S. MADSEN.

SASH MAKING MACHINE.

APPLICATION FILED MAR. 2, 1914.

1,151,892.

Patented Aug. 31, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

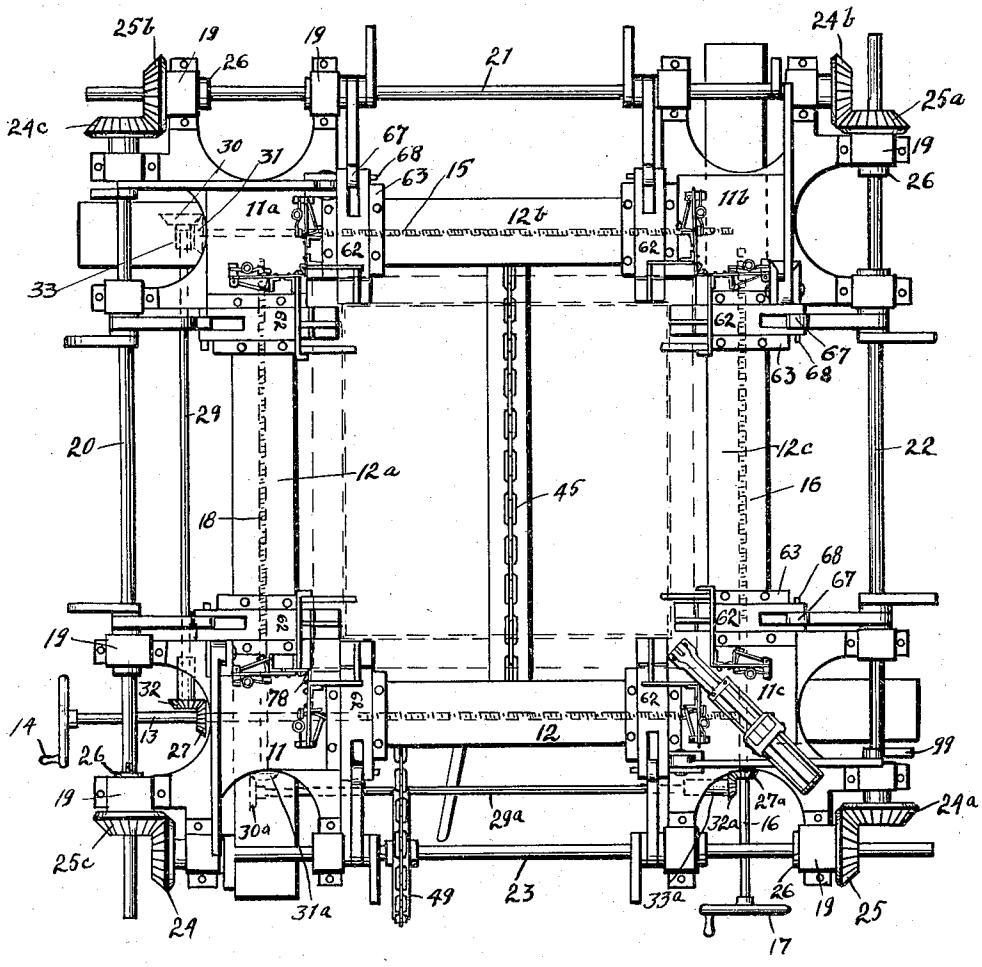
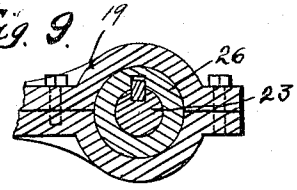


Fig. 2.



Witnesses.
G. F. Turechek
Will Freeman

Inventor.
Sem Madsen
By Orwig & Bair
Attys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

S. MADSEN.

SASH MAKING MACHINE.

APPLICATION FILED MAR. 2, 1914.

1,151,892.

Patented Aug. 31, 1915.

3 SHEETS—SHEET 2.

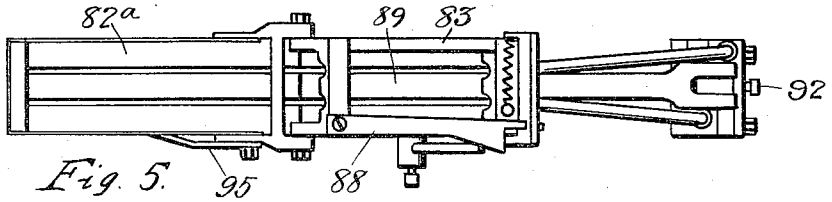


Fig. 5.

Fig. 3.

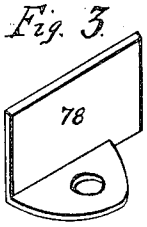


Fig 4

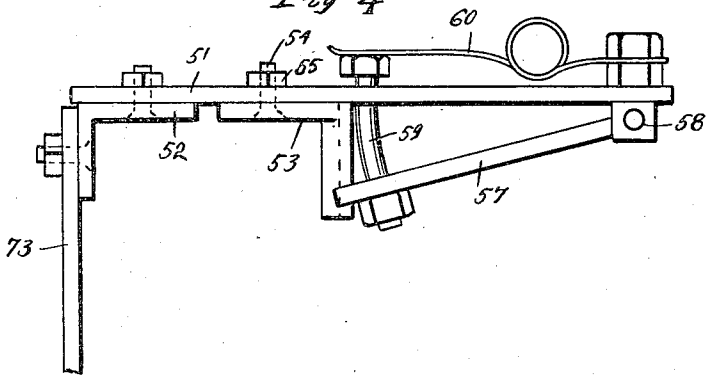
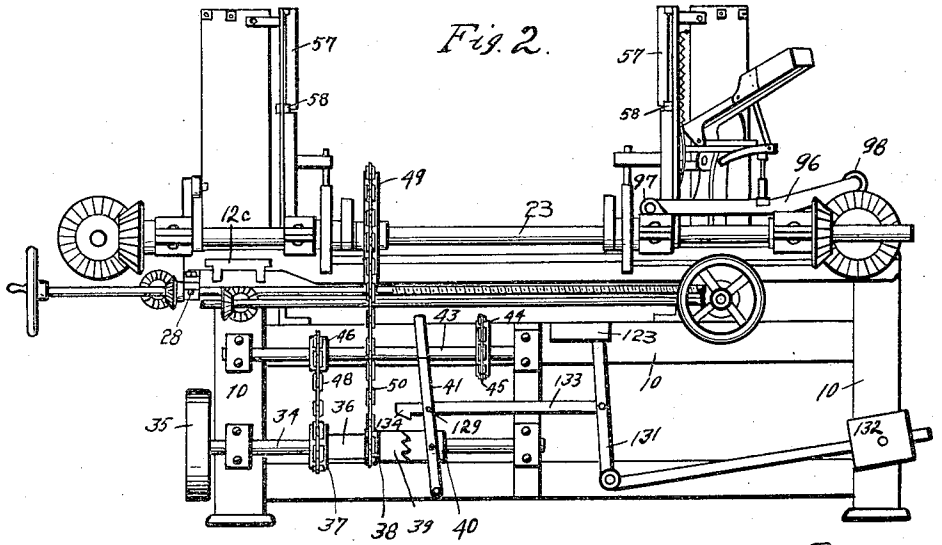


Fig. 2.



Witnesses.
G. F. Turechek
Will Freeman

Inventor.
Sern Madsen
By Owen & Bair
attys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

S. MADSEN.

SASH MAKING MACHINE.

APPLICATION FILED MAR. 2, 1914.

1,151,892.

Patented Aug. 31, 1915.

3 SHEETS—SHEET 3.

Fig 6.

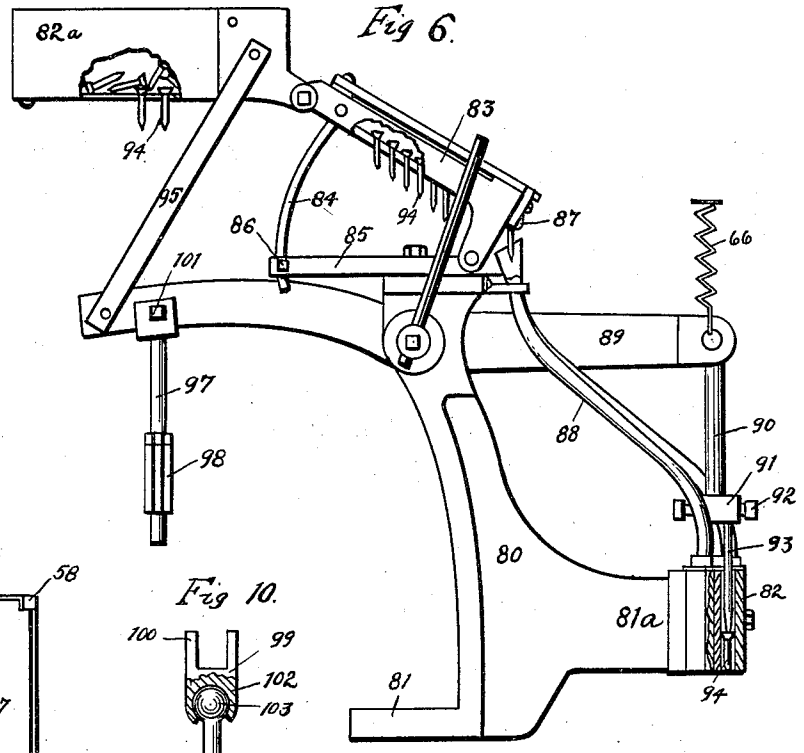


Fig 7.

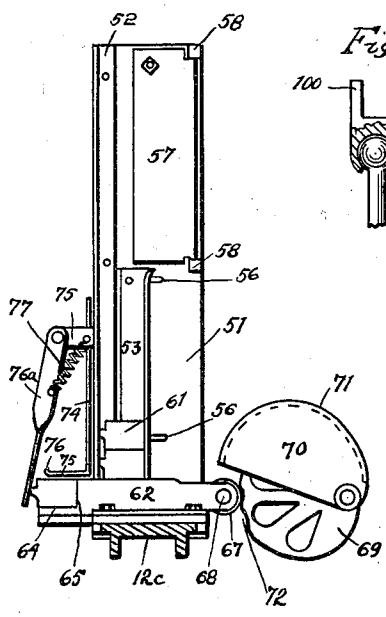
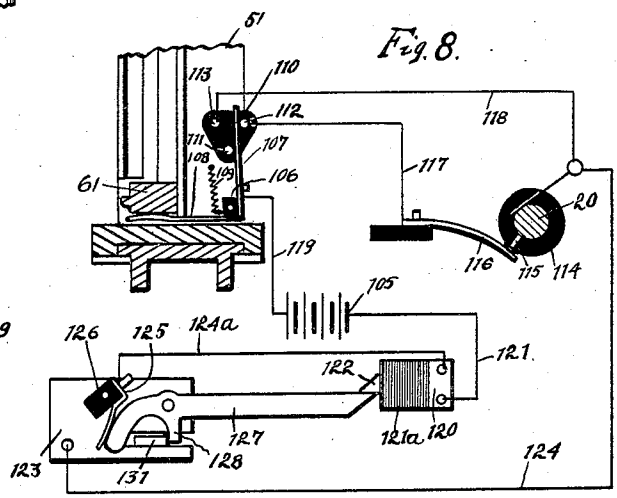


Fig 10.

Fig 8.



Witnesses.

G. F. Tuechek.

Will Freeman

Inventor

Sern Madsen

BY Orwig & Bair

Attys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SERN MADSEN, OF CLINTON, IOWA, ASSIGNOR TO CURTIS BROTHERS AND COMPANY, OF CLINTON, IOWA.

SASH-MAKING MACHINE.

1,151,892. Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed March 2, 1914. Serial No. 822,048.

To all who n it may concern:

Be it known that I, SERN MADSEN, a citizen of the United States, and resident of Clinton, in the county of Clinton and State of Iowa, have invented a certain new and useful Sash-Making Machine, of which the following is a specification.

The object of my invention is to provide a machine for the making of window sash and the like.

More particularly it is my object to provide such a machine having hoppers which may be filled with sash frame members, and so constructed and arranged as to take the frame members from the hoppers and move them together to form a rectangular sash, with the tenons of part of the members received in the mortises of the other members.

A further object is to provide such a machine having mechanism for nailing or pinning the sash members together.

A further object is to provide such a machine, having means for releasing the completed sash and carrying it away.

Still a further object is to provide such a machine which may be readily and easily adjusted for making window sash of different sizes.

My invention consists in certain details, in the construction, combination and arrangement of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a top or plan view of a sash making machine embodying my invention, the nailing machines, except at one corner, being removed so that the other parts of the machine may be seen. Fig. 2 shows a side elevation of my improved sash making machine, part of the nailing machines not being shown. Fig. 3 shows a perspective view of one of the guide plates adjacent to the ends of the hoppers at the bases thereof. Fig. 4 shows a top or plan view of one end of one hopper. Fig. 5 shows a similar view of one of the pinning machines. Fig. 6 shows a side elevation of one of the pinning or nailing machines. Fig. 7 shows a vertical, sectional view, showing the interior of one end of one hopper. Fig. 8 shows a sectional, detail view, partly diagrammatic, of the electric safety stop mechanism. Fig. 9 shows a sectional view through one of the shafts, showing the manner in which the hub of one of the beveled gears is mounted thereon, and Fig. 10 shows a sectional, detail view showing the manner in which the push rod is connected with the pinning beam.

My improved sash making machine comprises a supporting frame, indicated generally by the reference character 10. On the frame 10 is mounted a rectangular adjustable frame having four members, each comprising a head or block, said heads being indicated by the reference characters 11, 11^a, 11^b and 11^c. The respective heads are provided with extensions 12, 12^a, 12^b and 12^c. The extension or tail piece 12 is slidably mounted in ways in the head 11^c. The tail piece 12^a is similarly mounted in the head 11. The tail piece 12^b is similarly mounted in the head 11^a. The tail piece 12^c is similarly mounted in the head 11^b. One of the heads, for instance the head 11, is fixed upon the frame 10. It will thus be seen that the head 11 and tail piece 12 are fixed while the other portions of the adjustable frame may be adjusted to adapt the machine for making different sized sash. For regulating the size of said adjustable frame the following means have been provided: Rotatably but non-slidably mounted in the head 11 is a shaft 13 which extends longitudinally beneath the tail piece 12 and is provided with a screw-threaded end mounted in the head 11^c. The shaft 13 projects away from the head 11 and is provided with a hand wheel 14. Rotatably but non-slidably mounted in the head 11^a is a similar shaft 15, indicated by dotted lines, extending below the tail piece 12^b and having the screw-threaded end mounted in the head 11^b. A shaft 16 is rotatably but non-slidably mounted in the head 11^c and extended below the tail piece 12^c and provided with a screw-threaded end mounted in the head 11^b. The shaft 16 is provided with a hand wheel 17, similar to the one already described. Rotatably but non-slidably mounted in the head 11 is a shaft 18 indicated by dotted lines, which extends below the tail piece 12^a and is provided with a screw-threaded end mounted in the head 11^a.

Each of the heads heretofore described is provided with a plurality of bearings 19. The bearings 19 are so located and arranged as to support a plurality of shafts 20, 21, 22 and 23. The shafts 20 and 22 are parallel with each other and the shafts 21 and 23 are

parallel with each other, the four shafts just mentioned forming a rectangular frame outside the adjustable frame. Mounted on one end of the shaft 23 is a beveled gear 24. Mounted on the other end of said shaft is a beveled gear 25, having the hub 26 slidably but non-rotatably mounted on the shaft 23 and rotatably but non-slidably mounted in one of the bearings 19. On the shaft 22 is a beveled gear 24^a in mesh with a beveled gear 25. On the opposite end of the shaft 22 is a beveled gear 25^a slidably but non-rotatably mounted on the shaft 22 and having the hub 26 rotatably but non-slidably mounted in one of the bearings 19 of the head 11^b. On the shaft 21 is a beveled gear 24^b in mesh with the beveled gear 25^a. On the opposite end of the shaft 21 is a beveled gear 25^b, having a hub 26 slidably but non-rotatably mounted on the shaft 21 and rotatably but non-slidably mounted in a bearing 19 formed on the head 11^a. The gear 25^b is in mesh with the beveled gear 24^c on the shaft 20. On the shaft 20 is mounted a beveled gear 25^c in mesh with the beveled gear 24 and having the hub 26 slidably but non-rotatably mounted on the shaft 20 and rotatably but non-slidably mounted in the bearing 19 formed on the head 11. On the shaft 13, near the head 11, is a beveled gear 27. Formed on the bearings 19 of the heads 11 and 11^a are bearings 28 of suitable construction, for instance, as shown in Fig. 2, in line with each other. In the bearings 28 is mounted a shaft 29 at right angles to the shafts 13 and 15. On the shaft 29, adjacent to the head 11^a, is a beveled gear 30 in mesh with the beveled gear 31 on the shaft 15, said beveled gears being shown in dotted lines. Formed on the gear 30 is a hub 33 which is slidably but non-rotatably mounted on the shaft 29 and is rotatably but non-slidably mounted in one of the bearings 28. Fixed on the opposite end of the shaft 29 is a beveled gear 32. The shafts 16 and 18 are operatively connected by a shaft and beveled gears, arranged similarly to those just described and indicated by the same numerals as those just described with the addition of the character "*a*." It will therefore be seen that by turning the hand wheel 14, the heads 11^c and 11^b may be drawn toward or moved away from the heads 11^a and 11, and by turning the hand wheel 17 the heads 11^a and 11^b may be moved toward or away from the heads 11 and 11^c for regulating the size of the adjustable frame. It will also be seen from the foregoing description that if one of the shafts 20, 21, 22 and 23 is operated, the others will be operated in unison therewith and that on account of the manner in which the beveled gears are mounted on the shafts the shafts are operatively connected in all positions of the adjustment of the adjustable frame.

It will be understood that the beveled gears may be mounted in any suitable way, such for instance, as in Fig. 9, in which the hub 33 is shown mounted within the two part bearing 28 and upon the shaft 20 and slidably but non-rotatably connected with said shaft by means of a spline 42. Fig. 9 simply illustrates the manner in which the beveled gears 30, 30^a, 25, 25^a, 25^b and 25^c are mounted with relation to the respective heads.

Mounted on the frame 10 is a shaft 34, on which is a suitable means for transmitting power to the shaft, such as a belt pulley 35. Rotatably but non-slidably mounted on the shaft 34 is a sleeve 36 on which are sprocket gears 37 and 38. Formed on the sleeve 36 is a clutch member 39. Slidably but non-rotatably mounted on the shaft 34 is a coacting clutch member 40 which may be controlled by a lever 41.

Mounted on the frame 10 at opposite sides of the machine are shafts 43, only one of which is shown. On the shafts 43, in line with each other beneath the middle of the machine, are sprocket gears 44, only one being shown, on which sprocket gears travels a conveyer chain 45, the function of which will be hereinafter described. On the shaft 43 is a sprocket gear 46 in line with the sprocket 37. Power is transmitted from the shaft 34 to the shaft 43 by means of a sprocket chain 48 traveling on the sprockets 37 and 46. On the shaft 23 is a sprocket 49 in line with the sprocket 38 on the sleeve 36. A sprocket chain 50 travels on the sprockets 38 and 49 and power is thereby transmitted to the shafts 20, 21, 22 and 23.

Mounted upon the adjustable frame are four hoppers, each comprising two parts or ends. The ends of the hopper on each side of the adjustable frame are arranged opposite each other and are designed to receive the ends of the sash rails or stiles as the case may be. The two ends of each hopper are of similar construction, hence only one end of one hopper will be fully described.

Each hopper end comprises an upright member 51 supported on one of the heads and having at its inner edge an angle iron 52, or having a flange extending toward the opposite end of the same hopper, as clearly shown in Fig. 7. On the inner surface of the hopper end 51 are mounted angle irons 53 arranged substantially on a vertical median line of the member 51 and extending from the lower end of said member approximately half way to the top thereof. The angle irons 53 have one flange which extends toward the opposite end of the same hopper, as clearly shown in Fig. 4. The angle irons 53 are adjustable horizontally to vary the distance between the flanges of the angle irons 53 and 52 to adapt the hopper for different sizes of sash members. Such adjustability is se-

cured by means of bolts 54 having their heads counter sunk in the angle irons 53, as shown by the dotted lines in Fig. 4 and extending through the member 51 in which are formed horizontal slots 56 in which the bolts 54 travel. The bolts 54 and the angle iron 53 are clamped in position by means of nuts 55. Secured to the inner surfaces of the members 51, near their outer edges and above the level of the angle irons 53, are spring controlled gates 57, which are pivoted at one edge to the member 51 at 58 and are designed to swing from position resting adjacent to the member 51 toward the opposite end of the hopper. The swinging movement of the gates 57 is limited by means of a bolt 59 extended through the upper portion of the gate 57 and through the hopper end 51, as shown in Fig. 4. The bolt 59 is slidably mounted in the hopper member 51 and is preferably curved on the arc of a circle having its center at the pivotal point of the gates. A spring 60 is provided on the outside of the hopper member 51 for the purpose of holding the bolt 59 at the inward limit of its movement and thereby yieldingly holding the gate 57 at its position swung farthest away from the member 51, as shown in said Fig. 4.

The purpose of the construction of the hoppers hereinbefore described is as follows: The distance between the flanges of the members 52 and 53 may be varied to receive sash members of different lengths. The sash members are fed in horizontally past the gates 57. When they pass the swinging edges of the gates 57 the gates 57 swing inwardly and prevent the return of the stock. The stock then drops between the flanges of the members 52 and 53, at each end of the hopper which form guides to receive the stock comprised of the sash members 61, as shown in Fig. 7.

The stock in the hoppers is moved out to position for forming a completed sash by the following means: Two slides 62 are mounted in each head so that one slide in each head slides in a horizontal path parallel with the path of a slide in the next successive head. The upper surface of each slide 62 is preferably above the level of the upper surface of the head in which the slide is mounted. In the upper surface of each slide 62 at its inner end is a transverse slot 64, the bottom of which is slightly above the level of the surface of the head in which the slide is mounted. Such slide is so mounted that when it is at its rearward movement, its forward edge is withdrawn from the space below the stock 61 and when the slide 62 is pushed inwardly the shoulder 65 of the slot 63 engages one stile or rail and pushes it forward, resting upon the shelf formed below the slot 64. The angle iron 52 is cut away at its lower end to permit the stock to pass out. In the outer end of each slide 62 is mounted a roller 67 on a short shaft 68 which projects laterally on one side from the slide 62, as clearly shown in Fig. 1. For operating the slides 62 after taking the stock from the hoppers, and moving it to proper position for forming a sash, each of the shafts 21, 22, 23 and 24 is provided with a double cam, one member 69 of which is designed to engage the roller 67 and to move the slide 62 inwardly and the other of which is provided at its edge with a laterally extending flange 71, shown by the dotted line in Fig. 7. The cam member 70 is so located on the shaft and so shaped that just after the finish of the stroke of the cam member 69, the flange 71 engages the extended portion of the adjacent short shaft 68, provided with a roller, and draws the slide 62 outwardly. The cams are so constructed and proportioned as to accomplish the practical operation hereinafter more fully described.

In the practical operation of the machine as far as described heretofore, the heads and the extensions thereof forming the adjustable frame are moved by means of the hand wheels 14 and 17 to make the adjustable frame of the proper size for the construction of the sash desired. The stock comprising the stiles and rails is fed into the hoppers by being slid horizontally past the swinging gates 57 and is then dropped into the chutes or guides between the flanges of the angle irons 53 and 52 at each end of each hopper. Power is applied to the machine from any suitable source through the belt pulley 35. The cams on the shafts 20, 21, 22 and 23 are so arranged with relation to each other that the cams on two opposite shafts, for instance on the shafts 21 and 23, engage the lower rails of the stock in the hoppers above the heads at the upper and lower parts respectively of Fig. 1, and slide them inwardly, as shown in Fig. 7. The slides 62, at the right and left sides of the machine, as shown in Fig. 1, are then moved inwardly and they engage the lower stiles of the stock in the hoppers above said extensions and move them inwardly until the tenons of the rails are received in the mortises of the stiles. The cam members 69 are so shaped, as shown with exaggeration at 72, as to give a final inward movement to the slides 62 at the finish of the operation of said cams for tightening the check rail joints and holding the rails and stiles of the sash firmly together. The cams are also so arranged as to allow the slide 62 to remain stationary for an instant at the end of the movement of the cam members 69 to allow for the operation of the nailing or pinning machines.

Extending from each of the hopper ends toward the opposite end of the same hopper and preferably secured to the flange of the

angle iron 52 is a supporting bar 73. Extending downwardly from the support 73 is a flat spring 74, which at its lower end extends inwardly in the machine at 75 in a horizontal plane and at its inner end is slightly bent upwardly at 76. The portion 75 is designed to engage the upper surface of the rail or stile which is being moved inwardly by the slides 62 and yieldingly held against the bottom of the slot or notch 64, as shown in Fig. 7. Extending inwardly from the support 73 is a bracket arm 75[a] to which is pivoted a downwardly extending arm 76[a]. I provide a coil spring 77 for normally drawing the arm 76[a] toward the slide 62 so that when the stock is carried inwardly by the slide it is engaged by the arm 76[a] and held against the shoulder 65, as shown in Fig. 7.

It will be understood that there are two or more of the springs 74 and the spring controlled arms 76[a] for each hopper. Adjacent to the lower inner edge of each hopper member 51 is a short guide plate 78, the face of which is substantially in the same vertical plane as the inner faces of those flanges of the angle irons 52 and 53 which are secured to the hopper members 51. The guide plates 78 prevent the stock from moving endwise after it leaves the hopper.

I shall now describe the construction and operation of the pinning or nailing machines, whereby the stiles and rails are fastened together to make a sash when at their position at the inner limit of movement of the slides.

A support 80 has at its lower end a flange 81 which is suitably clamped or fastened to the flat upper surface of one of the heads of the main adjustable frame in any suitable position. The frame 80 is provided with an arm 81[a] which extends inwardly through the narrow space between the corners of the adjacent hoppers, as shown in Fig. 1. Mounted in the inner end of the arm 81 are the pinning chucks 82, preferably two in number. Above the upper end of the frame 80 is a nail sorter 82[a] which is of ordinary construction and forms no part of my present invention. Adjacent to the open end of the sorter 82[a] and pivoted thereto is the magazine 83, also of ordinary construction. The lower end of the magazine 83 is pivoted to the frame 80 and its rear upper end is adjustably supported on said frame by means of the arm 84, slidably extended through an opening in the supporting frame member 85 and held in any desired position by means of a bolt 86. At the lower end of the magazine 87 is a feeder of ordinary construction which delivers the nails to tubes 88 by which they are carried to the chucks 82.

For operating the pinning machine as a part of my sash making machine I have provided the following means: Centrally pivoted on the frame 80 is a pinning beam 89, the forward end of which is pivoted to a downwardly extending arm or rod 90, on the lower end of which is mounted a bar 91. The bar 91 carries punches 93, held by thumb screws 92, for driving the pins or nails 94 into the stiles and rails in completing the sash. A spring 66, secured to the arm 89 and to the hopper frame, normally holds the forward end of the arm 89 at the upper limit of its movement. The rearwardly extending portion of the pinning beam 89 is connected with the sorter 82[a] by means of a link 95 which is pivoted at one end to the sorter and at the other end to the beam 89. It will therefore be seen that when the beam 89 is given an oscillating motion a similar motion is transmitted to the sorter 82[a]. The pinning cam arm 96 is pivoted at one end to a bracket 97 on one of the heads and is provided at the other end with a roller 98 which is operated by a cam 99 on one of the shafts 20, 21, 22 and 23. The outwardly extending portion of the pinning beam 89 is connected with the pinning cam arm 96 by means of a push rod 97 made in two parts connected by a nut 98, whereby the two members may be adjusted. Each end of the push rod 97 may be mounted on a beam 89 and on the arm 96 by means of a bearing 99 having bifurcated arms 100 between which the beam or arm is engaged. The bifurcated arms 100 are held in position by means of the screw 101. The bearing 99 and the push rod 97 may be provided respectively with the socket 102 and ball 103, forming a universal joint. The beam 89 and the arm 96 are so shaped that when they are at the upward limit of their movement the portions upon which the bearings 99 are secured are in parallel horizontal positions and the punches 93 are then at their lower position of movement at the completion of their nail driving stroke.

It will readily be seen that the push rod, upon releasing the screws 101, may be moved along the beam 89 so that the nailing machine may be operated from the cam 99 regardless of its position on the main frame. It will be understood that there are four of the pinning machines of similar construction.

I will now describe the practical operation of the pinning or nailing machines in connection with the operation of the rail and stile positioning mechanism.

As hereinbefore described, the lower rails and stiles in the hoppers are moved inwardly to form a completed sash, with the proper tenons received in the proper mortises. The cams 69 and 70 are so shaped that when the slides have been moved to their inward position, they are held stationary for an instant, although the move-

ment of the cams continues and during that moment the pinning or cam arm 96 is raised, thereby driving the punches 93 downwardly and driving the nails 94 into the sash at the corners. The depth of the set of the nails may be regulated by means of the hollow screw-threaded socket 98 formed on one part of the push rod, into which is screwed the other part.

I have provided an automatic device for stopping the machine under certain conditions, which will now be described.

The device makes use of a battery or other suitable source of electrical energy 105. Suitably fulcrumed on one of the end members 51 of each hopper is a block of insulation 106. Secured to said block is an upwardly extending arm 107 of suitable material for conducting electricity. The block 106 is located on the lower inner surface of the member 51 near the rear edge thereof. Secured to the lower part of the block 106 and extending forwardly just above the head which forms the bottom of the hopper is a spring arm 108 which is normally held upwardly by means of the spring 109 secured to said arm and to the hopper end 51. Mounted on each hopper member 51, adjacent to the free end of the arm 107, is a block of insulation 110. The block 110 is mounted on the member 51 by means of the screw 111 which may be loosened for moving the block 110 on the screw 111 as a fulcrum and varying the position of said block. On the block 110 are two contact points 112 and 113, spaced from each other, as clearly shown in Fig. 8. The spring arm 108, the arm 107 and the contact points just described are so located and arranged that the spring arm extends outwardly below the ends of the foremost piece of stock. All of the automatic stopping devices connect through a timer having a wheel 114 mounted on one of the main shafts, for instance 23. The wheel 114 is of insulating material and through it extends a contact rod or pin 115, designed in certain positions of the rotation of the wheel 114 to engage the timer arm 116. The timer arm 116 is electrically connected with a contact point 112 by means of the wire 117.

It will be understood that the pin 115 is in electrical engagement with the shaft 20. The shaft 20 is in electrical engagement with the contact point 113 by means of the wire 118. The battery 105 is connected with the arm 107 by a wire 119 and with one terminal of a magnet 120 by means of the wire 121. Slidably mounted in the frame 121ª, which supports the magnet 120 is a latch device 122. Suitably mounted on the frame of the machine and insulated therefrom is a block of current conducting material 123. The wire 118 is connected with the block 123 by means of the wire 124. The other terminal of the magent 120 is electrically connected by the wire 124ª with a spring 125, pivotally mounted on the insulation block 126 on the block 123. Mounted on the block 123, by means of current conducting metal, is a current conducting metal arm or lever 127, which is normally in engagement with the spring 125 at one end and is held against pivotal movement at the other end by means of the latch device 122. On the arm or lever 127 is a trigger member 128 and extending laterally from the lever 41, by which the clutch member 40 is controlled is a pin 129. Centrally fulcrumed on the frame of the machine is a bell crank lever 131, one arm of which extends upwardly and rests against the trigger member 128. On the other arm of the bell crank 131 is a weight 132 which normally tends to press the first arm of the bell crank against the trigger 128 and to draw the arm 127 away from the spring 125. Pivoted to the upwardly extending arm of the bell crank 131 is an arm 133 extending above the pin 129 and having formed on its free end a catch member 134.

In the practical operation of the automatic stop device just described the insulation block 110 may be adjusted by means of the screw 111 to the proper position for adapting the stop device for use with the size of stock which is to be handled. The spring arm 108 is so shaped and is of such strength and so located that when the hopper is full the arm 107 extends between the contact points 112 and 113 so that no circuit is established through the magnet 120. Should the stock in the hopper run out the spring 109 will move the arm 107 to contact with the point 112. A circuit will then be established from the battery through the wire 119, the arm 107, the wire 117, the timer, a portion of the wire 118, the wire 124, the block 123, the spring 125, the wire 124ª, the magnet 120 and the wire 121. When the magnet is energized the latch member 122 is drawn away from the lever 127 and the weight on the bell crank 131 will cause the upwardly extending arm of said bell crank to move in such a manner as to cause the catch device 134 to engage the pin 129 and to draw the clutch member 40 away from engagement with the clutch member 39, thereby stopping the machine. The timer, however, is so arranged that even if the stock should run out the circuit will not be established and the machine stopped until the nailing operation is completed and the completed sash deposited on the carrier chain.

It will be seen that if the stock fails to drop properly the machine will be stopped just the same as if the hoppers were empty. The stiles and check rails are notched out on one side where touched by the arm 108 and advantage may be taken of this to insure

that the stock is right side up. For instance, if it is desirable to work with the notched side of the stock up and a piece of stock is turned over so that the notched side is down, the arm 108 will not be depressed and the arm 107 will be permitted to engage the contact point 112 resulting in the stopping of the machine when the timer closes the circuit. In case it is necessary to feed the stock with the notched side down, the block 110 is properly adjusted so that the arm 108 is normally engaged by the notch and held in such position that the arm 107 is between the two contact points 110 and 113. Should one piece of the stock be fed in wrong side up, then the full side of the piece 61 will depress the arm 108 and move the arm 107 to contact with the contact point 113, thereby establishing a circuit through the wire 118 and the other members the same as hereinbefore described, the result being that the machine is stopped when the latch releases the lever arm 127.

It will be understood that the full wiring system has been described but that a number of the wires may be dispensed with and the current grounded through the metal parts of the machine.

From the foregoing description it will be seen that my improved machine feeds the stock toward the center for completing the sash, nails the sash at the corners and discharges the sash automatically.

Many changes may be made in the details of the construction of my sash making machine without departing from its essential features and it is my intention to cover by this application any such changes which may be included within the scope of the following claims:

I claim as my invention:

1. An assembling machine comprising four relatively adjustable members, each of which carries two hopper end parts, cooperating respectively, each such end part with an end part on another member to complete a hopper, whereby adjustment of such members not only adjusts the hoppers collectively with respect to the size of the assembled article but also adjusts each hopper to the size of the blank appropriate to such size of the assembled article.

2. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, each hopper including upright end members mounted on different members of the adjustable frame, the end members having upright adjacent ribs near their inner edges and upright adjacent ribs spaced from the first ribs and movably mounted on the end members to form guides for stock.

3. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, each hopper including upright end members mounted on different members of the adjustable frame, the end members having upright adjacent ribs near their inner edges and upright adjacent ribs spaced from the first ribs and movably mounted on the end members to form guides for stock, the adjustable ribs extending from the bottoms of the end members to points spaced from the tops thereof, swinging gates mounted on said end members above the adjustable ribs, and means for yieldingly holding the free ends of the gates away from the end members.

4. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, each hopper including upright end members mounted on different members of the adjustable frame, the end members having upright adjacent ribs near their inner edges and upright adjacent ribs spaced from the first ribs and movably mounted on the end members to form guides for stock, the lower ends of the fixed ribs being cut away to permit the discharge of one piece of stock at a time, and means for moving the lower piece of stock in each hopper inwardly to position where the tenons of two pieces of stock enter the mortises of two other pieces.

5. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, each hopper including upright end members mounted on different members of the adjustable frame, the end members having upright adjacent ribs near their inner edges and upright adjacent ribs spaced from the first ribs and movably mounted on the end members to form guides for stock, the lower ends of the fixed ribs being cut away to permit the discharge of one piece of stock at a time, means for moving the lower piece of stock in each hopper inwardly to position where the tenons of two pieces of stock enter the mortises of two other pieces, and yielding means for holding each piece of stock in position on the means which moves it inward.

6. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, each hopper including upright end members mounted on different members of the adjustable frame, the end members having upright adjacent ribs near their inner edges and up-

right adjacent ribs spaced from the first ribs and movably mounted on the end members to form guides for stock, the lower ends of the fixed ribs being cut away to permit the discharge of one piece of stock at a time, means for moving the lower piece of stock in each hopper inwardly to position where the tenons of two pieces of stock enter the mortises of two other pieces, and means for returning said last named means to its outward position of movement.

7. In a sash making machine, a four part adjustable frame, means for adjusting said parts for varying the size of said frame, a hopper mounted on each side of said adjustable frame for holding stock, and means for moving the lower pieces of stock inwardly to position where the tenons of two pieces of stock enter the mortises of two other pieces to form a sash, and means for nailing the sash members together at the corners.

8. In a device of the class described, a frame, a four part adjustable frame mounted thereon, means mounted upon said adjustable frame for receiving and holding stock, means for feeding stock from said last means inwardly and forming a sash, said means comprising four shafts mounted parallel with the members of said adjustable frame, slides mounted in the members of said adjustable frame and designed to receive the lower pieces of stock in the hoppers and move said pieces inwardly to form a sash, means actuated from said shafts for operating said slides, and means for nailing the sash members together at the corners, said means comprising a frame capable of being adjustably secured to the members of said adjustable frame at the corners of said frame, and extending inwardly between said stock receiving means at each corner of the adjustable frame, pinning chucks on each frame, means for feeding nails to said chucks, a pinning beam on each frame, punches operated by said pinning beams, cams on said shafts, pinning cam arms pivoted at one end to the members of said adjustable frame, and designed to be operated at their other ends by the respective pinning cams on said shafts, and push rods connecting said pinning cam arms and said pinning beams and adjustably mounted thereon, the pinning beam and pinning cam arm of each nailing machine being arranged to extend in parallel horizontal position at the down stroke of the punch.

9. In a device of the class described, a frame, a four part adjustable frame mounted thereon, means mounted upon said adjustable frame for receiving and holding stock, means for feeding stock from said last means inwardly and forming a sash, said means comprising four shafts mounted parallel with the members of said adjustable frame, slides mounted in the members of said adjustable frame and designed to receive the lower pieces of stock in the hoppers and move said pieces inwardly to form a sash, means actuated by said shafts for operating said slides, and means for nailing the sash members together at the corners, said means comprising a frame capable of being adjustably secured to the members of said adjustable frame at the corners of said frame, and extending inwardly between said stock receiving means at each corner of the adjustable frame pinning, chucks on each frame, means for feeding nails to said chucks, a pinning beam on each frame, punches operated by said pinning beams, cams on said shafts, pinning cam arms pivoted at one end to the members of said adjustable frame, and designed to be operated at their other ends by the respective pinning cams on said shafts, a two part push rod, means for adjustably connecting the members of said push rod together, and means for adjustably connecting the respective parts of said push rod with the pinning cam arm and pinning beam respectively of the nailing machine.

10. In a device of the class described, a frame, a four part adjustable frame mounted thereon, means mounted upon said adjustable frame for receiving and holding stock, means for feeding stock from said last means inwardly and forming a sash, said means comprising four shafts mounted parallel with the members of said adjustable frame, slides mounted in the members of said adjustable frame and designed to receive the lower pieces of stock in the hoppers and move said pieces inwardly to form a sash, means actuated by said shafts for operating said slides, a shaft mounted on said first frame, clutch members on said last named shaft, one of the clutch members being operatively connected with one of said first shafts and the other being operatively connected with the last described shaft, means for throwing said shaft members out of operative connection, said means comprising means for normally tending to draw said clutch members apart, a latch device having two members so arranged that when said parts are in engagement said last named means is held in inoperative position, an electric circuit including a contact point, an arm, means for normally holding said arm in engagement with the contact point, part of said means being extended into the path of the lower piece of stock in the hoppers so that said stock holds said arm away from engagement with said point, said circuit also including means whereby when the circuit is established, the parts of said last device are disengaged, whereby said clutch disengaging means is permitted to be operated.

11. In a sash making machine, a hopper for receiving stock, means for moving the

lower piece of stock out of the hopper, means for operating said stock moving means, means for imparting power to said operating means, a clutch arranged between said last described means and said operating means, a movable arm arranged to extend beneath the stock in the hopper, an arm operatively connected therewith, a contact point adjacent to said last arm, an electric circuit including said last named arm, said contact point and a latch device operatively connected with one of the parts of said clutch and arranged to throw the clutch out when a circuit is established, means for yieldingly holding said first arm in position for holding said second arm in engagement with said contact point, said first arm being located beneath the stock in the hopper so that the stock holds the second arm away from the contact point.

Des Moines, Iowa, January 15, 1914.

SERN MADSEN.

Witnesses:
EDW. A. KIMBALL,
F. M. GRIMM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."