same.

When shaft 56 is rotated by the crank 69, the shaft 57 will obviously be rotated similarly and in unison therewith. In order to provide an abutment for one side of the window sash, a square section edge bar 70 is connected at its front end by a bolt 71 to the top surface of the stationary plate 20 and is held against outward movement about the bolt 71 by a threaded stud 72 working in an upstanding lug 73 secured at the outer edge of the plate 22.

Nailing devices 74, 75, 76 and 77 are mounted on the plates 20, 21, 22 and 23, respectively, the device 74 mounted on plate 20 being fixed in position, but each of the other nailing devices being mounted for sliding movement on the plates.

The mounting arrangement of the nailing devices 76 and 77 is identical so that the description given in respect to the device 76 applies also to device 77. The devices are mounted on short lengths of undercut bar 78, 78' secured to the top of plates on which the devices are mounted, as shown in Figures 7 and 9. Slide members 79 and 79' form a base for the nailing devices and are machined to interfit with the undercut bars which form guides for the slides. The front end 79*a* of the slide forms a pressure applying surface which is caused to exert pressure against the edge of the window sash to be squared up and secured together.

Slides 79 and 79' are provided with laterally projecting ears 79*b*, 79*c* to which are pivoted the rods of pistons 80 and 80' of double-acting pneumatic cylinders 81 and 81' which are pivotally secured at their rear ends to abutments 82 and 82' secured to the rear edge of plates 22 and 23.

The nailing device 75 is mounted on a slide 83 mounted on a guide similarly arranged to guides 78 but since the pressure required to be exerted is greater than at the upper corners of the window sash, a relatively large compressed air cylinder 84 is provided to supply the additional force required. This cylinder is secured at its rear end to a bracket 85 projecting laterally from plate 21, and the rod of a piston 86 mounted within this cylinder is pivoted to the longer arm 87 of a lever 88 pivoted at 89 to a block secured to the top of plate 21, the shorter arm 90 of the lever bearing against a roller 91 mounted on a pin 92 projecting upwardly from the body of the slide mounted on the guide 83. In the opposite direction of movement of the arm 90 it engages a small roller 91' and, as will be seen, this retracts the clamping member.

The nailing device 74 is mounted generally as described for devices 76 and 77 but since it is not required to move longitudinally, the slide member on which the nailing device 74 is mounted is secured to the track member.

A clamping member 93, not provided with a nailing device, is arranged on a lateral extension 23' of plate 23, the device being arranged to apply pressure against the side of the top of the window sash. Clamping member 93 is best shown in Figure 5. It will be noted that the clamping member 93 is mounted on a guide 94 similar in arrangement to the similar parts of the movable clamping elements 76 and 77 previously described.

Since greater force is required to be exerted by the clamping member 93 than is required of the clamps of devices 76 and 77, a double-acting air cylinder 95, pivoted at its rear end to a block 96 secured to plate extension 23', is provided to move the clamp through a lever 97 pivoted adjacent one end thereof at 98 to a block 99 secured to plate 23'. The rod of the piston 100 of the cylinder 95 is pivoted to the longer arm of the lever 97 while the shorter arm works against a roller 101 mounted on a pin projecting from the side of the slide. The shorter arm in the opposite direction of movement of the lever engages against a small roller 102 and thus retracts the clamping means.

All cylinders 81, 81', 84 and 95, referring now

to Figure 13, are connected between pipe 103 and 104 which serve alternately as pressure and exhaust lines, depending upon the position of a four-way valve 105 operated, as best shown in Figure 11, by a foot pedal 106 through a rod 106' and arm 106*a* biased toward closed position by a spring 106*b*.

The line 103 is connected to the front end of cylinders 84 and 95 and to the back end of cylinders 81' and 81. The pipe line 104 is connected to the back end of cylinders 84 and 95 and to the front ends of cylinders 81 and 81'.

An additiontal double-acting cylinder 107 is connected across pipe lines 103 and 104, line 103 being connected to the front end of cylinder 107, and line 104 being connected to the back end of the cylinder, this cylinder operating a valve controlling the nailing devices.

An adjustable reducing or needle valve 108 is connected in pipe line 103 ahead of cylinder 107 and is adjusted by a thumbwheel 109. The effect of the needle valve is to cause piston 110 to retract more slowly than the operative movement of the pistons of the cylinders applying pressure to square up the elements of the window sash. After a sufficient interval to enable this operation to be completed, the piston 110 will close the switch 111 of a solenoid operated valve 112 and admit compressed air to the cylinders operating the nailing devices, as will be later described.

The arrangement provided to secure the necessary delay in operation of the solenoid operated valve 112 is shown in detail in Figure 4. The parts of the delay device are mounted on a panel 113 and may be secured in any convenient manner to the table supporting the machine. This device comprises a bar 114 guided for straight line movement by a guide bracket 115 secured to panel 113. The piston 110 is connected to one end of the bar so that this bar is moved with the piston 110.

The bar 114 is provided with a hinged extension 116 normally held down toward panel 113 by a small spring 117 compressed between a bracket 118 secured to bar 114 and the outer surface of the extension 116. A catcher 119 in the form of a small rectangular plate 120 is secured to the underside of extension 116. Plate 120 is provided with a bevelled portion 120*a* at its rear vertical face and with a bevelled portion 120*b* at its front vertical face.

The vertical portion of the rear face of the plate 120 is adapted to engage with a small flat bar 121 projecting laterally from a bar 122 extending parallel with bar 114 and guided for straight line movement by the bracket 115*a*.

The rear vertical edge of bar 121 is provided with a bevelled portion 121'. A small block 123 is mounted in the path of movement of the plate 120, the forward edge 123*a* of the block being bevelled so that the bevelled edge 120*a* of plate 120 rides up on block 123 which is higher than bar 121 so that plate 120 is released from bar 121 at that time and bar 122 is therefore released from bar 114. The switch 111 controlling the valve causing operation of the nailing devices is mounted on the panel 113 in the path of a spring mounted switch operating plunger 124 carried in bracket 124' mounted on bar 122. The spring 125 engages a head on the plunger and holds the latter projecting toward the switch and has sufficient resistance to operate the switch when the plunger is moved against it, but enables the plunger to yield on continued excess movement of the bar 122 so as to avoid damage to the switch.

A spring 125*a* is coiled around bar 122 and held under compression between bracket 115*b* and a pin 126 secured in the bar, the spring yieldably resisting displacement of the bar 122 by bar 114.

The effect of the arrangement described is that as piston 110 is slowly retracted, bar 114 will move bar 122 back sufficiently to operate switch 111 and will then release bar 122 which will return to its initial position, but bar 114 will remain retracted until the operator releases the foot pedal 106, whereupon spring 106*b* will return the foot pedal to a raised position which will rotate the valve 105 to bring the passages of the valve body into the dotted line position shown in Figure 13, thus reversing the flow of compressed air to the cylinders and returning their pistons to the initial position. On piston rod 110 pushing rod 114 forward, the bevelled face 120*b* of catcher 119 will ride over the bevelled portion 121′ of the bar 121 so that the catcher will be in position to again catch bar 121 on the next rearward movement of the piston rod 110.

The nailing devices mounted on the clamping slides 79, 79′, and 83, as well as the device fixedly mounted on plate 20, are identical in construction and are best shown in Figures 9 and 10. The body 127 of the nailer is secured to the slide 79 by threaded studs 128 extending vertically through the body of the nailer, the heads of the studs being received in counterbores so that the top of the body is flat. The opposite sides of the body are slotted longitudinally, as shown at 129, to receive series of nails 130 connected together at their heads in such a way that each nail may be readily sheared from the next. The manner in which the series of connected nails fit in the grooves or slots in the body is clearly shown in Figure 10. Side plates 131 and 132 are secured to the sides of the body by threaded studs 133 screwed into the body. A nail follower formed of two separate channel-shaped strips 134 and 135 are fitted behind the nails 130 in the slots 129 and are urged forward by coil tension springs 136 and 137, having their rear ends hooked over studs 138 and 139 screwed into the rear ends of the followers, and their front ends secured to threaded studs 140 and 141 screwed in the sides of the body toward the front thereof.

The body 127 has an upwardly extending end portion 142 which is machined out, together with the thickness of corresponding upwardly extending, forward ends 131′ and 132′ to provide working space for a crosshead 143 which is fitted in said space, as shown in Figure 8, with an easy sliding fit and secured therein by a coverplate 144 secured to the front edges of the side plates 131 and 132 by some conventional means, such as machine screws. Shearing blades 145 and 146 are set into the bottom edge of the crosshead in any suitable way and are guided in slots 147, machined in a coverplate 148 also fixed to the front edges of the sideplates by machine screw 149. The shearing blades are, of course, aligned with the nail slots machined in the sides of the body so that when the crosshead is forced downwardly, the shear blades bearing on the heads of the end nails of each series will shear them off and force them into the corner of the window sash through the mortice and tenon joint between the sash members.

It should be noted that the bottom face of the nailer fits closely against the window sash and as the nails are under the constraint of the slots 147, there is no tendency for the nails to be driven in crookedly.

In order to adjust the height of the lower face of the nailer to different thickness of window sash, two threaded studs 150 and 151 are mounted in bores in the body of the nailer at the forward end thereof. Stud 150 bears against the top surface of the slider 79 and the bore in which it is positioned is threaded, while stud 151 is engaged in a threaded bore in the slider 79 but the bore of the body 127 in which it is positioned is not threaded. Screwing stud 150 downwardly as stud 151 is retracted will raise the front end of the nailer body, while reversing the process will lower the front end of the body. It is, of course, necessary to leave a slight amount of play between the head of stud 128 and the bottom of the counterbore in which it is positioned as, for instance, by positioning a spring washer between the head and the bottom of the counterbore.

The crosshead 143 is reciprocally operated, referring again to Figure 7, by a bell crank lever 152 having bifurcated ends 153 and 153′ and pivoted to the upstanding head of the nailer by a pin 154, positioned in a hole drilled through the side plates and body. The forward end of the lever is pivotally connected to the lower ends of a pair of links 155 and 156 by means of studs 157 and 158. The upper ends of the links are pivoted on a pin 159 fitting snugly in a hole 160 drilled through the width of the crosshead. Spacing washers 161 are used to keep the upper ends of the links 155 and 156 properly located on the pin 159, and these links are held against separation from the pin 159 by cotter pins or other suitable elements being used as may be preferred, cotter pins 162 being shown in Figure 8.

The opposite bifurcated end 153 of the bell crank lever is pivotally secured to the piston rod 163 of a double-acting compressed air cylinder 164 by a pin 165. The cylinder 164 is mounted pivotally at its rear on a bolt 166 passed through a hole drilled through the upstanding ears 167 of a bracket 168 fixed to the nailer body and a hole drilled in a lug 169 projecting from the rear end of the cylinder and mounted between said ears.

The piston of the cylinder 164 is operated by air led to the opposite ends of the cylinder through flexible hose members 170 and 171. The manner in which this cylinder and piston will, through the bell crank lever 152, reciprocally move the crosshead is believed obvious and will not now be enlarged upon.

Assuming cylinder 164 to indicate the air cylinder of nailer 74; 172 to indicate the air cylinder of nailing device 76; 173 to indicate the cylinder of nailing device 77; and 174 to indicate the cylinder of nailing device 75, it will be noted that all of the cylinders are connected across pipe lines 175 and 176, line 175 being connected by lengths of flexible air hose similar to hose 170 to the rear ends of the cylinders, and line 176 being connected by lengths of flexible air hose similar to 171 to the front end of the cylinders.

It will be seen that the compressed air lines for the nailing devices are separate from that operating the clamping means, this compressed air circuit being controlled by the four-way valve 112 operated automatically by the solenoid 112′. As long as the circuit controlled by the switch 111 is de-energized the solenoid 112′ will hold the valve in the position shown in solid lines in Figure 13 but once the switch 111 is moved to its closed circuit position, the solenoid will move the valve to the position shown in dotted lines in Figure 13.

In the position of valve 112 shown in solid lines

in Figure 13 the solenoid is not energized for the cylinder 107 and piston 110 have not yet closed switch 111, and the pistons of the nailing devices are in retracted position, pipe line 175 being connected to the exhaust and pipe line 176 supplying compressed air to the front end of the cylinders. Levers 152 will, therefore, hold the crossheads 143 raised. When the switch 111 is closed to energize the solenoid 112', the valve 112 will be rotated into the dotted line position by the solenoid 112' and compressed air will then be supplied through line 175 to the lower ends of the cylinders, the outward movement of the pistons thereof rocking the bell crank lever 152 in a clockwise direction, as viewed in Figure 7, to move the crossheads downwardly, thus driving home a pair of nails at each corner of the sash. As soon as the coil of the solenoid 112' is de-energized the valve is returned to its normal position by a spring, not shown, but forming a part of the solenoid and normally tending to hold the plunger of the solenoid in the position shown in Figure 13.

After the machine frame has been initially adjusted to the length, width, and thickness of the window sash by operation of the handles 37 and 69 and adjustment of the nailers, the edge bar 70 is checked to ensure that it is accurately at right angles to bar 38 so that the window sash will be properly squared up by the operation of the pressure applying devices. When in full production, two men are located alongside the machine by whom the lengths of material, which have been machine cut and morticed and tenoned are loosely assembled into sashes and stacked for the machine operator to work on.

The operator positions a sash with the bottom rail against the bar 38 and a side against bar 70, the sash resting at its corners on plates 20, 21, 23, and 24, and then depresses pedal 106 and keeps it depressed, which will cause all the slides to bear against the sash close to the corners and ensure full engagement of the mortice and tenon joints at the corners of the sash, pistons 86 and 100 moving slightly more slowly than pistons 80 and 80' because of the greater resistance to be overcome. Just after the movement of the pistons ceases, the nailers will be simultaneously operated whereupon the operator releases the foot pedal, thereby causing all parts of the machine to be returned to initial position.

It will be seen that the machine is very simple to operate and it has been found possible to turn out more than two hundred and fifty average size window sashes per hour which, to the best of my knowledge, is a much greater output than has been obtainable heretofore.

While I have specifically described and illustrated an embodiment of my invention at present deemed preferable by me, it is to be understood that various changes and modifications of parts may be made by those skilled in the art without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A squaring and nailing machine for frames and the like, comprising: means for supporting a partially assembled frame on said machine; squaring means mounted on said supporting means and adapted to be brought into engagement with the elements of said partially assembled frame; means for relatively moving said squaring means to bring the latter into pressural engagement with all elements of said partially assembled frame to pressurally urge the same into final assembled form; nail inserting devices carried by at least some of said squaring means and movable therewith into positions adjacent the corners of said finally assembled frame; means for simultaneously actuating said moving means to bring said squaring means into pressural engagement with said frame elements to square the same; means for simultaneosly actuating said nail inserting devices; control means, including a single operator means, for rendering operative both of said actuating means; and means operative to delay operation of said actuating means for said nail inserting means an interval of time sufficient for said moving means to bring said squaring means into pressural engagement with said partially assembled frame to urge the same into final assembled form.

2. A squaring and nailing machine for frames and the like, comprising: means for supporting a partially assembled frame on said machine; means mounted to said supporting means and adapted to square the same when relatively moved into engagement with the elements of said partially assembled frame; means for relatively moving said squaring means to bring the latter into pressural engagement with all elements of said partially assembled frame to pressurally urge the same into final assembled form; nail inserting devices carried by at least some of said squaring means and movable therewith into positions adjacent the corners of said finally assembled frame; means for simultaneously actuating said moving means to bring said squaring means into pressural engagement with said frame elements to square the same; means for simutaneously actuating said nail inserting devices; control means common to both actuating means; and means rendered operative by operation of said common control means for rendering inoperative the actuating means for said nail inserting devices for a predetermined interval of time whereby said moving means moves said squaring means into pressural engagement with said partially assembled frame and pressurally urges the same into final assembled form during said predetermined interval of time

3. A squaring and nailing machine for frames and the like, comprising: means for supporting a partially assembled frame on said machine; relatively movable squaring means mounted on said supporting means; means for relatively moving said squaring means to bring the latter into pressural engagement with all elements of said partially assembled frame to pressurally urge the same into final assembled form; nail inserting devices carried by at least some of said squaring means and movable therewith into positions adjacent the corners of said finally assembled frame; common control means for actuating said moving means to bring said squaring means into pressural engagement with said frame elements to square the same and to actuate said nail inserting devices; and means for delaying operation of said nail inserting means a predetermined length of time following operation of said control means, whereby said squaring means are brought into pressural engagement with said partially assembled frame to square the same before said nail inserting means are operated to insert nails at the corners of said squared frame.

4. A squaring and nailing machine for frames and the like, comprising: means for supporting a partially assembled frame on said machine; squaring means mounted on said supporting means; means for relatively moving said squaring means to bring the latter into pressural en-

gagement with all elements of said partially assembled frame to pressurally urge the same into final assembled form; nail inserting devices carried by at least some of said squaring means and movable therewith into positions superimposed relative to the corners of said finally assembled frame; and control means for actuating said moving means to bring said squaring means into pressural engagement with said frame elements to square the same, including means made operative after a predetermined time interval following engagement of said squaring means with the elements of said frame to actuate said nail inserting devices.

5. A squaring and nailing machine for frames and the like, comprising: means for supporting a partially assembled frame; a first abutment mounted on said means and adapted to position one side of the frame; a second abutment mounted on said support means and adapted to position a second side of the frame at right angles to the side positioned by the first abutment; pressure applying means mounted on said support means and arranged for movement against the remaining sides of the frame to pressurally urge the same into final assembled form; means effective to operate all of said pressure applying means at the same time; nailing devices arranged to operate on the corners of the frame; means effective to actuate said nailing devices in unison; and a single member effective to control both the means operating said pressure applying means and the means actuating the nailing devices.

6. A squaring and nailing machine for frames and the like, comprising: a machine frame having a front transverse member and spaced members extending rearward from said front transverse member and rigidly secured thereto; a first bar secured at its front end to the front of the machine frame; means effective to adjustably position the rear end of said bar with respect to one of the spaced members extending rearward from said front transverse member; a second bar secured at one end adjacent the front end of the first bar; means effective to position the opposite end of the second bar with respect to the front transverse frame member, said first and second bars being effective to engage against and position the frame on the machine; pressure applying means mounted on the machine frame and arranged for movement against the remaining sides of the frame; means effective to simultaneously operate all of said pressure applying means; nailing devices arranged to operate on the corners of the frame; means effective to actuate said nailing devices in unison; and a single member effective to control both the means operating said pressure applying means and the means actuating the nailing devices.

7. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted

on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; pressure applying means mounted on the second, third and fourth plates; nailing devices mounted on all of the plates; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices a predetermined time interval following movement of said pressure applying means into engagement with the sides of said frame.

8. A squaring and nailing machine for window frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; a straight bar movably secured to the surface of said first plate and retained in position by an adjustable abutment mounted on the second plate and slidably engaging said bar during movement of said second plate, said bar being effective to position one side of the window frame; a second straight bar secured at one end to the surface of said first plate and retained in position by an abutment mounted on the fourth plate and slidably engaging said bar during movement of the plate; pressure applying means mounted on the second, third and fourth plates; nailing devices mounted on all of the plates; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices.

9. A machine as set forth in claim 8 and in addition comprising a flat bar pivoted about its longitudinal axis to the inner face of said second straight bar to accommodate a bevelled frame member positioned thereagainst.

10. A squaring and nailing machine for frames and the like, comprising: a front transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to

adjust said second transverse frame member toward and away from the front transverse member; a pair of downwardly extending projections secured to the underside of said second transverse member and each provided with a hole having a screw thread formed in the walls thereof; a pair of screw threaded shafts mounted in bearings carried on the machine frame and held against axial movement therein, said shafts being engaged in the threaded holes; means for rotating one of said shafts; an adjusting shaft and bevel gears thereon engaging bevel gears on said pair of shafts for rotating the shafts in unison; means effective to slide the third and fourth plates together toward the second and first plates; pressure applying means mounted on the second, third and fourth plates; nailing devices mounted on all of the plates; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices.

11. A squaring and nailing machine for frames and the like, comprising: a front transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; a pair of downwardly extending projections secured to the underside of said second transverse member and each provided with a hole having a screw thread formed in the walls thereof; a pair of screw threaded shafts mounted in bearings carried on the machine frame and held against axial movement therein, said shafts being engaged in the threaded holes; means for rotating one of said shafts; an adjusting shaft and bevel gears thereon engaging bevel gears on said pair of shafts for rotating the shafts in unison; slides securing the second and third plates for sliding movement on the transverse members; a downwardly extending projection secured to each slide and each provided with a hole having a screw thread formed in the wall thereof; rotatable screw threaded shafts mounted on the underside of said transverse frame members and engaging in said threaded holes, said shafts having bevel gears mounted thereon; a rotatable adjusing shaft mounted in the machine frame and held against axial movement and provided with a bevel drive to the shaft engaging the projection on the slide of the fourth plate; a bevel gear having a slidable driving connection with the adjusting shaft; a bracket mounting said bevel gear on the underside of said second transverse frame member for engagement with the bevel gear mounted on the threaded shaft carried below the second transverse frame member; pressure applying means mounted on the second, third and fourth plates; nailing devices mounted on all of the plates; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices.

12. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; pressure applying means mounted on the second and fourth plates and exerting forces directed toward the first plate; abutment means on the first plate to prevent movement of the portion of a frame located thereon under said forces; a pair of pressure applying means positioned on the third plate, one of said means exerting force toward the second plate and the other exerting force directed toward the fourth plate; nailing devices located above the abutment on the first plate, above the force applying means located on the second and fourth plates and above one of the pressure applying means located on the third plate, the nailing devices operating to drive nails into the frame adiacent the force applying means; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices.

13. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; guide members mounted on the upper surface of the second, third and fourth plates; pressure applying members slidably mounted on said guide members; pressure fluid cylinder and piston means mounted on the plates to supply power to said pressure applying means; and a valve effective to admit pressure fluid simultaneously to said cylinders and to release pressure fluid from said cylinders.

14. A machine as set forth in claim 13 and in addition comprising lever means connected be-

tween the pistons of said compressed air cylinders and certain of said pressure applying means in order to increase the power exerted by said means on the portion of the frame with which they are engaged.

15. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; guide members mounted on the upper surface of the second, third and fourth plates; pressure applying members slidably mounted on said guide members; pressure fluid cylinder and piston means mounted on the plates to supply power to said pressure applying means; a valve effective to admit pressure fluid simultaneously to said cylinders and to release pressure fluid from said cylinders; nailing devices mounted on the pressure applying means mounted on the second and fourth plates and on a pressure applying means mounted on the third plate and exerting force directed toward the fourth plate, and a nailing device mounted on the first plate; fluid pressure cylinder and piston means acting only on said nailing devices; a valve controlling admission of pressure fluid to, and release from, said cylinders; and a delay device operated by the fluid pressure actuating the pressure applying members and effective to move said valve to admit pressure to the cylinder and piston means to operate the nailing devices after the operation of the pressure applying members.

16. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; pressure applying means mounted on the second, third and fourth plates; a nailing device base member mounted on each of said plates; a nailing device body member secured to the base by a threaded stud passing through a hole in the body member into a threaded bore in the base member, and a threaded stud engaged in a threaded bore in the body member and bearing against the top of the base member, whereby by adjustment of said studs the height of the nailing device may be adjusted to suit frames of different thickness; means effective to force all of said pressure applying means at the same time against the sides of the frame; and means effective to operate said nailing devices.

17. A squaring and nailing machine for frames and the like, comprising: a front, transverse frame member and spaced frame members extending rearward from, and rigidly secured to, said front transverse member; a second transverse frame member slidably mounted on the rearwardly extending frame members; a first plate immovably secured to the machine frame at the junction of the front transverse member and a rearwardly extending frame member; a second plate immovably secured on one end of the second transverse member and aligned with said first plate; a third plate slidably mounted on the second transverse member on the end opposite the second plate; a fourth plate slidably mounted on the front transverse member at the end opposite said first plate; means effective to adjust said second transverse frame member toward and away from the front transverse member; means effective to slide the third and fourth plates together toward the second and first plates; guide members mounted on the upper surface of the second, third and fourth plates; pressure applying members slidably mounted on said guide members; pressure fluid cylinder and piston means mounted on the plates to supply power to said pressure applying means; a valve effective to admit pressure fluid simultaneously to said cylinders and to release pressure fluid from said cylinders; nailing devices mounted on the pressure applying means mounted on the second and fourth plates and on a pressure applying means mounted on the third plate and exerting force directed toward the fourth plate, and a nailing device mounted on the first plate; fluid pressure cylinder and piston means acting only on said nailing devices; a valve controlling admission of pressure fluid to, and release from, said cylinders; a delayed action cylinder and piston connected in the fluid pressure circuit supplying said pressure fluid cylinders operating the pressure applying members and controlled by the valve controlling admission of fluid to said cylinders; a valve in the connection between the pressure circuit and said delayed action cylinder effective to reduce the flow of pressure fluid thereinto; an electrically operated valve effective to admit pressure fluid to the cylinder and piston means operating the nailing devices, and when not operated, enabling the nailing devices to return to initial position; and a switch in the circuit of the electrically operated valve closed by the piston of the delayed action cylinder, after an interval sufficient to enable completion of movement of the pressure applying devices, to cause actuation of said electrically operated valve; and an operator actuated valve effective when actuated to start an operative cycle of the machine and when released, enabling the pressure applying and nailing devices to return to initial position.

18. A machine as set forth in claim 17 and in addition comprising: a panel; a first bar mounted on the panel for longitudinal sliding movement and connected to the piston of the delayed action

cylinder; a second bar mounted on the panel for longitudinal sliding movement and arranged alongside the first bar, an operative connection between said first and second bars, and means automatically operative after a predetermined length of travel of said bars, to release said driving connection; resilient means yieldably resisting movement of the second bar by the first bar, an electric switch closed by said second bar while moving under the influence of the first bar, the second bar being released from the first bar after operation of the switch, the driving connection between the bars being re-established by return of the piston of the delayed action cylinder to initial position at the termination of an operative cycle of the machine.

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